Appendix 6: EIAR Chapter 6 - Ornithology

6. ORNITHOLOGY

6.1 INTRODUCTION

SLR Environmental Consulting (Ireland) Ltd (SLR) was commissioned by FuturEnergy Ireland to prepare an Ornithological Impact Assessment for the proposed Wind Farm, the grid connection route (GCR) and the turbine delivery route (TDR) (collectively termed the "proposed project"; refer to Glossary of Terms provided in Chapter 1 of Volume II of this Environmental Impact Assessment ("EIA") Report ("EIAR") for an explanation of key terms and definitions).

This Chapter describes and evaluates the current avian interests of the proposed project site and Study Area (full described in Section 6.2.2.2). It assesses all likely significant effects of the proposed project on important bird species and, where necessary, describes proposed mitigation and compensation measures.

No noteworthy limitations were identified in terms of scale, scope or context in the preparation of this assessment. Details of any minor constraints and limitations have been discussed in Section 6.2.5.

This Chapter is supported by the following Appendices which are contained in Volume III of this EIA report:

- Appendix 6-1: Relevant Legislation and Policy;
- Appendix 6-2: Bird Survey Report Breeding 2020;
- Appendix 6-3: Bird Survey Report Winter 2020-21;
- Appendix 6-4: Bird Survey Report Breeding 2021;
- Appendix 6-5: Bird Survey Report Winter 2021-22;
- Appendix 6-6: Bird Survey Report Breeding 2022;
- Appendix 6-7: Bird Survey Report Breeding 2023;
- Appendix 6-8: Bird Survey Report Breeding 2024;
- Appendix 6-9: Bird Survey Report Breeding 2025;
- Appendix 6-10: Species Importance;
- Appendix 6-11: Species Legal and Conservation Status, and Population Trends;
- Appendix 6-12: Hen Harrier Foraging Habitat Loss Report;
- Appendix 6-13: Outline Biodiversity Management Plan;
- Appendix 6-14: Avian Collision Risk Report; and
- Appendix 6-15: Nature Conservation Site Synopses.

6.1.1 Brief Description of the Proposed Project Site

A full description of the proposed project site is given in Chapter 2 of Volume II of the EIAR and the site is shown in Figure 6-1 (Proposed Project Site Overview) and Figure 6-2 (Proposed Project Site Wind Farm Development). A summary of each component of the proposed project as it pertains to ornithology is given below.

6.1.1.1 Wind Farm

The proposed wind farm site comprises of a mixture of coniferous forestry, marginal agricultural land and peatland. The site is in an upland environment, bordering Dough Mountain to the east and Saddle Hill to the west. Land use is primarily commercial forestry and

agriculture. The conifer plantation comprises different stages of clear-feel, second rotation, immature, semi-mature and mature forestry. There are several watercourses within the site.

6.1.1.2 GCR

The GCR primarily utilises existing public roads, with some minor deviations into private lands at watercourse crossings. In such cases, the lands are generally used for pastoral agriculture.

6.1.1.3 TDR

The accommodations along the TDR will be adjacent to artificial, grassy verge, hedgerow and treeline habitats.

6.1.2 Brief Description of the Proposed Project

A full description of the proposed project is given in Chapter 2 – Description of Proposed Project. In summary, the proposed project will comprise 14 wind turbines with an overall blade tip height of 180 m to 185 m, a rotor diameter range of 149 m to 163 m, a hub height range of 101 m to 110.5 m, and all associated ancillary infrastructure including a 100 m tall meteorological mast, an on-site 110kV substation, borrow pits and construction compounds. An underground GCR to the existing 220/110 kV Srananagh Substation in the townland of Ballysumaghan, Co. Sligo is also proposed. The proposed project also comprises accommodations required along the public road network between Killybegs, Co. Donegal and the wind farm site to facilitate turbine and construction material delivery.

The entirety of the proposed project has been considered and addressed as part of this EIAR.

6.1.3 Purpose of this Chapter

The purpose of this Chapter is to:

- Describe the baseline data collection and assessment methods used;
- Summarise the baseline ornithological conditions;
- Identify and describe all likely significant effects on important ornithological features associated with the proposed project;
- Set out the design, mitigation and compensation measures required to ensure compliance with nature conservation legislation and to address any potentially significant ornithological effects;
- Identify how mitigation and compensation measures will be delivered;
- Provide an assessment of the significance of any residual effects in relation to the effects on important ornithological features;
- Identify appropriate enhancement measures and how these will be delivered; and
- Set out the requirements for post-construction monitoring.

6.1.4 Relevant Legislation and Policy

6.1.4.1 Legislation

The following legislation is relevant to this assessment:

- The EU Birds Directive (2009/147/EC; as amended);
- European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011), as amended (including S.I. No. 293 of 2021); and

- Wildlife Acts 1976-2021.

The relevant legislation is summarised in more detail at Appendix 6-1. Compliance with relevant planning policy is assessed in the Planning Statement, which accompanies this EIAR.

Figure 6-1: Proposed Project Site Overview

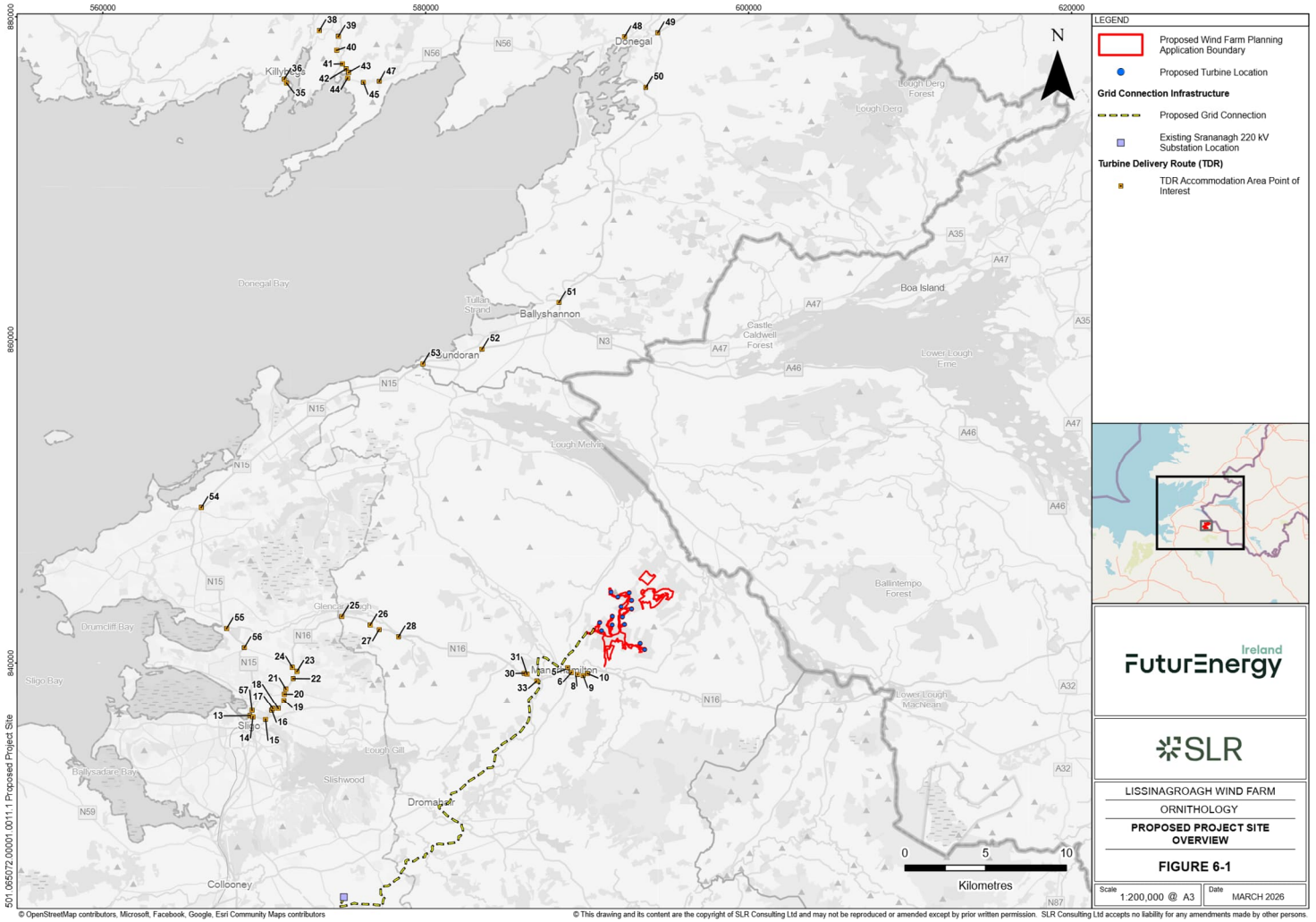
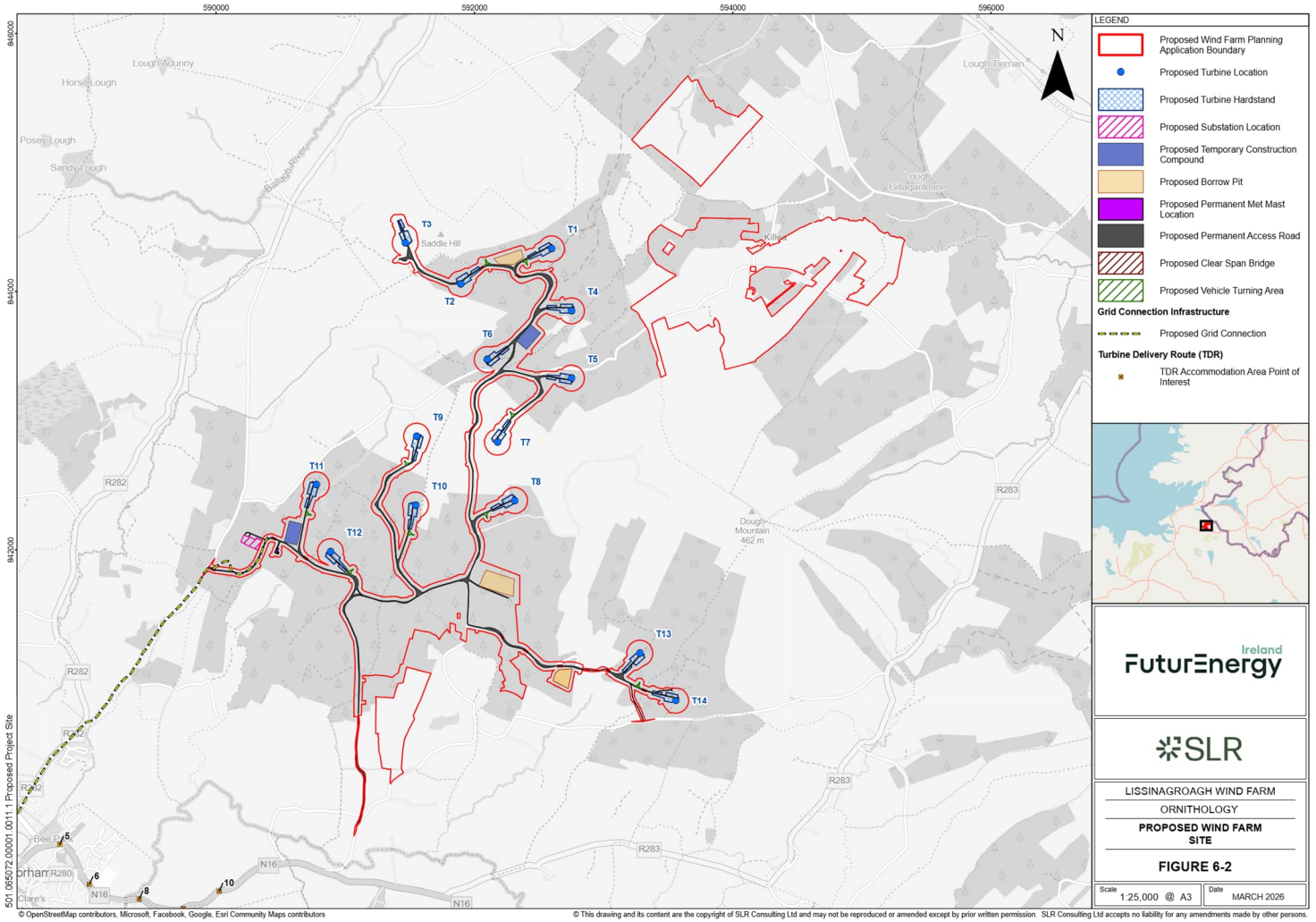


Figure 6-2: Proposed Wind Farm Site



6.2 METHODS

6.2.1 Turbine Range

As stated in EIAR Volume II Chapter 2, a range of turbine permutations between a minimum hub height of 101 m and maximum hub height of 110.5 m, a minimum tip height of 180 m and a maximum tip height of 185 m, a minimum rotor diameter of 149 m and maximum of 163 m, and a minimum ground clearance of 22 m and a maximum of 36 m, has been assessed in this EIAR. For ornithological features, each potential impact pathway was examined with reference to the entire proposed dimensional range. For collision risk, in accordance with NatureScot (2024), the option likely to present the greatest bird collision risk should be assessed. In this case, a turbine with a 103.5 m hub height and 163 m rotor diameter was used as this has the greatest rotor swept area, the largest rotor swept height, and the highest rotor swept height of any of the turbine options under consideration. The dimensions of all the other turbine models under consideration fall within the range of the rotor swept height of a turbine with a 103.5 m hub height and 163 m rotor diameter and would therefore result in a slightly lower collision risk estimate. For all other ornithological impact pathways (including disturbance, displacement, barrier effects, and habitat loss / functional loss), variations in turbine dimensions within the proposed range were determined to have a negligible influence on predicted effects, as these pathways ae driven principally by turbine presence and layout rather than minor dimensional differences.

6.2.2 Scope

The scope of the assessment is outlined below.

6.2.2.1 Ecological Features Considered

6.2.2.1.1 Avian Species

Ecological features considered in this assessment include avian species only. Likely significant effects on habitats and non-avian animal species are considered separately in Chapter 5 - Biodiversity and together with this Chapter provide an assessment of the likely significant effects of the proposed project on biodiversity. This approach of assessing effects on bird species separately is in recognition of the fact that avifauna are a key taxonomic group in the context of wind farm development.

6.2.2.1.1.1 Nomenclature

All bird species' common names in this Chapter follow those given in the AviList Checklist v2025 (Christidis et al., 2025).

6.2.2.1.2 Nature Conservation Sites

Likely significant effects on designated and non-designated nature conservation sites of ornithological importance have been considered in this Chapter, along with any supporting habitats for those bird species that may be located outside their boundaries including other wetland sites designated for non-avian interests.

An assessment of effects on Natura 2000 sites has also been provided within a separate Appropriate Assessment ("AA") screening report and Natura Impact Statement (NIS).

6.2.2.2 Study Area

6.2.2.2.1 Wind Farm Site

The desk study area was the 10 km hectad overlapping with the proposed wind farm site per professional judgment, with further details given in Section 6.2.3.2.

The survey areas used for the ornithological impact assessment differ according to receptor as recommended by relevant NatureScot ("NS") good practice survey guidance (NatureScot, 2025d). These are summarised in Section 6.2.3.2 and are described in more detail within the baseline survey reports (Appendices 6-2 to 6-9).

Regarding designated nature conservation sites, OPR (2021) guidelines suggest that the source-pathway-receptor framework is adopted on a case-by-case basis when assessing the potential for source-receptor connectivity between a project and European sites. A 20 km study area was used initially, in recognition that 20 km is the maximum distance special conservation interest ('SCI') bird species typically travel (NatureScot, 2016). This initial search area was then reappraised during the impact assessment process e.g. to account for downstream hydrological connectivity beyond this search area, reflecting the requirement to implement the source-pathway-receptor framework on a case-by-case basis. This resulted in consideration of one additional nature conservation site outside the 20 km buffer.

The approach described above for designated nature conservation sites was extended to non-designated nature conservation sites also.

6.2.2.2.2 GCR and TDR

No bird surveys were undertaken for the GCR or TDR accommodation areas (see Section 6.2.3.2 for justification) and so survey areas refer to the proposed wind farm site only. However, habitat, invasive species, bat and aquatic surveys were carried out for the GCR and at TDR accommodation areas and any notable bird species were recorded as incidentals if present (see Section 5.2.1.2 in EIAR Volume II Chapter 5).

The study area for the desk study is a precautionary 1 km distance around the GCR and TDR accommodation areas, reflecting that 1 km is the maximum disturbance distance reported by Goodship et al. (2022) for any relevant bird species. This buffer captures habitats likely to experience temporary disturbance from the proposed accommodations, while also allowing for screening of important bird species that may commute or forage in adjacent lands.

The same 1 km search radius was applied for designated nature conservation sites, reflecting the significantly lower potential for ecological impacts associated with these proposed project components. This initial search area was then reappraised during the impact assessment process e.g. to account for downstream hydrological connectivity beyond this search area. This approach was extended to non-designated nature conservation sites also, reflecting the requirement to implement the source-pathway-receptor framework on a case-by-case basis. This resulted in consideration of additional nature conservation sites outside the 1 km buffer due to downstream hydrological connectivity.

6.2.2.3 Consultation

A request for observations on the preparation of the EIAR was issued by TOBIN on 3 December 2024 with a full list of consultees provided in Chapter 1 (Introduction). A summary of key points relating to ornithology taken from the responses received is provided in Table 6-

1 along with details of how the comments have been addressed in this Chapter. Copies of the consultee responses are included in Appendix 1-2.

Table 6-1: Key Issues Raised by Consultees in Relation to Ornithology

Consultee	Date of Response	Summary of Key Issues	Response / Where Addressed in Chapter
Development Applications Unit ("DAU")	11 February 2025	Forestry plantations in the local area around the slopes of Dough Mountain and the adjacent Saddle Hill have been a reliable site for 1-2 pairs of nesting Hen Harrier over a number of years. The locations of nest sites have shifted between years, contingent on suitable habitat in pre-thicket rotations within the afforested areas and other rough grasslands in undisturbed areas. The potential for disturbance to nesting harriers during construction operations is therefore high, with the additional collision risks to adults participating in foraging and display flights during the operational lifespan of the windfarm.	Mitigation measures to prevent disturbance to nesting hen harrier during construction are outlined in Section 6.4.1. These include *inter alia* confirmatory surveys to identify active nests, seasonal restrictions on construction activities during the breeding season, and the establishment of disturbance-free buffer zones around any confirmed nests, as required. A comprehensive operational-phase strategy that aims to compensate for disturbance to nesting and foraging hen harrier is detailed in Section 6.4.9.1 and Appendix 6-13. This includes the creation of two dedicated nesting enhancement areas ("NEAs") and the targeted enhancement of nearby foraging lands to support breeding success and reduce interaction with turbines. Collision risk modelling results are presented in Section 6.4.3.2.1.2.2 and Appendix 6-14. To mitigate potential collision risk, the proposed NEAs and associated foraging habitats are located more than 750 m from the nearest turbine. These measures are designed to encourage breeding hen harrier away from turbine locations, thereby reducing the likelihood of collision during both foraging and display flights. Furthermore, hen harriers are known to exhibit displacement behaviour in response to operational turbines. Since displacement and collision are mutually exclusive outcomes, this behavioural response is expected to further reduce actual collision risk. Post-construction monitoring, as proposed in Section 6.4.11, will be linked to an adaptive management framework. The requirement for post-construction monitoring / surveys does

Consultee	Date of Response	Summary of Key Issues	Response / Where Addressed in Chapter
			not represent a lacuna in the survey assessment but is fully in line with industry best practice.
		The landscape around Dough Mountain also forms part of the wider migration routes for Whooper Swan moving between their breeding grounds in Iceland and wintering areas further south in Ireland. Both Whooper Swan and Hen Harrier are protected under Annex I of the EU Birds Directive 2009/147/EC.	An extensive suite of flight activity surveys was undertaken between the 2020/21 non-breeding season and the 2025 breeding season as described in Section 6.2.3.2.1. These surveys were undertaken following NatureScot (2025d) guidance[1] and included the spring and autumn migratory periods in full in 2020/21 and 2021/22 and in part (April-May and September) during surveys in 2023 to 2025. Surveys encompassed a full spread of daylight hours. Only data collected within the past five years were used for the impact assessment, in line with NatureScot (2025d) guidance. Older data (pre-2020/21 non-breeding season) were included only for contextual background and are summarised in Section 6.3.3.1.1. Although the 2020/21 non-breeding season data sit at the five-year threshold, they remain valid because site habitats and conditions (forestry, peatland, agricultural land) have not materially changed during this period. The potential impacts posed by the proposed project to migrating whooper swan have been assessed in Table 6-23. No significant effects on migrating whooper swan are predicted.
Leitrim County Council	27 January 2025	**Environmental and Ecological Considerations** The EIAR shall take account of all ecological sensitivities and of the likely environmental effects of the proposed project on	A comprehensive suite of bird surveys has been undertaken for the proposed project following NatureScot (2025d) best-practice[1]. This guidance states that a minimum of two years of bird surveys must be undertaken. As shown in Section

[1] The 2017 version of this guidance was used to inform most surveys apart from those conducted in 2025 where the updated guidance was used; however, there are no deviations from the methods used in the current 2025 guidance and so the surveys are also compliant with 2025 guidance. For brevity, we have referred to the 2025 guidance throughout.

Consultee	Date of Response	Summary of Key Issues	Response / Where Addressed in Chapter
		the receiving environment. All in combination and cumulative effects of the proposed project within the zone of influence of the proposal are to be considered together with the following: • Biodiversity with particular attention to species and habitats protected under the Habitats and Birds Directives. In terms of the receiving environment, the EIAR shall include all areas that would be impacted upon, directly or indirectly, by the proposed project. The information contained in the EIAR should therefore be based on comprehensive surveys of the area and have regard to updated data bases which may exist in terms of heritage and ecology.	6.2.3.2.1, this level of effort has been exceeded, giving confidence that the baseline reported in this Chapter is robust. Impacts have been assessed in this Chapter following current best practice CIEEM (2018), NatureScot (2025c) and (NatureScot, 2025a) guidance. A description of how effects have been characterised is given in Section 6.2.6. All potentially significant impacts on ornithology have been assessed in full, with particular attention to species protected under the EU Birds Directive. Cumulative impacts have been assessed for birds following NatureScot (2025a) best-practice guidance and are presented in Section 6.4.7 of this Chapter.
		Ornithology Field survey methodologies should be carried out using survey standards recommended by NatureScot (formerly Scottish Natural Heritage (SNH), 2017), which are widely regarded as representing best practice in Ireland and carried out during suitable times of the year. Two full years of bird survey data, as recommended by current NatureScot (2017) guidance, should be undertaken in forming any analysis/assessment of the potential impacts of the proposed project in this regard	A comprehensive suite of bird surveys has been undertaken for the proposed project following NatureScot (2025d) best-practice guidance[1]. This guidance states that a minimum of two years of bird surveys must be undertaken. As shown in Section 6.2.3.2.1, this level of effort has been exceeded, giving confidence that the baseline reported in this Chapter is robust.
		The scope and nature of the ecological and related surveys should be reviewed with the NPWS section of the Department of Housing, Local Government and Heritage and with the IFI. The work should comply with best practice for seasonality and scope, and the various environmental directives, legislation and guidance documents should be	MKO (the consultants who undertook the baseline bird surveys) consulted with NPWS regarding the scope of the bird surveys conducted for every year of surveys (see Appendices 6-2 to 6-9). An initial response was received from NPWS on 18 June 2018, which provided information on known raptor nests and red grouse records within the survey. All subsequent

Consultee	Date of Response	Summary of Key Issues	Response / Where Addressed in Chapter
		complied with. The comments of the Development Applications Unit on these issues should be sought	responses confirmed that no further information was available. No direct comments were provided regarding the scope of surveys. Survey work was carried out following NatureScot (2025d) best-practice guidance[1] and no limitations regarding seasonality and the scope of the surveys were identified in Appendices 6-2 to 6-9. Comments from the DAU were sought with a response provided by them on 11 February 2025 included in this table but they did not comment on the scope of the surveys. A meeting with NPWS was held on 18 March 2026 to discuss ornithological issues with comments and responses summarised below.
		The EIAR should address the potential for the enhancement of the biodiversity of the site arising from the development and the measures undertaken to maximise these impacts.	Regarding enhancement for ornithology, focus has been given to enhancing habitats for breeding and foraging hen harrier. A comprehensive outline biodiversity management plan ("OBMP") has been developed with details provided in Appendix 6-13.
		Ecology inputs should be provided in the form of an Ecological Impact Assessment (ECIA) which would contain ornithological, aquatic, habitat and bat surveys. Bat, Mammal and ornithological surveys should be undertaken for 2 years to Scottish Natural Heritage standards.	A comprehensive suite of bird surveys has been undertaken for the proposed project following NatureScot (2025d) best-practice guidance[1]. This guidance states that a minimum of two years of bird surveys must be undertaken. As shown in Section 6.2.3.2.1, this level of effort has been exceeded, giving confidence that the baseline reported in this Chapter is robust.
		Cumulative impacts with other developments, including but not limited to other wind farms, should be assessed for all sensitive receptors. Interactions with other environmental	Cumulative impacts have been assessed for birds following NatureScot (2025a) best-practice guidance and are presented in Section 6.4.7 of this Chapter.

Consultee	Date of Response	Summary of Key Issues	Response / Where Addressed in Chapter
		disciplines, especially hydrology and climate should also be assessed.	
Save Dough Mountain Group (Addendum to Leitrim County Council Comments)	27 January 2025	**Topographical Considerations and Avian Impacts** The region's topography, including Dough Mountain's elevation of 460m and surrounding terrains, is central to understanding the potential impacts of wind turbine placement. When combined with turbine blade tip heights (up to 535 m above sea level), the development poses significant risks to birds of prey and other avian species that traverse these altitudes. Request: Accurate topographical modelling must be conducted to assess impacts on local biodiversity, including bird flight paths and potential microclimatic changes caused by turbine operations.	Collision risk modelling ("CRM") has been undertaken following best-practice NatureScot guidance (Band, 2024). Bird flight paths, including their height above ground, have been mapped during flight activity surveys conducted between 2020 and 2025 following best-practice guidance (NatureScot, 2025d)[1] and are illustrated in Appendices 6-2 to 6-9. These flight paths have also formed part of the collision risk modelling process. The modelling is described in full in Appendix 6-14. The results of the CRM have been assessed, considering avian populations, in Section 6.4 of this Chapter.
		Biodiversity Surveys and Cumulative Impact Assessment The region supports species of conservation concern, including the Marsh Fritillary butterfly, Hen Harrier, and Buzzard. Existing ecological data appears incomplete, and cumulative impacts from other developments in the vicinity may not have been adequately considered. Request: Comprehensive biodiversity surveys must be conducted to establish a full baseline for protected species, and cumulative impact assessments must be performed to evaluate the broader ecological implications of the wind farm.	A comprehensive suite of bird surveys has been undertaken for the proposed project following NatureScot (2025d) best-practice guidance[1]. This guidance states that a minimum of two years of bird surveys must be undertaken. As shown in Section 6.2.3.2.1, this level of effort has been exceeded, giving confidence that the baseline reported in this Chapter is robust. Cumulative impacts have been assessed for birds following NatureScot (2025a) best-practice guidance and are presented in Section 6.4.7 of this Chapter.
		The council emphasises that, because the proposed wind farm site lies only three kilometres from the Northern Ireland border, ornithological assessments must incorporate	Northern Irish biodiversity data have been incorporated into ornithological assessments, particularly in relation to nature

Consultee	Date of Response	Summary of Key Issues	Response / Where Addressed in Chapter
Fermanagh and Omagh District Council (FODC)	27 January 2025	Northern Ireland biodiversity data sources, particularly the NBN Atlas and CEDaR datasets. These datasets are important because many bird species in the region move freely across the border or depend on hydrologically linked habitats that extend into County Fermanagh. The council notes that while the scoping report outlines a broad ecological survey programme, additional surveys such as bird surveys including wintering bird surveys, should also be considered.	conservation sites (Section 6.3.3.1.1). A CEDaR request was also made and received on 18 February 2026. Two seasons of non-breeding bird surveys have been undertaken as described in Section 6.2.3.2. The scope of surveys and survey areas reflect industry best-practice guidance (NatureScot, 2025d).
		The council highlights Northern Ireland's Areas of Special Scientific Interest (ASSIs) must be considered in the EIA and in particular, Lough Melvin ASSI given the hydrological connection between the proposed project and the ASSI.	ASSIs have been considered in Section 6.3.1. While Lough Melvin ASSI is hydrologically connected to the proposed project, it is not designated for birds and there is no mention of bird species or ornithological interest as part of its ASSI features. Lough Melvin ASSI's notified features relate to mesotrophic lake habitat, plant communities, and unique salmonid populations. The CEDaR request showed that most bird records for Lough Melvin are for passerines or hirundines, which are generally not considered susceptible to wind farms (see Section 6.3.3.1.1). The only other species recorded at Lough Melvin is osprey *Pandion haliaetus*, which has been considered in Table 6-11.
		In addition, the council supports the preparation of a Nature Impact Statement but stresses that consultees should be given the opportunity to review it. The NIS is expected to provide critical insight into ecological linkages between the site and Northern Ireland's designated bird conservation areas, and its transparency is considered necessary for a robust assessment of implications for protected bird species.	The NIS considers SPAs and Ramsar sites within Northern Ireland.
		Finally, the council states that the proposal is likely to trigger transboundary Environmental Impact Assessment requirements, in part because bird species, habitats, and	Transboundary effects have been considered in Section 6.4.8.

Consultee	Date of Response	Summary of Key Issues	Response / Where Addressed in Chapter
		designated conservation sites span the border. It therefore reserves its position on the planning merits until full survey results including the additional bird surveys it has recommended are available for review.	
An Coimisiún Pleanála (pre-application meeting 1)	20 October 2025	Ensure all NPWS submissions are fully addressed, including any requests for additional surveys. Consider engaging with the Northern Irish authorities, such as the relevant nature conservation body, if relevant. Support assessments with robust scientific evidence and apply the latest NatureScot collision risk model. The impact assessment should be targeted, specific, and proportionate to the proposed development. For example, minimise focus on passerines. Discuss whooper swan migration thoroughly, explaining why impacts are not expected.	All NPWS submissions (including as part of the TOBIN scoping request and those made by MKO during the baseline bird surveys) have been detailed and addressed in this table. Engagement with Northern Irish authorities has been undertaken (see consultation response from Fermanagh and Omagh District Council). Nature conservation sites in Northern Ireland have been considered (see Sections 6.3.1 and 6.3.2) and other projects in Northern Ireland have been considered as part of the cumulative assessment (see Section 6.4.7). Impact assessment has been undertaken using robust scientific evidence. The latest NatureScot collision risk model has been applied (see Appendix 6-14 and Section 6.2.6.1.3 for a further description). NatureScot (2025a) best-practice guidance[1] was followed in the selection of target species for surveys and CIEEM (2018) and NatureScot (2025c) guidance was followed for targeted, specific and proportionate ecological impact assessment. Our approach is given in Section 6.2.6.1. Whooper swan migration and any impacts on the same have been discussed in Table 6-23.
An Coimisiún Pleanála (pre-application meeting 2)	27 January 2026	Ensure any NPWS consultation responses are fully addressed. Provide sufficient examples of similar hen harrier compensation and enhancement measures to demonstrate likelihood of success.	All NPWS submissions have been detailed and addressed in this table. A meeting with NPWS was conducted on 18 March 2026 with comments and responses summarised below.

Consultee	Date of Response	Summary of Key Issues	Response / Where Addressed in Chapter
			Examples of similar hen harrier compensation and enhancement measures are provided in the OBMP Appendix 6-13 and have been referred to in Section 6.4.9.
NPWS (meeting)	18 March 2026	Displacement of nesting habitat and collision mortality must be classified as significant at the regional population level if they negatively affect the small Leitrim-Cavan hen harrier population. Even if impacts are not nationally significant by strict metrics, they may still be nationally significant in terms of range loss if they accelerate decline of an already fragile regional population.	The potential for displacement and collision risk on hen harrier has been fully addressed in the EIAR, with assessment detailed in Section 6.4.5.5. Nesting and foraging displacement have been assessed using the buffers recommended by Goodship et al. (2022) and Pearce-Higgins et al. (2009), and the resulting habitat loss estimates are presented in Appendix 6-12. We agree with NPWS that effects on a small regional population have the potential to contribute to national population status. This issue is addressed directly in the assessment in Section 6.4.5.5, which considers both regional vulnerability and the potential for any national-level influence.
		Emphasised mitigation is preferred to compensation but recognises that compensation may be ultimately required due to site constraints. Accepts that proposed project is outside a designated site for hen harrier, so compensation refers to that used in an EIA sense and not an AA sense. Stated that compensation must be justified and described accurately, with a preference for forest to bog/heath restoration for hen harrier nesting enhancement areas because it creates permanent, non-rotational habitat.	The mitigation hierarchy is described in Section 6.2.6.4 and has been applied throughout this Chapter and is used in an EIA sense throughout. The use of compensation rather than mitigation has been justified in Section 6.4.1.1 and the proposed management involves conversion of forestry to heath/scrub habitats, as described in Section 6.4.9.
		Advises characterisation of compensation lands to demonstrate that sites chosen are suitable for the forestry conversion management measures outlined, noting that past 'forestry conversion' sites in the Ireland and the UK have failed where habitats have become unmanageable as trees have recolonised. Encourages choosing areas that will require	The compensation lands have been characterised in the OBMP (Appendix 6-13), which demonstrate their suitability for conversion from low yield forestry to a scrub-heath mosaic. The management measures proposed have been shown to be practical and realistic.

Consultee	Date of Response	Summary of Key Issues	Response / Where Addressed in Chapter
		lower interventions over the 35-year lifespan of the proposed project using practical, realistic management measures.	
		Advises that simple, robust monitoring indicators are set for the compensation lands including wide coverage and a dense sampling protocol to assess foraging habitat suitability, 2-3 clear, simple objectives with easily replicable metrics, targets for success should be reasonable and time-bound and to outline potential pitfalls if management is not working with remedial actions prescribed via a system of adaptive management.	The monitoring protocol in the OBMP (Appendix 6-13) has been developed following this advice.
		Acknowledges literature is vague on the calculation of hen harrier displacement distances but encourages a reasonable approximation of indirect habitat loss due to displacement that references relevant literature and a greater than 1:1 ratio for foraging habitat compensation, consistent with best practice.	A comprehensive literature review of hen harrier foraging habitat and displacement distances by operational wind turbines has been given in Appendix 6-12, justifying the rationale behind the foraging habitat loss calculation methodology and supported by the latest scientific literature. A greater than 1:1 ratio for foraging habitat compensation is proposed.
		Ensure distribution and abundance surveys consider potential for white-tailed eagle nest sites within the core foraging range for this species and survey accordingly following NatureScot guidance. Contextualise any potential effects given that any impacts on a nesting pair could affect the range of the population nationally.	NatureScot (2025d) guidance states that surveys should be undertaken up to 6 km from development sites for white-tailed eagle in areas where breeding white-tailed eagle are likely to be present. At the time that surveys were carried out there was no information to suggest the possible presence of white-tailed eagle. Nevertheless, field surveys were conducted up to 5 km, and no eagle breeding attempts were identified in any survey year and no activity indicating possible breeding just outside the 5km survey area was recorded. A data request was made to NPWS on 20 March 2026. No confirmed white-tailed eagle nesting attempts are known to NPWS within 6 km of the proposed project; however, a

Consultee	Date of Response	Summary of Key Issues	Response / Where Addressed in Chapter
			tentative nesting attempt may have been made in 2025, 5-6 km away from the nearest turbine (no precise location given and no confirmed breeding was recorded). The impact assessment considers the possibility that the frequency of eagle sightings could increase over the lifespan of the proposed project and any potential effects on eagles have been contextualised on this basis (Section 6.4.5.7), with additional mitigation proposed to reduce the likelihood of eagles flying through the collision risk zone should nesting attempts occur in the wider area in the future (Section 6.4.6).
		Recommends not to consider collision mortality and displacement as mutually exclusive as avoidance rates in the collision mortality analysis provide a method in which displacement effects are quantified.	It is acknowledged that the NatureScot CRM avoidance-rate guidance (NatureScot, 2025f) mentions both displacement and turbine-level avoidance in close proximity, which can create ambiguity if "avoid/avoidance" is read as a single concept. However, NatureScot's broader onshore bird impacts guidance (NatureScot, 2025e) distinguishes these clearly: displacement is an area-level response ("indirect loss of habitat if disturbance causes birds to avoid the wind farm and surrounds"), whereas avoidance rate captures evasive action near the rotor (birds "change their route, time their flight through the rotor or take emergency avoidance action") within collision risk modelling. Accordingly, avoidance rates in the CRM do not include for displacement. They represent the proportion of birds that evade collision when exposed to turbines, applied after estimating exposure from baseline flight activity and distribution. By contrast, displacement means birds avoid the site or surrounds altogether due to disturbance. These processes are conceptually and analytically distinct in NatureScot's guidance (NatureScot, 2025e).

Consultee	Date of Response	Summary of Key Issues	Response / Where Addressed in Chapter
			In line with this distinction, the assessment treats displacement and collision risk as related but separate processes: NatureScot's 'Wind farm impacts on birds' guidance is used to define and assume displacement (NatureScot, 2025e), while NatureScot's CRM 'Use of Avoidance Rates' guidance (NatureScot, 2025f) is used only for the avoidance rate parameter that adjusts modelled collisions for turbine-level evasive behaviour. This avoids conflation of terms and prevents methodological issues. Assuming displacement occurs, observed flight activity within/around the site during operation will be lower than baseline flight activity levels, which reduces collision exposure in addition to any turbine-level evasive behaviour captured by the avoidance rate. For these reasons, it is not correct to state that the CRM avoidance rate "provides a method in which displacement effects are quantified".
		If data indicate collision mortality occurs during the breeding season the default should be to consider impacts to occur on breeding adult hen harrier only unless a clear distinction between adult vs juvenile birds can be made in the survey data.	Collision-related impacts on the breeding population of adult hen harrier have been discussed in Section 6.4.5.5 in-line with NPWS's advice.
		Hen harrier collision mortality impacts must be contextualised using the Leitrim-Slieve Rush-Cavan Complex population as the appropriate sub-unit.	This has been implemented in Section 6.4.5.5.
		Mitigation should, wherever possible, prioritise measures such as turbine layout redesign or seasonal curtailment during the breeding period, rather than relying on compensation. Where such mitigation options are not feasible, the EIAR should clearly explain the reasons why. If compensation measures are proposed, such as habitat improvement or	As explained in Sections 6.3.3.1.3.1 and 6.4.1.1, it was not appropriate to design the turbine layout around historical hen harrier nest locations because the nesting sites were not spatially consistent between years, meaning no fixed exclusion zone could be reliably defined or incorporated into the layout. As a result, layout-based mitigation could not

Consultee	Date of Response	Summary of Key Issues	Response / Where Addressed in Chapter
		predator control to offset potential collision-related mortality of breeding adults, an indication should be provided of the scale of compensation required and whether it is reasonably achievable, noting that these measures primarily influence fledging success rather than adult survival. A simple population-modelling approach, similar to that used in the National Hen Harrier Survey could potentially be adapted for the relevant sub-unit. This could be used to compare a do-nothing scenario, a scenario including predicted impacts, and a compensated scenario demonstrating how proposed measures might offset those impacts. Any demographic parameters used in such modelling should be fully referenced, precautionary in nature, and reflect the lower indicative survival and productivity estimates available for Irish hen harriers. Likewise, any projected improvements in fledging success or juvenile survival arising from the proposed compensation should be supported with appropriate evidence and references.	practicably reduce potential nesting disturbance or displacement. Curtailment is not a viable mitigation option for collision-related impacts as predicted collision risk is too low to justify it and the loss of energy generation could potentially make the proposed project non-viable. The proposed compensation measures outlined in Section 6.4.9 are not intended to mitigate collision-related impacts on hen harrier populations directly, as predicted collision mortality is anticipated to be very low. Instead, these measures specifically address the effective loss of nesting and foraging habitats arising from operational displacement. They may also indirectly reduce collision exposure by increasing the attractiveness of habitats located >750 m from turbines, outside the collision risk zone, and by placing foraging enhancement areas adjacent to these NEAs meaning birds don't need to fly through the turbine area to access foraging areas, as described in Section 6.4.9. Because the proposed compensation measures are designed to address habitat-based effects (i.e., potential loss or displacement of nesting and foraging habitat) rather than to offset collision mortality of breeding adults, a population-modelling exercise aimed at quantifying how compensation might offset collision-related mortality would not be appropriate.

6.2.3 Baseline Data Collection

6.2.3.1 Desk Study

A desk study compiled contextual information on bird populations and nature conservation sites in and around the study area, which was undertaken prior to surveys and completing assessments (described in Appendices 6-2 to 6-9). This included:

- National Parks and Wildlife Service ("NPWS") website (NPWS, 2025b) - searched for information on species trends and designated sites in Republic of Ireland on 02/10/2025;
- Northern Ireland Environment Agency ("NIEA") Natural Environment Map Viewer website (DAERA, 2025) – searched for designated sites in Northern Ireland on 02/10/2025;
- National Biodiversity Data Centre ("NBDC") website (NBDC, 2025) - searched for historical species records on 02/10/2025 with spatial species data given in hectads (hectad G94);
- Northern Ireland CeDAR data request – received historical species records on 18/02/2026 with spatial species data given in hectads (hectads G94, G95, H04, H05);
- The 2022 National Survey of Breeding Hen Harrier in Ireland (Ruddock et al., 2024);
- The Hen Harrier Threat Response Plan 2024-2028 (NPWS, 2024);
- A review of Greenland white-fronted geese *Anser albifrons flavostris* in Ireland 1982/83 – 2011/12 (Burke et al., 2014) – searched for evidence of goose roosts nearby;
- The Irish Wetland Bird Survey (I-WeBS) online species accounts (IWeBS, 2025) – searched for wetland bird species population sizes and trends on 02/10/2025;
- The UK's Wetland Bird Survey online tool (BTO, 2025b) – searched for wetland bird species population sizes and trends on 02/10/2025;
- The Article 12 Web Tool (EIONET, 2025); and
- Birds of Conservation Concern in Ireland 4 ("BoCCI4"): 2020-2026 (Gilbert et al., 2021) – searched for species conservation status.

6.2.3.2 Field Surveys

Baseline ornithology surveys were conducted during the period October 2017 to September 2025. The scope of surveys was informed by NS guidance (NatureScot, 2025d)[1].

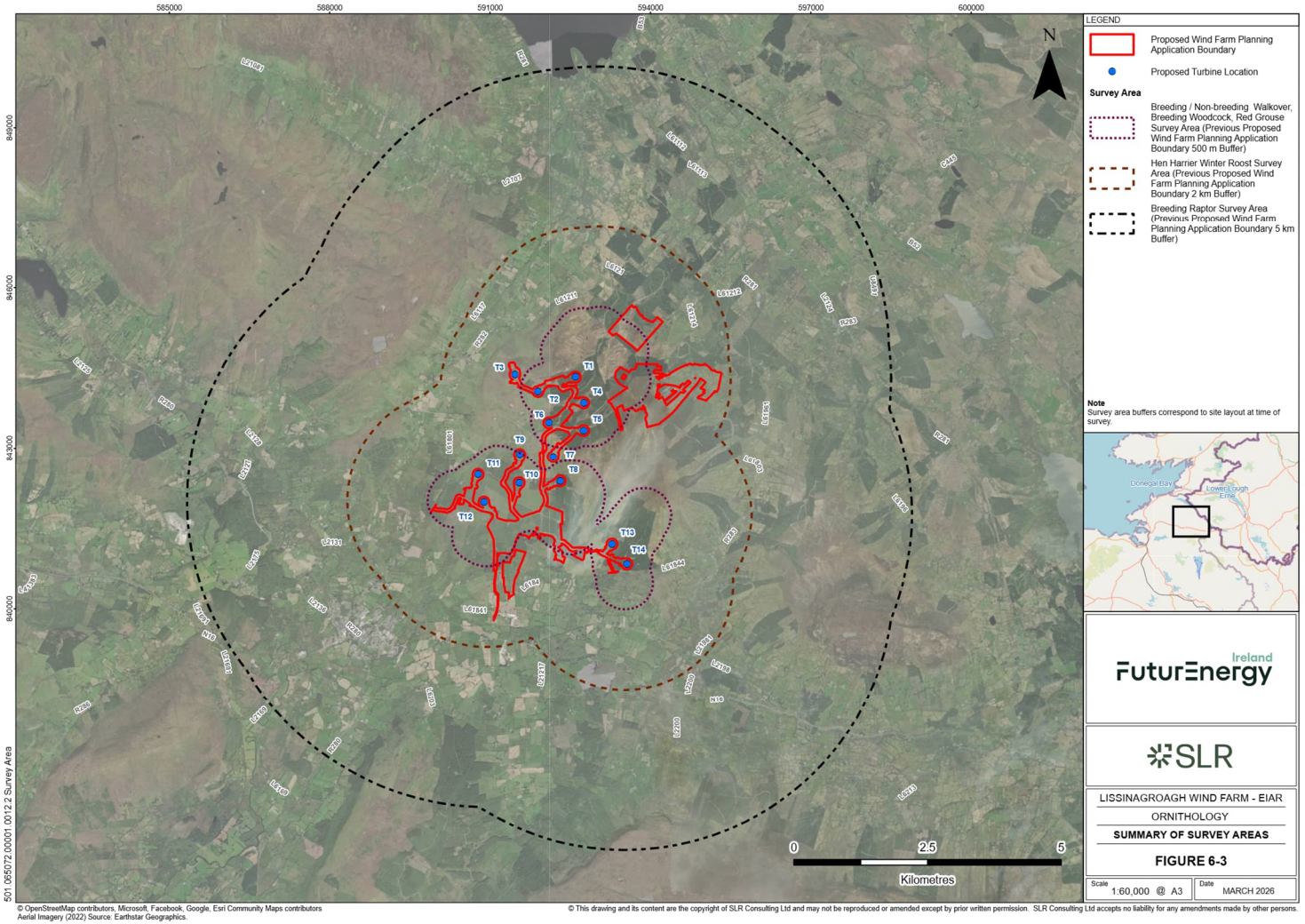
Surveys were focused on the proposed wind farm and surrounding survey-specific buffers; however, no dedicated bird surveys were undertaken for the GCR and TDR accommodation areas. This is because the proposed GCR is located almost entirely within existing public road corridors, which are artificial habitats and not likely to be important for bird species of conservation importance (see Section 5.4.2 of EIAR Volume II Chapter 5 which shows only a small length (10 m) of hedgerow WL1 and very small areas (0.01 ha) of mixed broadleaved woodland WD1 and scrub WS2 are to be lost). Similarly, there are no designated nature conservation sites for birds within 1 km of the GCR and the only potential impacts will be temporary, as the cable is to be buried underground. Along the TDR accommodation areas, accommodations are limited to minor verge-side measures, such as trimming vegetation, with no significant land-take (see Section 5.6.2.3 of EIAR Volume II Chapter 5 which shows the habitats, such as (mixed) broadleaved woodland WD1, scrub WS1, hedgerows WL1 and treelines WL2 within the study area). These areas are highly disturbed and regularly maintained and are likely to support only common bird species adapted to roadside environments.

Only data collected within the last five years have been presented in this Chapter and used for impact assessment, as advised by NS guidance (NatureScot, 2025d). Any data collected prior to the 2020/21 non-breeding season have been used to provide context only and are not described in detail in this Chapter. A summary has been provided in Section 6.3.3.1.1.

From 2023 onwards, additional (i.e. more than recommended by NS guidance) survey efforts focused on the breeding season only, reflecting the presence of breeding hen harrier within the wider study area. This approach aligns with best practice by prioritising survey effort where potential impacts are greatest.

Full details are presented in Appendices 6-2 to 6-9 with a summary provided below. The various Study Areas used are survey-specific and are given under the description for each survey methodology with a summary given in Figure 6-3.

Figure 6-3: Summary of Survey Areas



6.2.3.2.1 Flight Activity Surveys

Flight activity surveys commenced in October 2020 and continued until September 2025. Continuous year-round surveys were carried out for two full years up to end of the 2022 breeding season. From 2023 onwards, survey effort was limited to the breeding season only (2023, 2024 and 2025) to provide focus on breeding hen harrier. The methodology followed that given in NS guidance (NatureScot, 2025d). Survey effort was conducted from each of four vantage points ("VPs") for both non-breeding (NB) and breeding (B) seasons.

The non-breeding season was defined as October to March inclusive, and the breeding season was defined as April to September inclusive.

The number of survey hours completed at each VP in each season is summarised in Table 6-2. The level of survey effort undertaken during the non-breeding season met the requirements of current NS guidance while the level of survey effort during the breeding season was considerably more than the minimum 72-hours of effort per VP per season (over two years) required by NS guidance (NatureScot, 2025d).

Note that for the purposes of collision risk modelling (see Appendix 6-14), the breeding season has been treated as April to August and the non-breeding season as September to March. These seasonal definitions were used to meet NS best-practice guidance for collision risk modelling (NatureScot, 2025d). Therefore, the number of hours presented for each survey season in Appendix 6-14 differs from those presented here; however, this is not considered to have affected the validity of the assessment because all survey effort has been included as part the modelling and the minimum level of survey effort required for each season has been achieved.

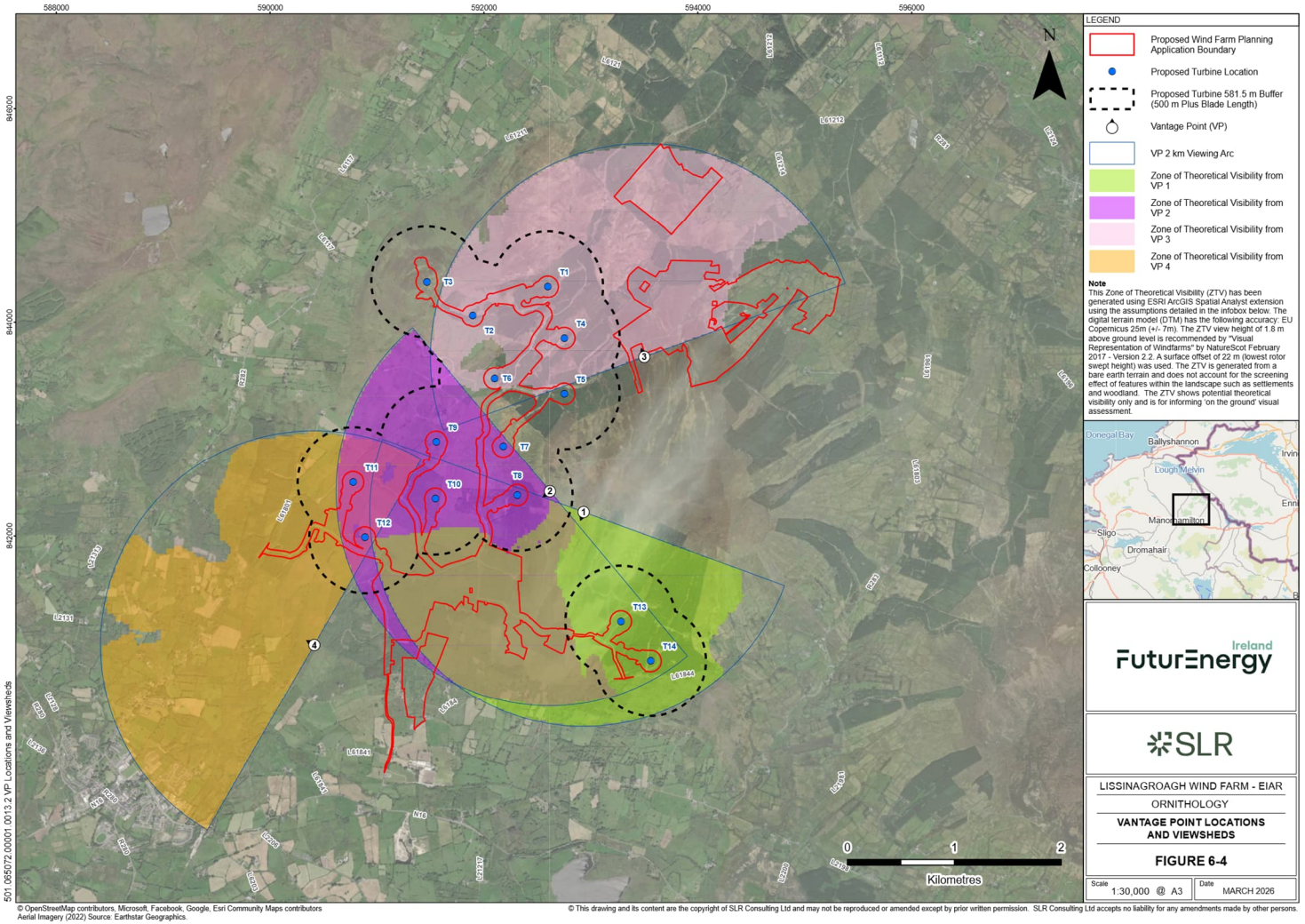
Vantage point locations and viewsheds are shown in Figure 6-4.

Table 6-2: Flight Activity Survey Hours

VP Number	Total Survey Effort Per Season[2] (hours)							Total NB Survey Effort (Hours)	Total B Survey Effort (Hours)	Total Survey Effort (Hours)
	NB 20/21	B 21	NB 21/22	B 22	B 23	B 24	B 25			
1	36	36	36	36	36	36	36	72	180	252
2	36	36	36	36	36	36	36	72	180	252
3	36	36	36	36	36	36	36	72	180	252
4	36	36	36	36	36	36	36	72	180	252

[2] NB = non-breeding season Oct-Mar; B = breeding season Apr–Sep.

Figure 6-4: Vantage Point Locations and Viewsheds



6.2.3.2.1.1 Target Species

NS guidance (NatureScot, 2025d) recommends that species targeted for flight activity surveys are split into two groups: primary and secondary species, which are listed in Appendices 6-2 to 6-9. During field surveys, recording of secondary species is subsidiary to recording of primary species. This approach is explained below in more detail.

6.2.3.2.1.1.1 Primary Target Species

Current NS guidance (NatureScot, 2025d) states that *"in most circumstances the target species will be limited to those species which are afforded a higher level of legislative protection."*

Primary target species were specifically limited to species upon which effects are most likely to be potentially significant, e.g. breeding and non-breeding species forming SCIs for nearby special protection areas ("SPAs") or species listed on Annex I of the Birds Directive.

In addition, some species red-listed under the BoCCI4 scheme (Gilbert et al., 2021) were also included as primary targets, especially if considered susceptible to impacts from wind farms. While being red listed does not afford species a higher level of legislative protection, it does reflect poor conservation status and potential vulnerability of bird populations to negative effects from wind farms. Most red-listed non-passerine species were included as primary target species. Passerine species are not generally considered to be significantly impacted by wind farms (NatureScot, 2025d) and were therefore not included as primary target species.

This approach to identifying primary target species enabled recording to focus on the species of greatest importance without the distraction of having to record detailed flight data for a larger number of more common species.

6.2.3.2.1.1.2 Secondary Target Species

Secondary target species were limited to species that may be affected by wind farms (i.e. non-passerine species) but either lack a higher level of legislative protection (not listed on Annex I of the Birds Directive or listed as SCIs) and/or are not red listed under the latest BoCCI4 scheme.

6.2.3.2.2 Breeding Walkover Surveys

Breeding walkover surveys were undertaken in 2021 and 2022 within different habitat complexes inside the proposed wind farm site, plus surrounding 500 m, using the methodology described in Brown & Shepherd (1993) and Calladine et al. (2009), which is suitable for upland moorland sites. In accordance with current NS guidance (NatureScot, 2025d), four survey visits were undertaken each year in April, May, June and July. Targets were all species of conservation concern.

6.2.3.2.3 Breeding Woodcock Surveys

Breeding Eurasian woodcock *Scolopax rusticola* surveys were undertaken in 2021 and 2022 within suitable woodland habitat inside the proposed wind farm site, plus surrounding 500 m, using the methodology described in Gilbert et al. (1998). Two survey visits were undertaken each year in May and June. While woodcock were the targets of the survey, any other crepuscular or nocturnal birds were recorded.

6.2.3.2.4 Breeding Raptor Surveys

Breeding raptor surveys were undertaken in 2021, 2022, 2023, 2024 and 2025 within suitable habitat inside the proposed wind farm site plus surrounding 5 km using the methodologies described in Hardey et al. (2013). Four survey visits were undertaken each year in April to August inclusive.

The purpose of surveys was to identify potential raptor nesting territories. Surveys involved a combination of raptor vantage point watches of 3 hours and walked transects in areas deemed most likely to hold breeding raptors, based on habitat and observed movements of raptor species in the study area.

6.2.3.2.5 Hen Harrier Foraging Surveys

Surveys to provide additional information on foraging areas used by breeding hen harrier were undertaken in 2023 and 2024. Observations were made from vantage points positioned near confirmed nest sites, with surveyors tracking birds' flight paths to and from nests and recording visible activity. Each survey lasted 3–6 hours during daylight, focusing on peak activity periods, and documented flight lines, habitat types, and behaviours such as prey carrying and food passes.

Foraging surveys started when a nest was identified starting in June and continued until August when breeding birds had left the area.

6.2.3.2.6 Red Grouse Surveys

Red grouse *Lagopus lagopus hibernica* surveys were undertaken in 2022 within suitable habitat inside the proposed wind farm site, plus surrounding 500 m, using the methodologies described in Bibby et al. (2000) and Murray et al. (2013). One survey visit was undertaken in March.

The aim of the survey was to census the local red grouse population. Surveys involved walking a transect playing a tape lure and were carried out under NPWS licence.

6.2.3.2.7 Winter Walkover Surveys

Winter walkover surveys were undertaken in 2020/21 and 2021/22 within different habitat complexes inside the proposed wind farm site, plus surrounding 500 m, using the methodologies described in Bibby et al. (2000) and Brown & Shepherd (1993). Four survey visits were undertaken each season, during the period October to March inclusive.

The aim of the survey was to obtain a fuller picture of activity for species of conservation concern. Surveys involved walking a transect and recording all bird species encountered.

6.2.3.2.8 Hen Harrier Winter Roost Surveys

Hen harrier winter roost surveys were undertaken in 2020/21, and 2021/22 within suitable habitat inside the proposed wind farm site, plus surrounding 2 km, using the methodologies described in Gilbert et al. (1998) and the Irish hen harrier winter roost survey (B. O'Donoghue, 2019). Six survey visits per survey location were undertaken each season, during the period October to March inclusive.

Surveys involved watches of potential hen harrier roost sites from four locations overlooking the most suitable hen harrier roosting habitat.

6.2.4 Statement of Authority - Project Team

6.2.4.1 Jonathon Dunn

This Chapter has been prepared by Jonathon Dunn MCIEEM, PhD, MSc and MA (Cantab.). Jonathon is an Associate Ornithologist at SLR with over 11 years' professional experience and has worked on multiple consented and proposed wind farm projects in Ireland. He has undertaken and designed bird survey programmes for a large volume of onshore wind farms in Ireland, and has written multiple EIAR biodiversity and ornithology chapters, Natura Impact Statements and biodiversity management plans. Jonathon also has undertaken training in collision risk modelling delivered by CIEEM and has implemented and written multiple modelling reports to support planning applications.

6.2.4.2 Duncan Watson

This Chapter has been reviewed by Duncan Watson CEnv MCIEEM MSc BSc (Hons). Duncan is a Technical Director at SLR with over 27 years' professional ecological and ornithological experience. He has particular experience in the renewable energy sector having played a key role in the EIAs for over 90 onshore wind farms across the UK and Ireland. Duncan has a particular interest in Ecological Impact Assessment and was a member of the technical review group responsible for revising and updating the CIEEM Guidelines for Ecological Impact Assessment in the UK (published in 2018). He has also led CIEEM workshops on Ecological Impact Assessment and Habitats Regulations Assessment.

6.2.4.3 Field Surveyors

Bird surveys were carried out by MKO. Details of MKO bird surveyors including evidence of technical competence are provided in Appendices 6-2 to 6-9.

Habitat surveys to assess lands to be enhanced for foraging hen harrier were carried out by Tobin and Bird Surveyors Ltd, the latter of which is directed by Irish hen harrier expert, Dr Marc Ruddock. Details of the surveyors including evidence of technical competence are provided in Appendices 6-12 and 6-13.

6.2.5 Baseline Data Limitations

6.2.5.1 Desk Study

Desk study data is unlikely to be exhaustive, especially in respect of species, and is intended mainly to set a context for the study. The field surveys were designed to address any limitations with the desk study data.

Fine-scale (county or regional) population estimates are not available for most terrestrial bird species in Ireland. National monitoring programmes provide trend data primarily at national or broad-regional scales, with the exception of wetland birds for which site-specific I-WeBS datasets exist. This limitation is recognised in national guidance and evidence reviews (e.g., NPWS (2024)), which note that detailed demographic or spatial modelling is unavailable for most upland and open-habitat birds. Accordingly, this assessment follows accepted practice by combining national trend information with site-specific survey results to evaluate potential impacts in the absence of finer-scale population datasets.

6.2.5.2 Field Surveys

Regarding viewshed coverage (i.e. the areas visible from the VPs), due to local topographical conditions and the evolving turbine layout and dimensions, there are some areas in the northwest and east of the 500 m survey buffer that are not within the 2 km viewsheds. Most turbine locations and most of the 500 m buffer were visible from at least one VP however, and the gaps in the viewsheds are not considered to represent a significant limitation. It is considered that the vantage point data are representative of the proposed wind farm site as a whole and sufficient to inform a robust impact assessment.

NS guidance (NatureScot, 2025d) recommends that baseline data are collected within the last five years. The 2020/21 non-breeding season data is approximately five years old; however, the data from this season remains valid, as site conditions and habitats have not materially changed in the intervening period i.e. forestry, peatland and agricultural habitats still dominate the study area. Furthermore, the non-breeding bird assemblage recorded within the study area is typical of the habitats present and does not comprise features of elevated sensitivity or conservation concern, such that no constraints or issues relating to non-breeding season ornithology have been identified. This conclusion is supported by consistency with earlier non-breeding season survey data collected prior to 2020.

6.2.5.3 Summary

None of the limitations outlined above are considered to affect the validity of the data on which the assessment is based.

6.2.6 Assessment Approach

The evaluation and impact assessment approach used in this chapter is based on Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland ("CIEEM guidelines") (CIEEM, 2018).

Reference is also made to other relevant guidance, within the chapter, as appropriate.

6.2.6.1 Important Ornithological Features (IOFs)

According to CIEEM guidelines (CIEEM, 2018) detailed assessment is only required for IOFs that are potentially affected by the proposed project. For this chapter, IOFs are restricted to avian species for which potential effects from wind farms are most likely to be significant such as species forming SCIs for nearby SPAs, species listed on Annex I of the Birds Directive, and certain non-passerine species with poor conservation status (e.g., those red-listed under BoCCI4).

CIEEM guidelines state that it is not necessary to carry out detailed assessment of ecological features that are sufficiently widespread, unthreatened and resilient to project impacts and would remain viable and sustainable. For example, as noted previously, passerines (relating to the largest order of birds, *Passeriformes*, which includes over half of all living birds and consists chiefly of altricial songbirds of perching habits) are generally not considered to be significantly impacted by wind farms (Beston et al., 2016; Garcia et al., 2015; NatureScot, 2025d; Stewart et al., 2007) due to relatively large populations and high reproductive rates, making populations more resilient.

Therefore, this Chapter only considers IOFs for detailed assessment. The approach to determining importance is described below. A list of IOFs based on survey work completed is included in Table 6-8 and Table 6-9.

6.2.6.1.1 Determining Importance

The importance of an ornithological feature was considered within a defined geographical context. The following frame of reference has been used in this case, relying on known / published accounts of distribution and rarity where available, and professional experience:

- International;
- National (e.g. Ireland);
- Regional (e.g. non-designated important breeding areas for hen harrier);
- County (e.g. Co. Leitrim); and
- Local (e.g. proposed wind farm site plus circa 5 km).

The above frame of reference is applied to the ornithological features identified during the desk study and surveys to inform this Chapter.

For designated sites, importance reflects the geographical context of the designation. For example, an SPA is considered internationally important, while a Natural Heritage Area ("NHA") or proposed NHA ("pNHA") is considered nationally important.

In assigning a level of value to a species, its distribution and status were considered, including a consideration of trends based on available historical records. Reference has therefore been made to published lists and criteria where available. Examples of relevant lists and criteria include:

- species of European conservation importance (as listed on Annex I of the Birds Directive); and
- BoCCI4 (Gilbert et al., 2021).

Where appropriate, the value of resident or regularly occurring species populations has been determined using the standard '1% criterion' method (Holt et al., 2012; Percival, 2003). Using this, the presence of >1% of the international population of a species is considered internationally important, >1% of the national population is considered nationally important and so on.

Where available, regions were defined based on established scientific literature and reports. For instance, the Hen Harrier Threat Response Plan (NPWS, 2024) was used to identify non-designated but regionally important breeding areas for hen harrier.

County-level populations of wintering wildfowl were assessed using I-WeBS data, incorporating records from all I-WeBS sites within County Leitrim. However, this dataset is limited to wintering wildfowl and does not cover all bird species or breeding populations.

In cases where detailed regional or county population estimates were unavailable, national estimates were used as a benchmark to determine likely importance. This assessment considered:

- frequency of occurrence on the site;
- peak count totals;
- evidence of sustained or regular habitat use (e.g. foraging, roosting, breeding); and

- the ecological significance of that use, particularly during sensitive periods such as breeding.

Species recorded only occasionally, in low numbers, and with no evidence of regular habitat use were assigned less than county importance. In contrast, species using the site regularly and in ecologically meaningful numbers were valued as county or regional importance, depending on the strength of evidence.

Where it was not possible to clearly differentiate between regional and county importance, professional judgment and a precautionary approach was applied.

For this assessment, bird species evaluated as important at the county scale or above were scoped in for detailed assessment provided a realistic pathway for significant effects from the proposed project exists (e.g. regular on-site breeding, foraging and roosting, or potentially significant collision risks). In certain cases, species evaluated as important at the local scale were scoped in if there was a credible impact pathway and the resulting effect could be significant given the species' importance. For example, if the levels of flight activity recorded on-site were sufficiently high that collision could present a significant risk to the species.

The same general principles were applied to nature conservation sites i.e. only those with a plausible pathway for impact were scoped in for detailed assessment.

Effects on other ornithological features are considered unlikely to be significant in terms of legal or policy implications.

6.2.6.1.2 Impact Assessment

The impact assessment process involves the following steps:

- identifying and characterising potential impacts;
- incorporating measures to avoid and mitigate (reduce) these impacts;
- assessing the significance of any residual effects after mitigation;
- identifying appropriate compensation measures to offset significant residual effects (if required); and
- identifying opportunities for ecological enhancement.

When describing impacts, reference has been made to the following characteristics, as appropriate:

- Positive or negative;
- Magnitude (quantified wherever possible, e.g. number of birds displaced, number of birds predicted to collide with turbines, etc);
- Duration (specifically whether impacts would be permanent or temporary, and if temporary over what period);
- Timing and frequency (how frequently bird species may be affected and at what times of year, times of day, etc); and
- Reversibility (i.e. whether impacts may be reversible and over what timescales, e.g. re-establishment of habitats used by bird species following temporary loss or disturbance).

The impact assessment process considers both direct and indirect impacts: direct impacts are changes that are directly attributable to a defined action, e.g. the physical loss of habitat occupied by a bird species during the construction process. Indirect impacts are attributable to an action, but which affect ornithological resources through effects on an intermediary

ecosystem, process or feature, e.g. the creation of roads which cause hydrological changes, which, in the absence of mitigation, could lead to the drying out of wetland habitats used by IOFs.

Disturbance impacts have been assessed with reference to the relevant literature (Drewitt & Langston, 2006; Goodship et al., 2022; Hötker et al., 2006; Pearce-Higgins et al., 2009), and the literature has also been used to recommend appropriate disturbance-free buffer zones considered likely to be required to help prevent nest failure due to disturbance during construction and operation.

6.2.6.1.3 Collision Risk Modelling

The latest NatureScot-recommended, standard Band 'random flights' CRM (Band, 2024) was used to estimate collision risk based on recorded target species activity levels and flight behaviour, proposed turbine numbers and specifications, and the relevant species biometrics and flight characteristics.

Modelling collision risk under the Band CRM is a two-stage process:

- Stage 1 estimates the number of birds that fly through the rotor swept disc; and
- Stage 2 predicts the proportion of these birds that have the potential to be hit by a rotor blade.

Combining both stages produces an estimate of collision mortality in the absence of any avoidance action/behaviour by birds. Avoidance rates are then applied to generate predicted rates of collision mortality. Further details of the CRM methodology are provided in Appendix 6-14.

In line with the latest NatureScot CRM guidance, nocturnal flight activity has been incorporated using the recommended species-specific correction factors. These factors adjust observed daytime activity to reflect the proportion of additional flight activity expected to occur during low-light or night-time periods, ensuring that total activity levels used in the CRM represent a full 24-hour period rather than daylight surveys alone. This approach aligns the assessment with current best practice and provides a precautionary estimate of potential collision risk.

CRM is based on several assumptions, such as flight speeds and the distribution of flights (both spatially and within height bands), which generally offer a precautionary estimate of collision risk. This should be considered when interpreting the results.

6.2.6.2 Likely Significant Effects

Significance is always context-specific and tailored criteria should, thus, be developed for each project and its settings.

The concept of ecological significance is addressed in paragraphs 5.24 through to 5.28 of CIEEM guidelines (CIEEM, 2018). Significance is a concept related to the weight that should be attached to effects when decisions are made. For EIA, a 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general.

Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local and the scale of

significance of an effect may or may not be the same as the geographic context in which the feature is considered important.

NatureScot (2025c) also provides guidance for assessing the significance of impacts on bird populations from onshore wind farms that do not affect protected areas. NatureScot guidance is widely recognised as the industry-standard for assessing wind farm impacts on birds in the UK and Ireland and broadly follows the latest CIEEM guidance described above. NatureScot (2025c) guidance states that:

'The EIA report should set out the consequences for the integrity of the species population in terms of its size, trend, distribution (where known) and the area of suitable habitat. The assessment should identify whether the impact is likely to negatively affect the conservation status of the species, by:

- *Preventing a recovering or reintroduced species from reaching favourable conservation status, at a national or international level; or*
- *Changing a species' status from favourable to unfavourable; or*
- *For a species that is already in decline, the assessment should focus on whether the proposal would undermine the potential for halting its decline and allowing it to recover to favourable conservation status.'*

6.2.6.3 Cumulative Effects

Cumulative effects result from effects arising from two or more developments and/or from different elements of the same project. Effects may be:

- Additive: where combined effects are equivalent to the simple summation of the individual effects;
- Antagonistic: the cumulative impact is less than the sum of the individual effects; or
- Synergistic: the cumulative impact is greater than the sum of the individual effects.

NatureScot (2025a) guidance was used to assess cumulative effects on birds due to onshore wind energy developments. While antagonistic or synergistic models may occur in real-life settings, the approach adopted in the guidance is based on a simpler additive model.

Cumulative effects have been assessed for all bird species for which detailed assessment has been undertaken in this chapter for which potential negative effects are likely. The potential for cumulative effects with other wind farms, and other developments, due to disturbance and collision mortality has been assessed. The cumulative assessment is based on consideration of residual effects, i.e. assuming that proposed mitigation measures for other wind farm projects are implemented.

Regarding the spatial extent of the cumulative assessment, current NatureScot (2025a) guidance indicates that the default approach should be to assess cumulative effects at the Natural Heritage Zone ("NHZ") scale, unless there is a reasonable alternative. As there are no NHZs in Ireland, or widely accepted alternative, the approach used is based on a 20 km search distance recommended by (IWEA, 2012). With respect to designated sites, other developments, plans and projects which lie within core foraging distances of relevant designated features of the relevant designated sites are considered.

The likely significance of cumulative effects has been determined using the same methods adopted in the assessment of effects for the proposed project considered on its own (see Section 6.2.6.2).

6.2.6.4 Avoidance, Mitigation, Compensation and Enhancement

Where potentially significant effects have been identified, the mitigation hierarchy has been applied, as recommended in the CIEEM guidelines (CIEEM, 2018). The mitigation hierarchy sets out a sequential approach beginning with the avoidance of impacts where possible, the application of mitigation measures to minimise unavoidable impacts and then compensation for any remaining impacts. Once avoidance and mitigation measures have been applied residual effects are then identified along with any necessary compensation measures, and incorporation of opportunities for enhancement.

The differences between avoidance mitigation, compensation and enhancement are defined here as follows:

- Avoidance is used to seek options that avoid harm to ecological features, e.g. through changes in scheme design;
- Mitigation is used to refer to measures to avoid or minimise a specific negative effect, for example, timing restrictions during construction to avoid key periods for certain species;
- Compensation describes measures taken to offset significant residual effects, i.e. where mitigation is not possible, for example, creation of new habitats to compensate for habitats lost or effectively lost due to displacement; and
- Enhancement is the provision of net benefits for biodiversity over and above the requirements for avoidance, mitigation or compensation.

6.2.6.5 Relationship between EIA and AA

It is important to note that the term 'compensation', as defined in the CIEEM guidance in relation to the mitigation hierarchy, is different to 'compensatory measures', which have a specific legal meaning under Article 6(4) of the Habitats Directive (92/43/EEC) in the context of Appropriate Assessment. Compensatory measures in the context of Appropriate Assessment are those measures which are implemented only where a plan or project is permitted to proceed despite adverse effects on the integrity of a European site, in order to ensure that the overall coherence of the Natura 2000 network is maintained.

The Natura Impact Statement (NIS) prepared for the proposed project concludes that, no adverse effects on the integrity of any European site are predicted. Accordingly, compensatory measures, within the context of Article 6(4) of the Habitats Directive, are not required for the proposed project.

Where 'compensation' is referred to within this EIAR it should be understood as referring to 'compensation' within the meaning of the CIEEM guidance (as defined above) rather than 'compensatory measures' within the context of the Appropriate Assessment process.

This assessment for the EIA assesses likely significant effects on IOFs on the basis that standard mitigation by design and good-practice construction controls (e.g., pollution prevention, timing restrictions, nest checks) form part of the proposed project and will be implemented (embedded mitigation). The AA process adopts a different sequencing, initially screening European sites on the basis of plausible pathways and then evaluating whether mitigation ensures no adverse effect on integrity. While the framing differs, the underlying controls assumed are consistent across assessments and, where pathways exist (e.g., hydrological connectivity), the same mitigation measures are relied upon to inform the assessment conclusions.

6.3 EXISTING ENVIRONMENT

6.3.1 Sites Designated for Nature Conservation

Sites that are statutorily designated for their ornithological interest (i.e. SPAs, Ramsar sites[3], Areas of Special Scientific Interest ("ASSIs"), and NHAs) within the relevant study areas are shown in Figure 6-5, Figure 6-6 and Figure 6-7. A brief description of each site within 20 km of the proposed wind farm site and 1 km of the GCR and TDR accommodation areas is provided in Table 6-3, Table 6-4 and Table 6-5. Additional sites with downstream hydrological connectivity or potential ecological connectivity up to and beyond these 20 km and 1 km initial search distances are also shown. Site synopses are shown in Appendix 6-15.

6.3.1.1 Proposed Wind Farm Site

There are two SPAs within the Republic of Ireland ("ROI") and one within Northern Ireland ("NI") within 20 km of the proposed wind farm site, with one additional SPA located beyond 20 km where potential ecological connectivity is possible. There are also two Ramsar sites within 20 km of the proposed wind farm site, both located within NI. There are no NHAs designated for birds within 20 km of the proposed wind farm site but one ASSI with birds mentioned in the citation documents within the same distance. There is only one of these sites with remote downstream connectivity to the proposed wind farm site.

Table 6-3: SPAs, Ramsar Sites and NHAs within Study Area of the Proposed Wind Farm Site and Beyond Where Relevant

Country	Site Name (Code)	Distance & Direction from Site Boundary	Features of Special Conservation Interest[4]
SPAs			
ROI	Sligo / Leitrim Uplands SPA (004187)	9.2 km northwest	Peregrine falcon *Falco peregrinus* (r) Red-billed chough *Pyrrhocorax phyrrhocorax* (r)
	Donegal Bay SPA (004151)	16.5 km northwest (remote downstream hydrological connectivity via Lough Melvin)	Common scoter *Melanitta nigra* (w) Great northern diver *Gavia immer* (w) Light-bellied brent goose *Branta bernicla hrota* (w) Sanderling *Calidris alba* (w) Wetlands and waterbirds

[3] Ramsar sites are recognised under the Ramsar convention (1971), but they do not have standalone statutory protection in Ireland, and their protection derives from overlapping designations such as SPA, SAC or NHA.
[4] Population type for SCI species: p = permanent, r = reproducing, w = wintering and c = concentration

Country	Site Name (Code)	Distance & Direction from Site Boundary	Features of Special Conservation Interest[4]
	Lough Derg (Donegal) SPA (004057)	31 km northeast	Lesser black-backed gull *Larus fuscus* (r) Herring gull *Larus argentatus* (r)
NI	Pettigoe Plateau SPA (UK9020051)	17 km northeast	European golden plover *Pluvialis apricaria* (r) Greenland white-fronted goose *Anser anser albifrons* (w)
Ramsar sites			
NI	Pettigoe Plateau	17 km northeast	European golden plover (r)
	Cuilcagh Mountain	17 km southeast	European golden plover (r) Merlin *Falco columbarius* (p)
ASSIs			
NI	Cuilcagh Mountain ASSI	17 km southeast	European golden plover (r) Peregrine falcon (r) Merlin (r)

6.3.1.2 GCR

There are no SPAs, Ramsar sites or NHAs designated for birds located within 1 km of the GCR. There is one SPA with remote downstream hydrological connectivity to the GCR.

Table 6-4: SPAs, Ramsar Sites and NHAs within Study Area of the GCR and Beyond Where Relevant

Country	Site Name (Code)	Distance & Direction from Site Boundary	Features of Special Conservation Interest[5]
SPAs			
ROI	Ballysadare Bay SPA (004192)	16.2 km northwest but with remote, downstream hydrological connectivity	Light-bellied brent goose (w) Grey plover *Pluvialis squatarola* (w) Dunlin *Calidris alpina* (w)

[5] Population type for SCI species: p = permanent, r = reproducing, w = wintering and c = concentration

Country	Site Name (Code)	Distance & Direction from Site Boundary	Features of Special Conservation Interest[5]
			Bar-tailed godwit *Limosa lapponica* (w) Common redshank *Tringa totanus* (w)

6.3.1.3 TDR Accommodation Areas

There are four SPAs and two Ramsar sites within 1 km of the TDR accommodation areas with one site having downstream hydrological connectivity also. There are no NHAs designated for birds located within the same distance.

Table 6-5: SPAs and Ramsar Sites within Study Area of TDR Accommodation Areas and Beyond Where Relevant

Country	Site Name (Code)	Distance & Direction from Site Boundary	Features of Special Conservation Interest[6]
SPAs / Ramsar sites			
ROI	Cummeen Strand SPA (004035) / Ramsar site	20 m from accommodations area 13 and downstream hydrological connectivity	Light-bellied brent goose (w) Eurasian oystercatcher *Haematopus ostralegus* (w) Common redshank (w) Wetlands and waterbirds
	Sligo / Leitrim Uplands SPA (004187)	216 m from accommodation area 25	Peregrine falcon (r) Red-billed chough (r)
	Drumcliff Bay SPA (004013)	250 m from accommodation area 55 (part 2)	Sanderling (w) Bar-tailed godwit (w) Wetlands and waterbirds
	Donegal Bay SPA (004151)	300 m from accommodation area 53	Common scoter (w) Great northern diver (w) Light-bellied brent goose (w) Sanderling (w) Wetlands and waterbirds

[6] Population type for SCI species: p = permanent, r = reproducing, w = wintering and c = concentration

Figure 6-5: Designated Sites for Nature Conservation - Wind Farm Site

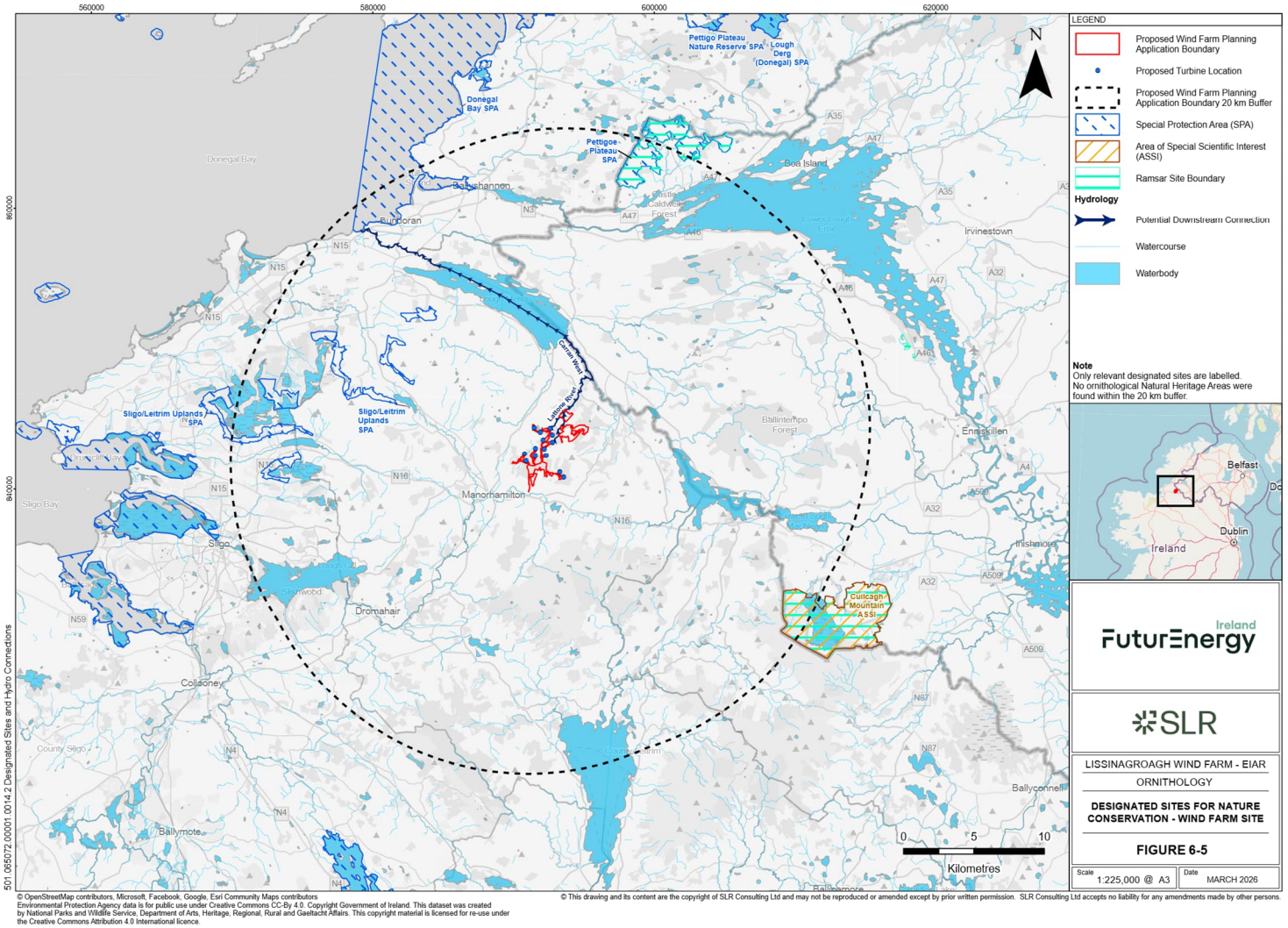


Figure 6-6: Designated Sites for Nature Conservation – GCR

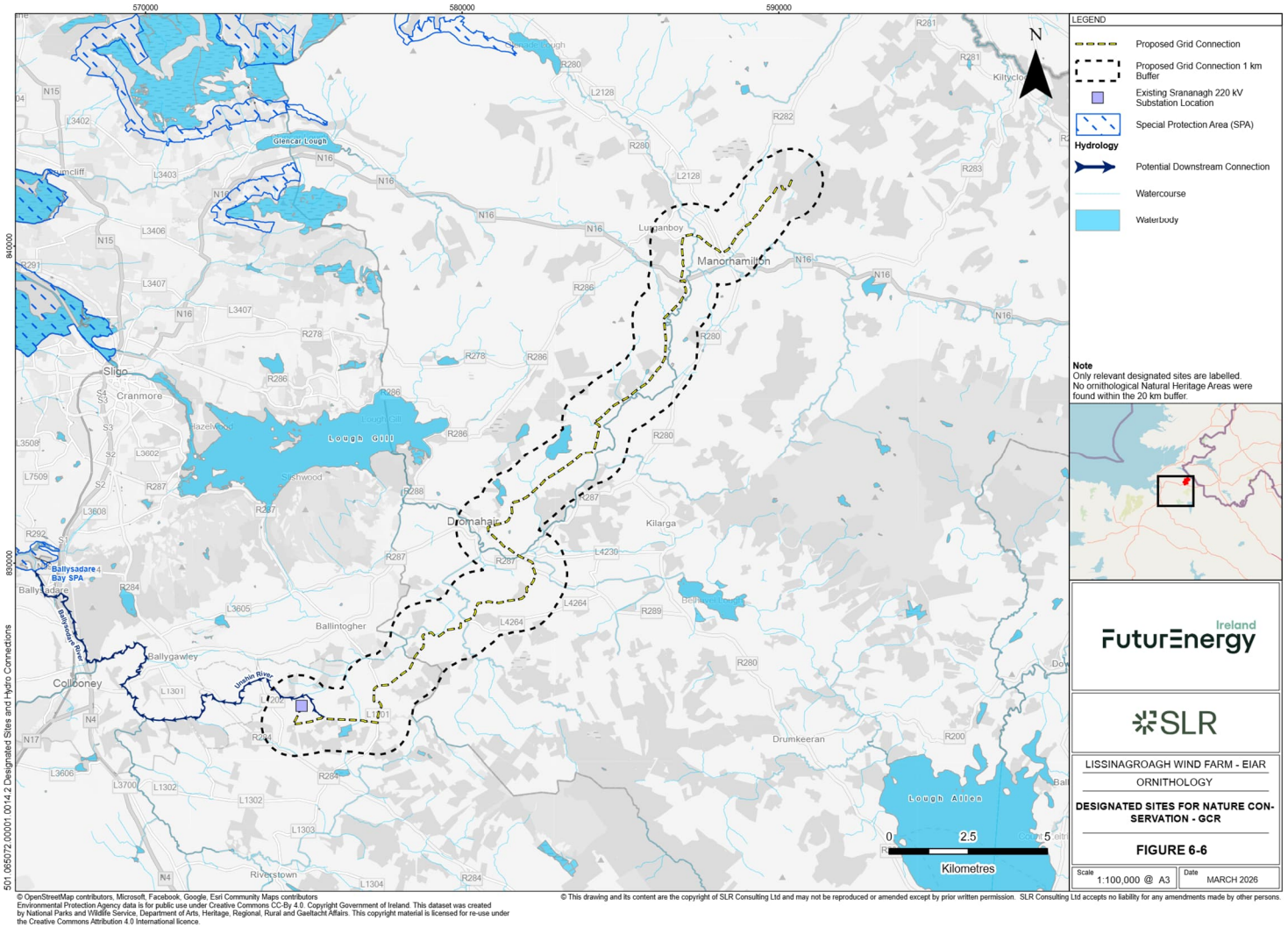
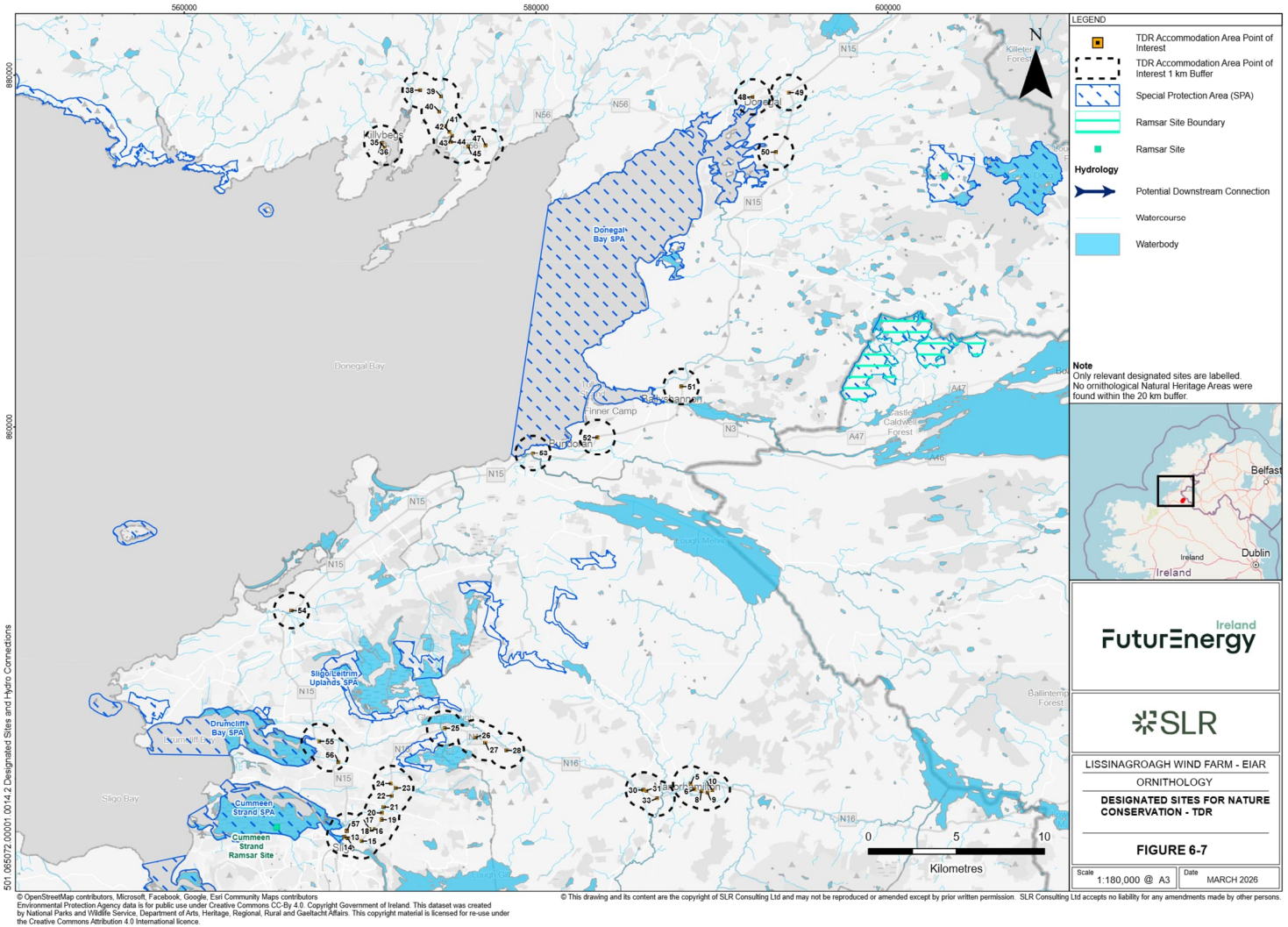


Figure 6-7: Designated Sites for Nature Conservation -TDR



6.3.2 Other Sites of Conservation Interest

Other sites of conservation interest where birds are mentioned are shown in Figures 6-8, 6-9 and 6-10. A brief description of each site within 20 km of the proposed wind farm site and 1 km of the GCR and TDR accommodation areas is provided in Table 6-6 and Table 6-7. Additional sites with downstream hydrological connectivity up to and beyond these 20 km and 1 km initial search distances are also presented. Site synopses are shown in Appendix 6-15.

6.3.2.1 Proposed Wind Farm Site

There are three pNHAs and three non-designated important breeding areas for hen harrier within 20 km of the proposed wind farm site. The Leitrim Uplands non-designated important breeding area for hen harrier overlaps with the site.

There are no nature reserves where birds are mentioned in the site synopses within 20 km of the proposed wind farm site within ROI or NI.

Table 6-6: pNHAs and Hen Harrier Non-Designated Important Breeding Areas within Study Area of the Proposed Wind Farm Site and Beyond Where Relevant

Country[7]	Site Name (Code)	Distance / Direction from Site Boundary	Species[8]
pNHAs			
ROI	Owengar Wood pNHA (001419)	16.8 km south	Common pheasant *Phasianus colchicus* (u) Eurasian woodcock (u)
	Colgagh Lough pNHA (001658)	16.5 km southwest	Common goldeneye *Bucephala clangula* (u) Common pochard *Aythya ferina* (u) Green-winged teal *Anas crecca* (u) Grey heron *Ardea cinerea* (u) Little grebe *Tachybaptus ruficollis* (u) Mallard *Anas platyrhynchos* (u) Mute swan *Cygnus olor* (u) Tufted duck *Aythya fuligula* (u) Whooper swan *Cygnus cygnus* (w)

[7] ROI = Republic of Ireland, NI = Northern Ireland
[8] Key to populations: b = breeding, r = resident, w = wintering and u = unspecified

Country[7]	Site Name (Code)	Distance / Direction from Site Boundary	Species[8]
	Erne Estuary / Finner Dunes pNHA (000139) – partially overlaps with Donegal Bay SPA	16.5 km northwest	Common ringed plover *Charadrius hiaticula* (w) Dunlin *Calidris alpina* (w) Eurasian oystercatcher (w) Eurasian wigeon *Mareca penelope* (w) Great cormorant *Phalacrocorax carbo* (w) Green-winged teal (w) Long-tailed duck *Clangula hyemalis* (w) Northern lapwing *Vanellus vanellus* (w) Red-breasted merganser *Mergus serrator* (w) Sanderling (w)
Hen Harrier Non-Designated Important Breeding Areas			
ROI	Leitrim Uplands	0 km	Hen harrier (b)
	South Donegal 2	15.5 km northeast	
	Slieve Rushen	16.8 km southeast	

6.3.2.2 GCR

The Leitrim Upland non-designated important breeding area for hen harrier overlaps with the northern component of the GCR nearest to the proposed wind farm site.

There are no pNHAs where birds are mentioned in the site synopses or nature reserves within 1 km of the GCR and no downstream hydrological connectivity to the same.

6.3.2.3 TDR Accommodation Areas

There is one pNHA where birds are mentioned in the site synopsis that is within 1 km of the TDR accommodation areas and no sites with downstream hydrological connectivity.

Table 6-7: pNHAs and Hen Harrier Non-Designated Important Breeding Areas within Study Area of the TDR Accommodation Areas

Country[9]	Site Name (Code)	Distance / Direction from Site Boundary	Species[10]
pNHAs			
ROI	Erne Estuary / Finner Dunes pNHA (000139) – partially overlaps with Donegal Bay SPA	785 m from accommodations area 52	Common ringed plover (w) Dunlin (w) Eurasian oystercatcher (w) Eurasian wigeon (w) Great cormorant (w) Green-winged teal (w) Long-tailed duck (w) Northern lapwing (w) Red-breasted merganser (w) Sanderling (w)

[9] ROI = Republic of Ireland, NI = Northern Ireland
[10] Key to populations: b = breeding, r = resident, w = wintering and u = unspecified

Figure 6-8: Other Sites of Conservation Interest - Wind Farm Site

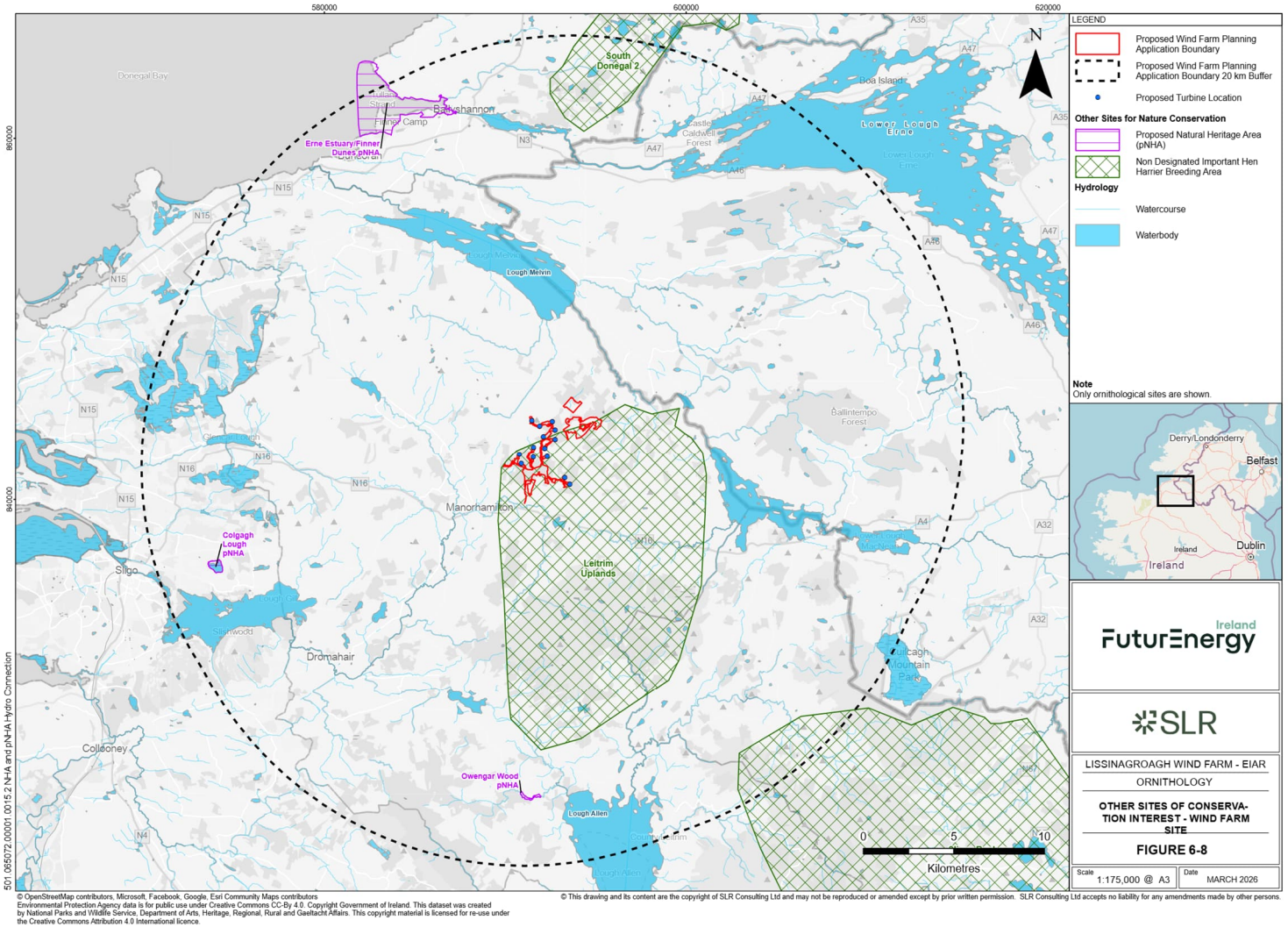


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Figure 6-9: Other Sites of Conservation Interest – GCR

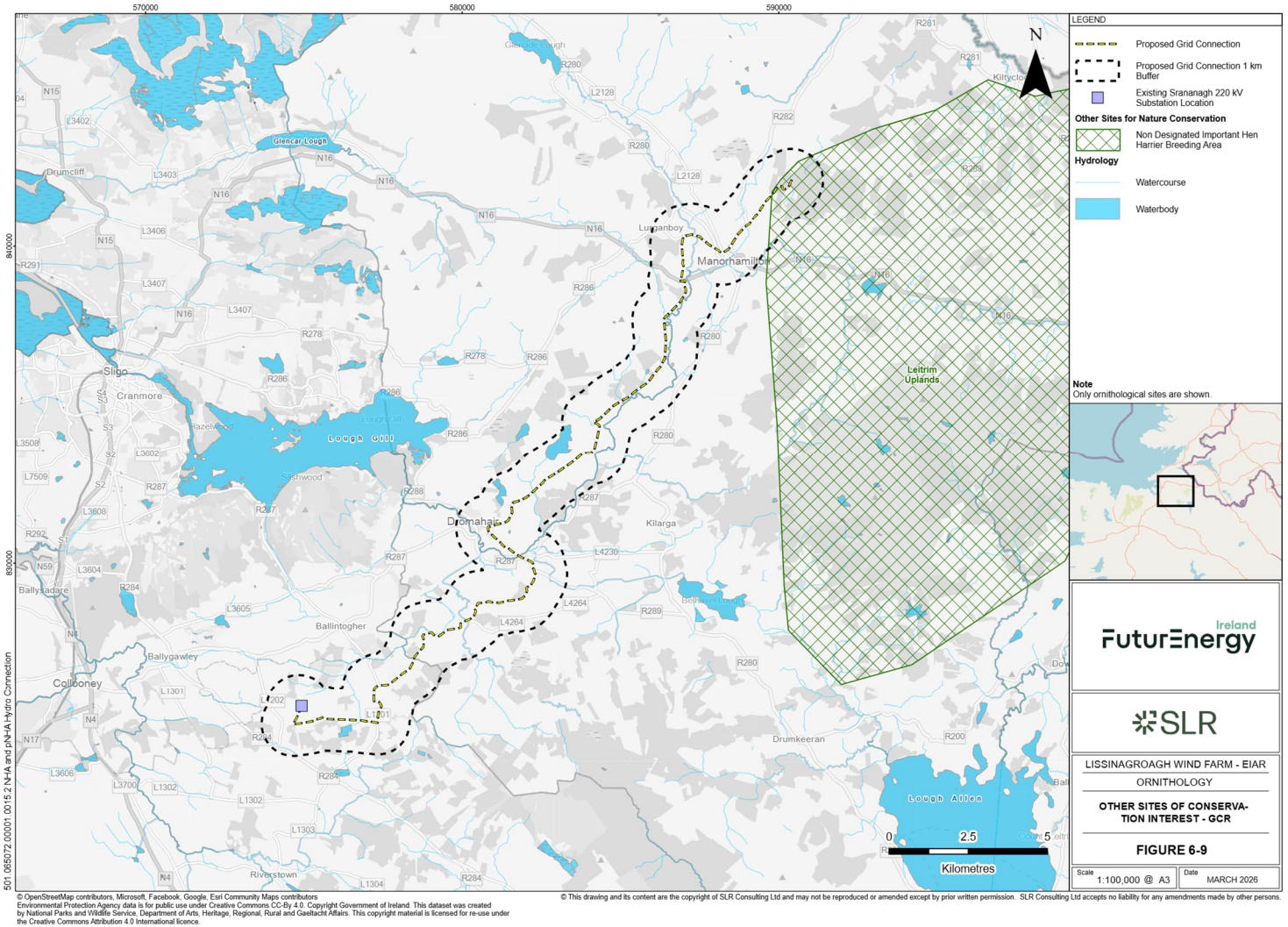
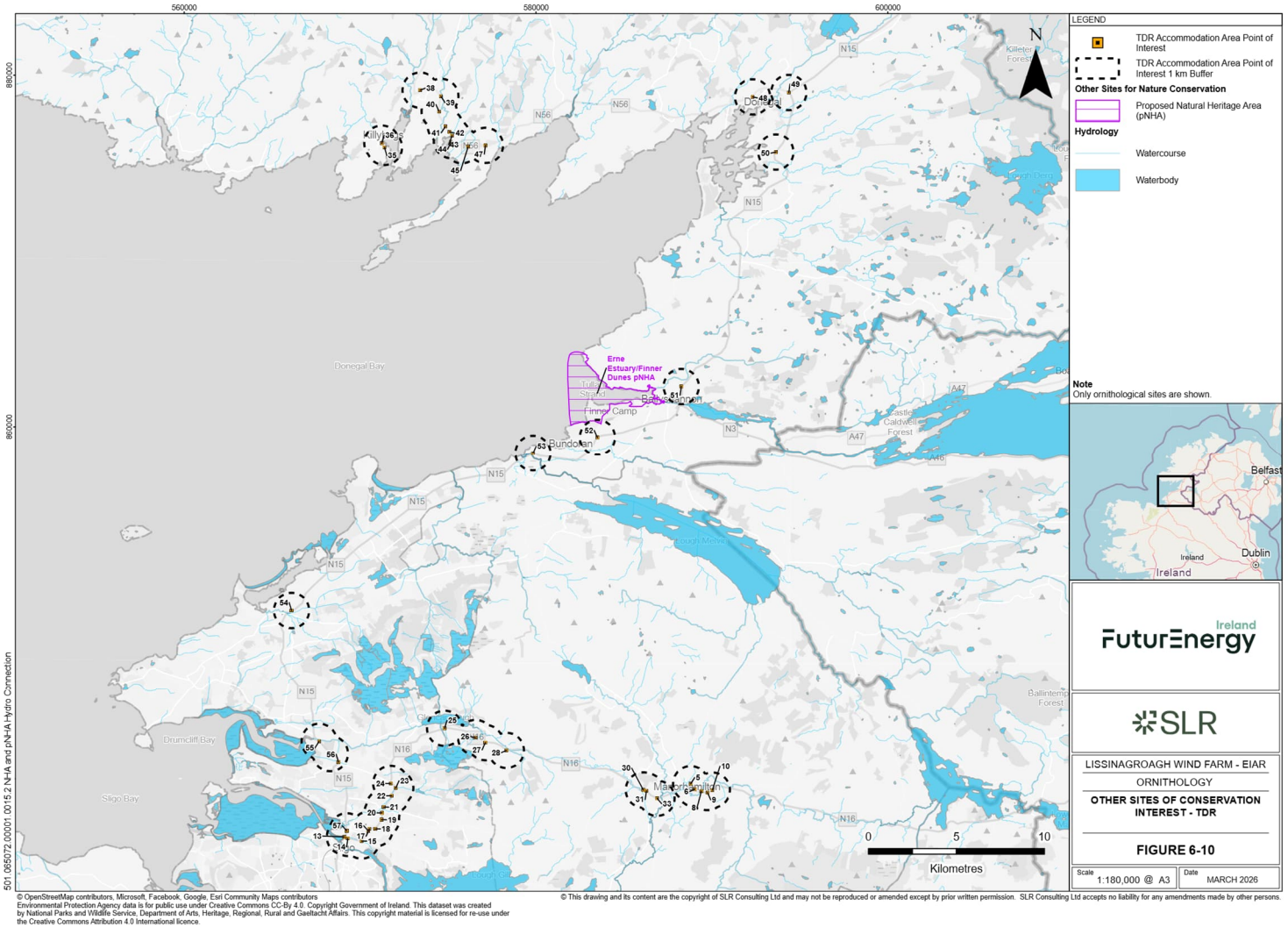


Figure 6-10: Other Sites of Conservation Interest - TDR



6.3.3 Bird Species

6.3.3.1 Proposed Wind Farm Site

6.3.3.1.1 Previous Survey Data

Survey information relating to the 2018, 2019 and 2020 breeding seasons and 2017/18 and 2018/19 non-breeding seasons (MKO, 2018a, 2018b, 2019, 2020, 2025) has been summarised below. These data have not been used for the current Chapter but provide background context, with only data from the 2020/21 non-breeding season onwards used to represent the Existing Environment and for impact assessment.

In general, the assemblage of upland and woodland species previously recorded was the same as for surveys conducted for the 2020/21 non-breeding season onwards, with similar levels of flight activity recorded also.

Across the three-breeding season and two non-breeding season surveys, confirmed breeding was recorded for hen harrier in all years with two nests identified in 2020, one of which fledged at least one chick. Common kestrel bred near but outside the proposed wind farm site in all seasons. Breeding evidence for Eurasian woodcock and common snipe was present throughout the surveys, with confirmed territories for both species in 2020. Red grouse remained present throughout, with probable breeding within the general area but outside 500 m of the proposed wind farm site. Occasional observations of European golden plover, and whooper swan were recorded.

One flock of four whooper swan was recorded during the 2017/18 non-breeding season in October 2017 but off-site, more than 500 m from the proposed turbine locations to the west. Another flock of four whooper swan was also recorded in the 2018/19 non-breeding season in November 2018, below collision risk heights and well beyond 500 m from the proposed turbine locations, again to the west near Tawnyfeacle.

No hen harrier winter roosts were recorded during the 2017/18 and 2018/19 non-breeding season.

Peregrine falcon was recorded in earlier survey datasets but was not detected during the first four years of surveys informing the current assessment. The species was observed once in the 2017/18 non-breeding season survey, once in the 2019 breeding season survey, and once in the 2020 breeding season survey. It was subsequently recorded again in the 2025 breeding season. Across all survey years, there was no indication of regular site use or breeding activity, and the species is therefore assessed as an occasional visitor.

Barnacle goose *Branta leucopsis* was also recorded in the 2017/18 non-breeding season, comprising a flock of 23 birds flying over the collision risk zone during an October vantage point survey. No further sightings were made in any subsequent survey and there was no evidence of regular site usage.

There were no records of golden eagle *Aquilla chrysaetos*, osprey *Pandion haliaetus* and white-tailed eagle *Haliaeetus albicilla* in the previous survey data. However, NPWS consultation in March 2026 identified a tentative (non-confirmed) breeding attempt by white-tailed eagle in 2025 c.5-6 km from the proposed wind farm site.

The CEDaR data request showed that there are no species of migratory birds recorded at the proposed project site within the dataset informing this assessment that are also known to occur

regularly within Northern Ireland. While osprey is a scarce summer migrant and has been recorded both at Lough Melvin and during surveys at the proposed project, its migratory behaviour involves long-distance movements to Africa (Mackrill, 2024) rather than cross-border movements within Ireland, and therefore does not give rise to any meaningful transboundary pathway (see Section 6.4.8).

6.3.3.1.2 Flight Activity Surveys

A summary of the 16 primary target species recorded during flight activity surveys undertaken from the 2020-21 non-breeding season onwards is given in Table 6-8. This represents a summary of the raw data presented in Appendices 6-2 to 6-9 so includes all recorded flights, not just those within 500 m of proposed turbine locations (the collision risk zone). Thus, this table differs to that used for CRM shown in Appendix 6-14, which exclusively focuses on those within the collision risk zone, and uses slightly different seasonal definitions (see Section 6.2.5.2).

Flight activity was low for most species throughout the study period. The main exceptions were for common kestrel, common snipe, lesser black backed gull, and breeding hen harrier, with concentrations of flight activity around nest sites for the latter species.

Note there are some minor discrepancies in the number of flight lines reported in this Chapter and in Appendices 6-2 to 6-9 as the results in Appendices 6-2 to 6-9 are framed in terms of 'observations' rather than flight lines. Some observations in these appendices are of stationary birds and so the results in this Chapter and figures reflect flying birds only given the survey type (flight activity surveys). All subsequent impact assessment for collision risk is based on flight lines only.

Table 6-8: Summary of Flight Activity Survey Results for Primary Target Species

Species	Number of Flight Lines per Season								Peak Count in Any Single Flight Line	Cumulative Number of Birds	Total Time Spent at Collision Risk Heights ("CRH") (s)	Any Flight Lines Within Collision Risk Zone
	NB 20/21	B 21	NB 21/22	B 22	B 23	B 24	B 25	Total				
Black-headed gull *Chroicocephalus ridibundus*	-	-	-	1	11	2	2	16	134	349	5,880	Yes
Common kestrel *Falco tinnunculus*	2	3	7	11	8	28	16	74	2	72	17,496	Yes
Common snipe *Gallinago gallinago*	6	8	10	10	25	74	52	181	21	398	29,749	Yes
Eurasian woodcock	4	-	3	1	1	-	-	9	1	9	13	No
European golden plover	1	4	12	3	-	2	-	22	100	739	3,376	Yes
Great cormorant	-	-	-	-	1	1	1	3	3	6	340	Yes
Hen harrier	5	79	11	24	34	17	8	178	4	196	10,494	Yes
Herring gull	-	-	-	-	4	-	2	6	18	33	2,060	Yes
Lesser black-backed gull	-	2	-	8	19	27	15	71	37	475	11,706	Yes
Little egret *Egretta garzetta*	-	-	-	-	2	-	-	2	3	5	320	No
Mallard	-	-	-	-	1	-	1	2	13	16	334	No
Merlin	1	-	-	1	1	5	3	11	1	10	170	Yes
Peregrine	1	-	-	-	-	-	2	3	1	3	195	Yes

Species	Number of Flight Lines per Season								Peak Count in Any Single Flight Line	Cumulative Number of Birds	Total Time Spent at Collision Risk Heights ("CRH") (s)	Any Flight Lines Within Collision Risk Zone
	NB 20/21	B 21	NB 21/22	B 22	B 23	B 24	B 25	Total				
Red grouse	2	-	-	1	1	-	-	4	1	4	0	Yes
White-tailed eagle	-	-	-	-	1	1	2	4	1	5	1,840	Yes
Whooper swan	-	-	1	-	-	-	-	1	8	8	50	No

An overview of the flight activity data for each IOF species collected is given in Figures 6-11 to 6-25, with the exception of hen harrier flight activity, as the patterns of flight activity are strongly associated with nesting locations (see Section 6.3.3.1.3.1.1 for further information on treatment of sensitive ornithological data).

Figure 6-11: Overview of Flight Activity Data for All Species Except Hen Harrier: Black-Headed Gull

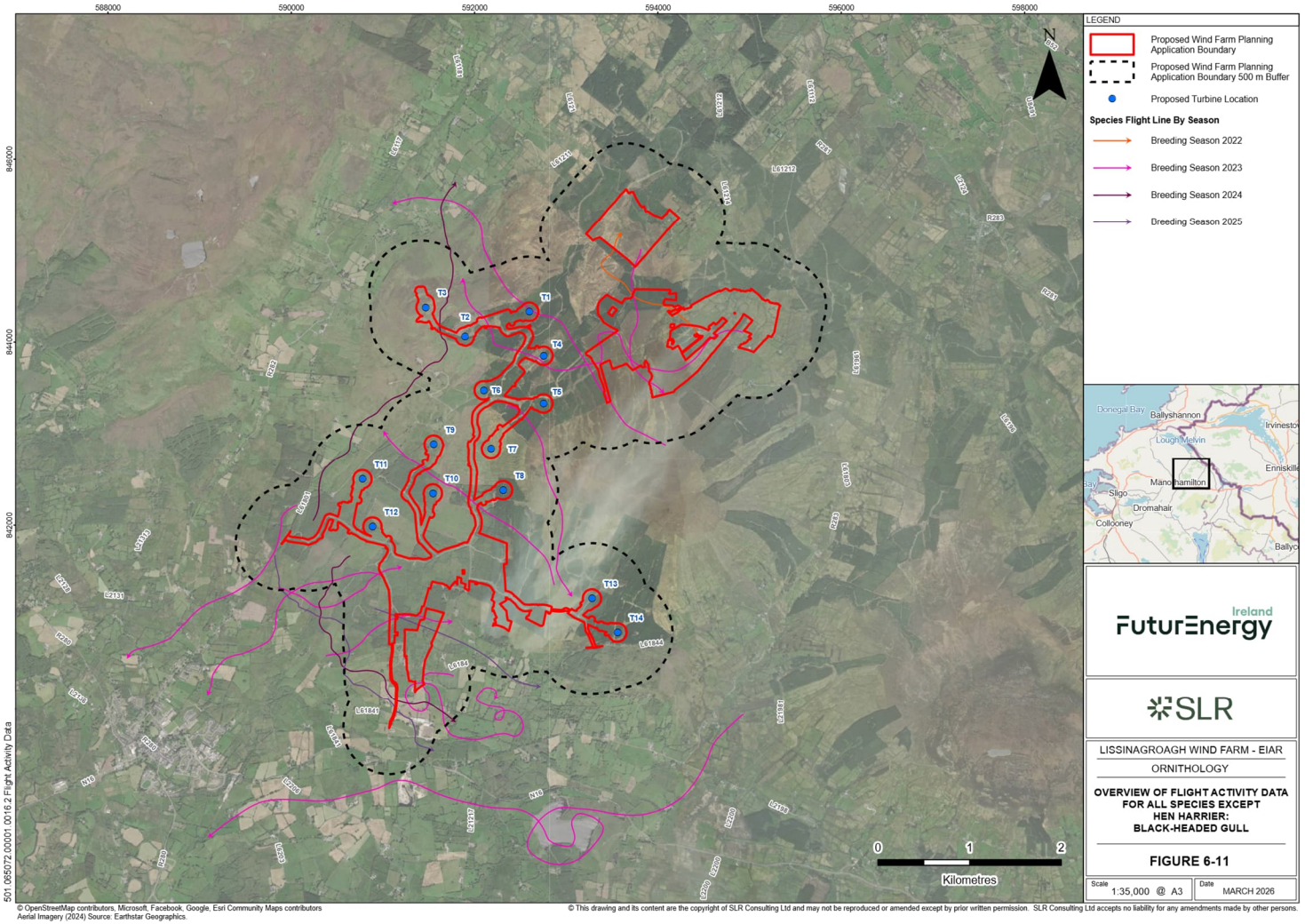


Figure 6-12: Overview of Flight Activity Data for All Species Except Hen Harrier: Common Kestrel

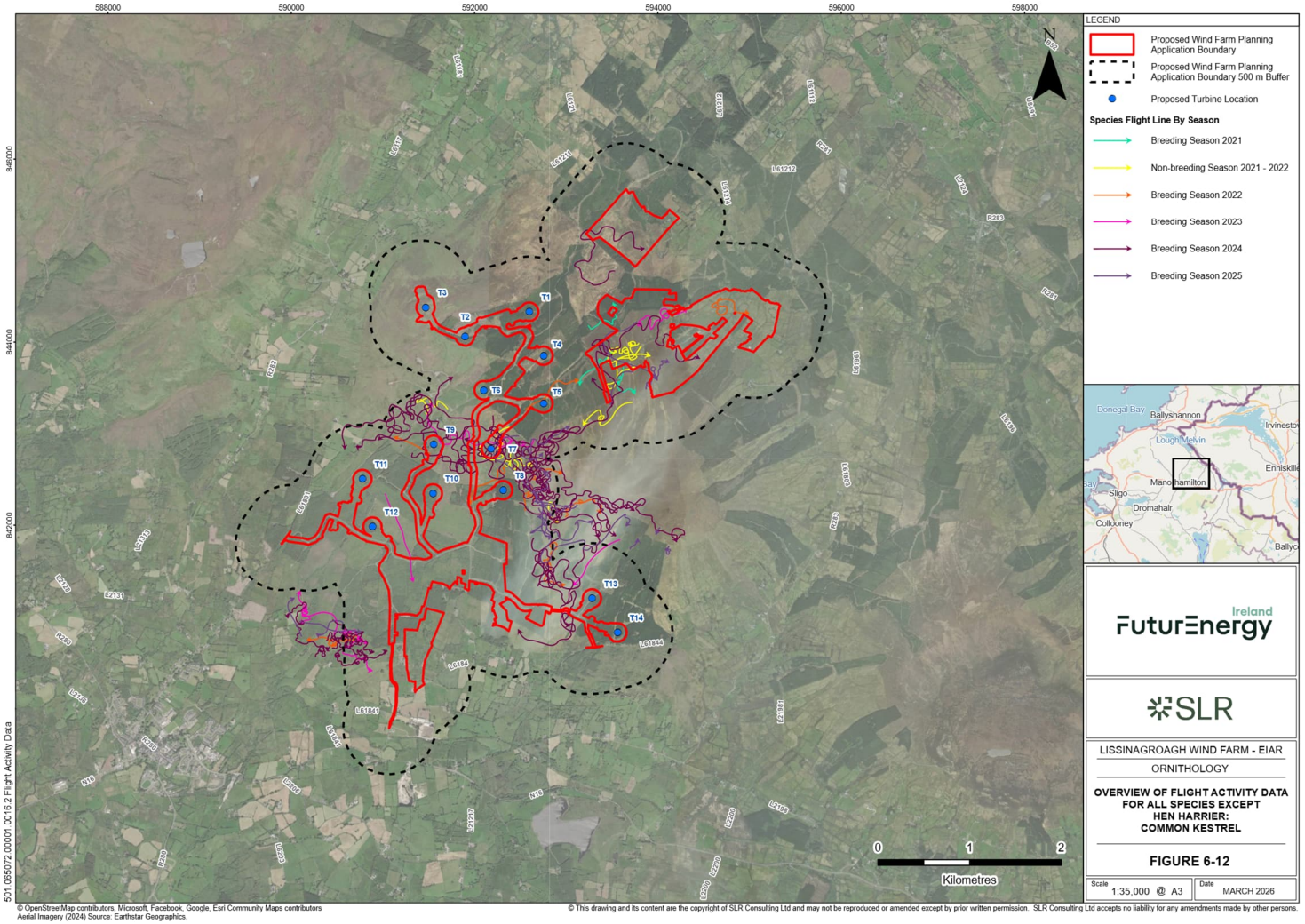


Figure 6-13: Overview of Flight Activity Data for All Species Except Hen Harrier: Common Snipe

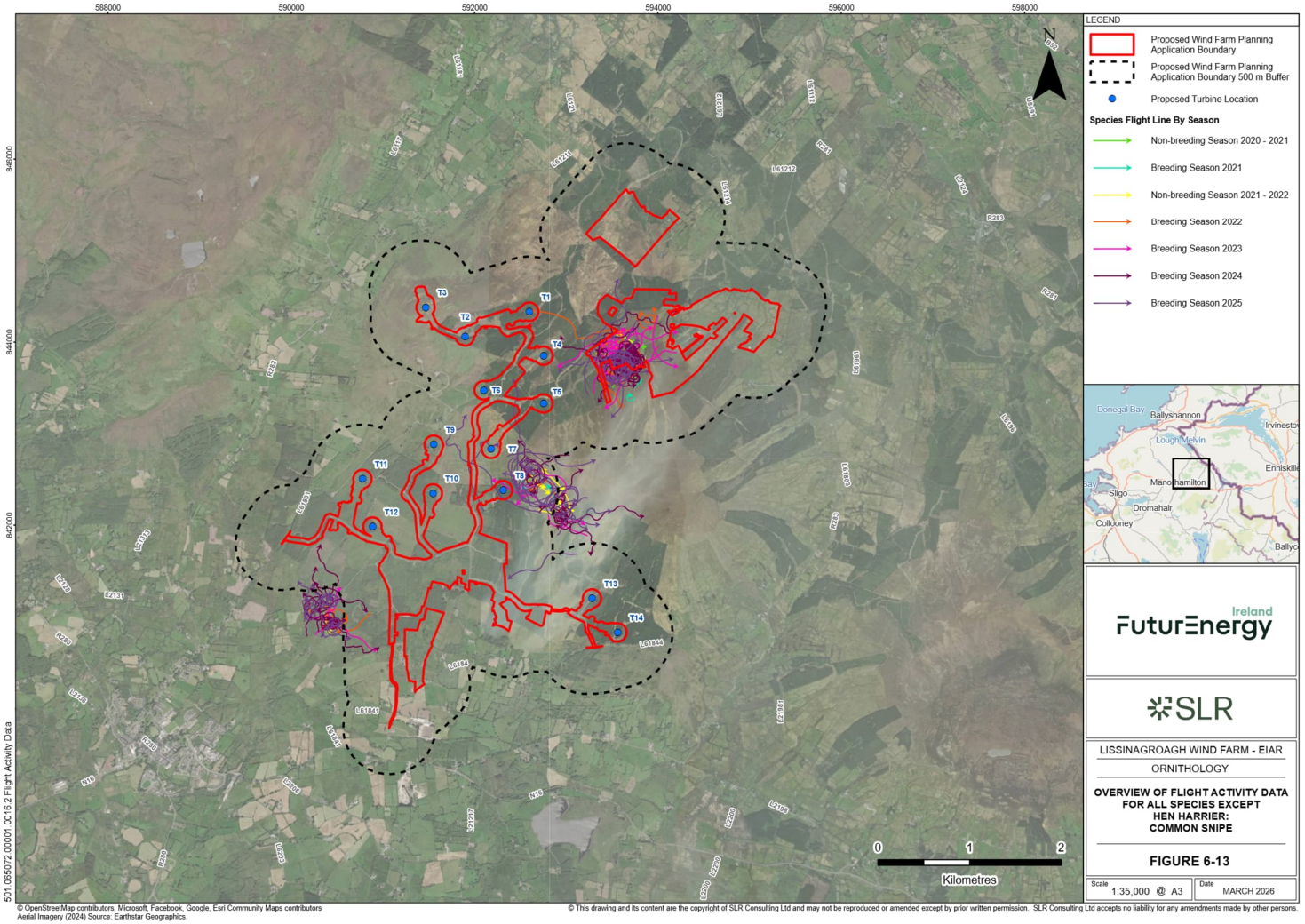


Figure 6-14: Overview of Flight Activity Data for All Species Except Hen Harrier: Eurasian Woodcock

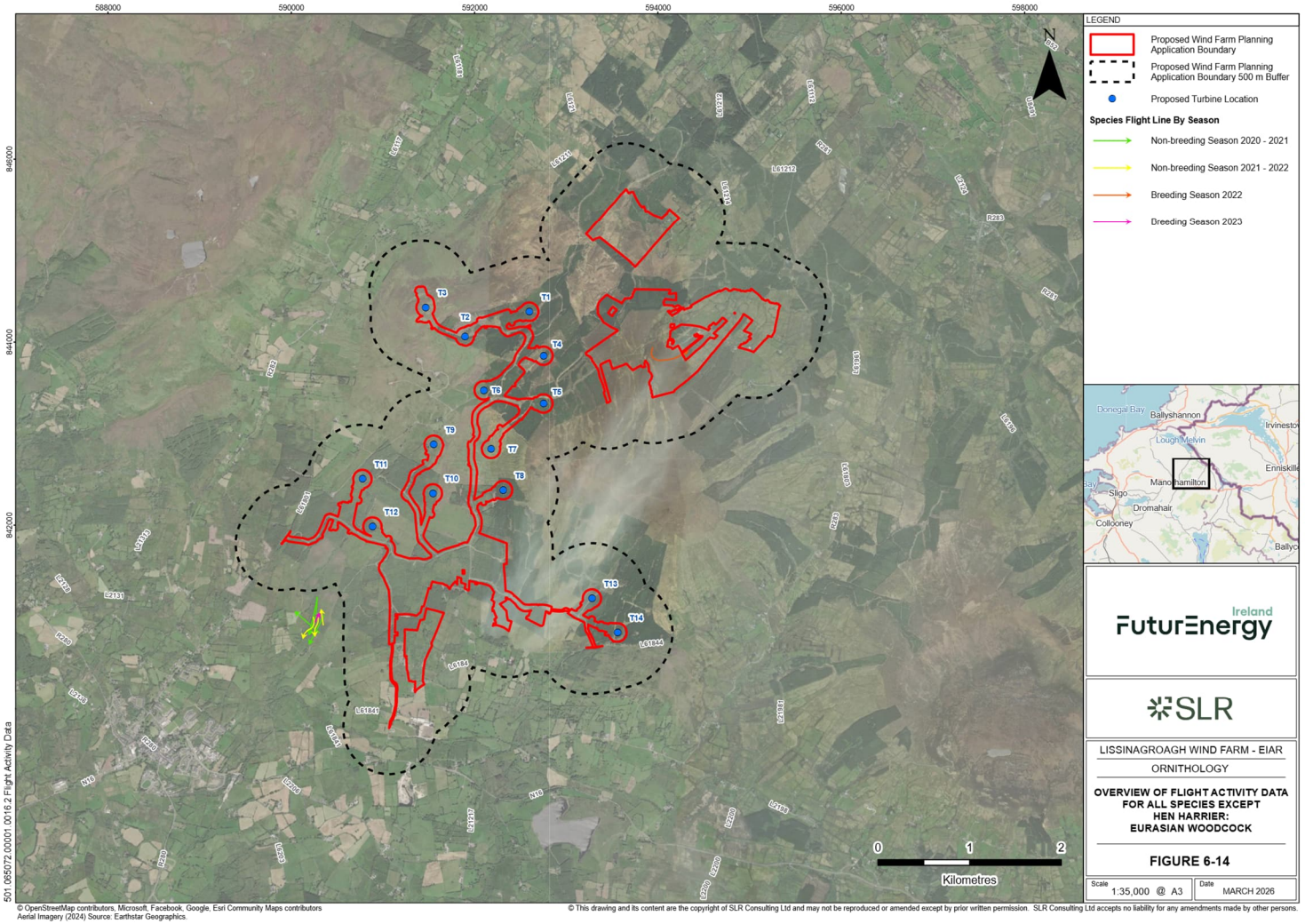


Figure 6-15: Overview of Flight Activity Data for All Species Except Hen Harrier: European Golden Plover

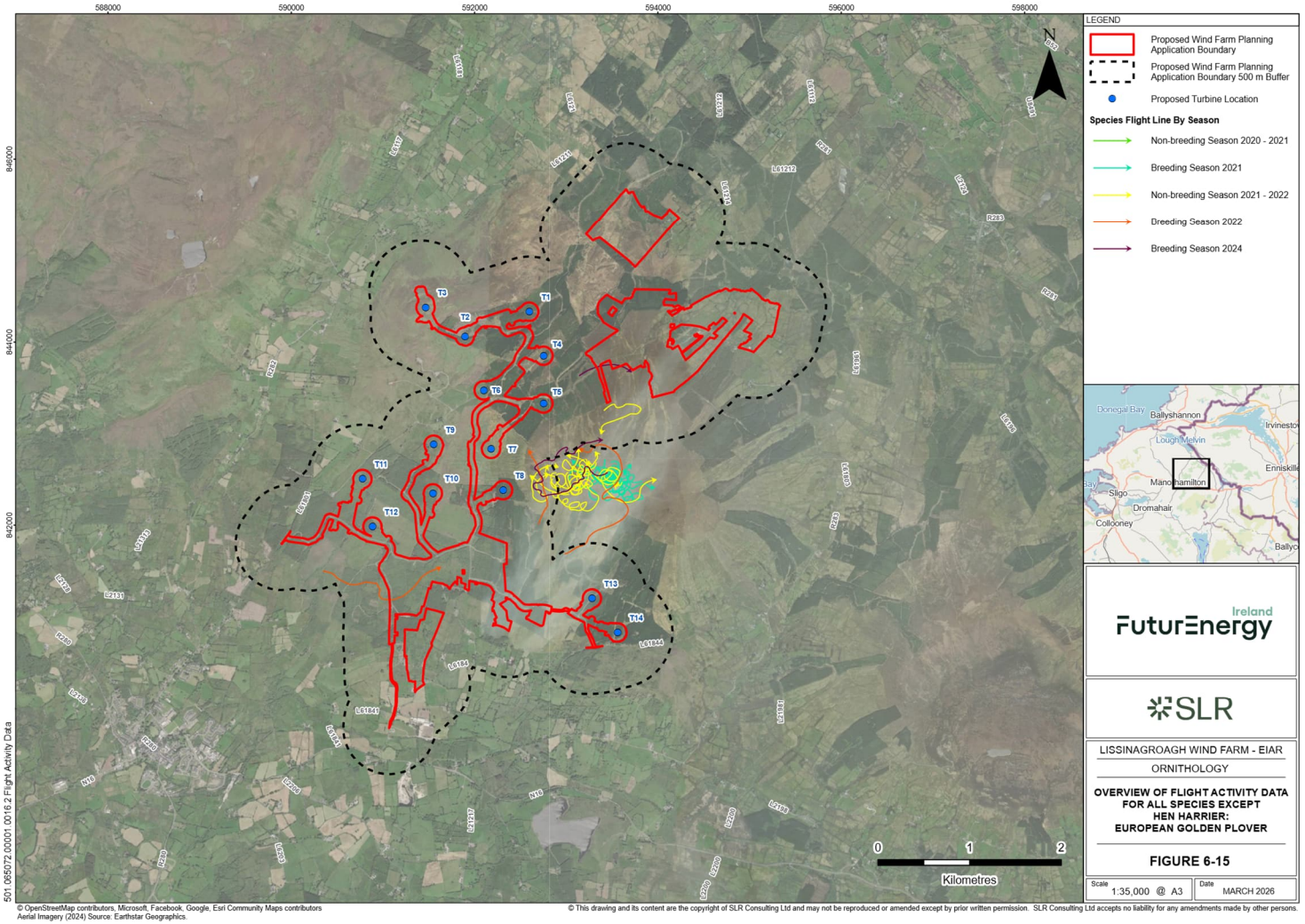


Figure 6-16: Overview of Flight Activity Data for All Species Except Hen Harrier: Great Cormorant

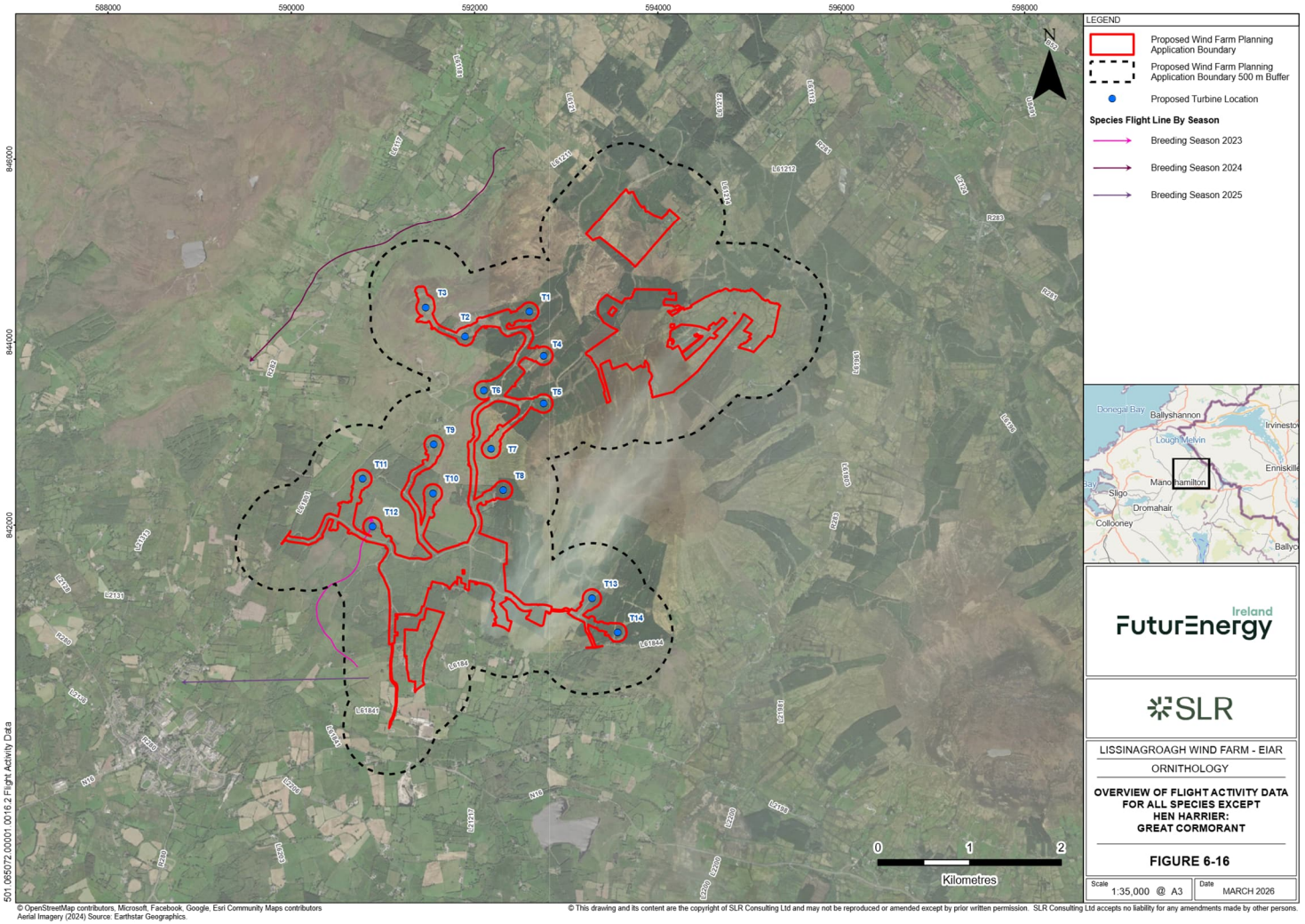


Figure 6-17: Overview of Flight Activity Data for All Species Except Hen Harrier: Herring Gull

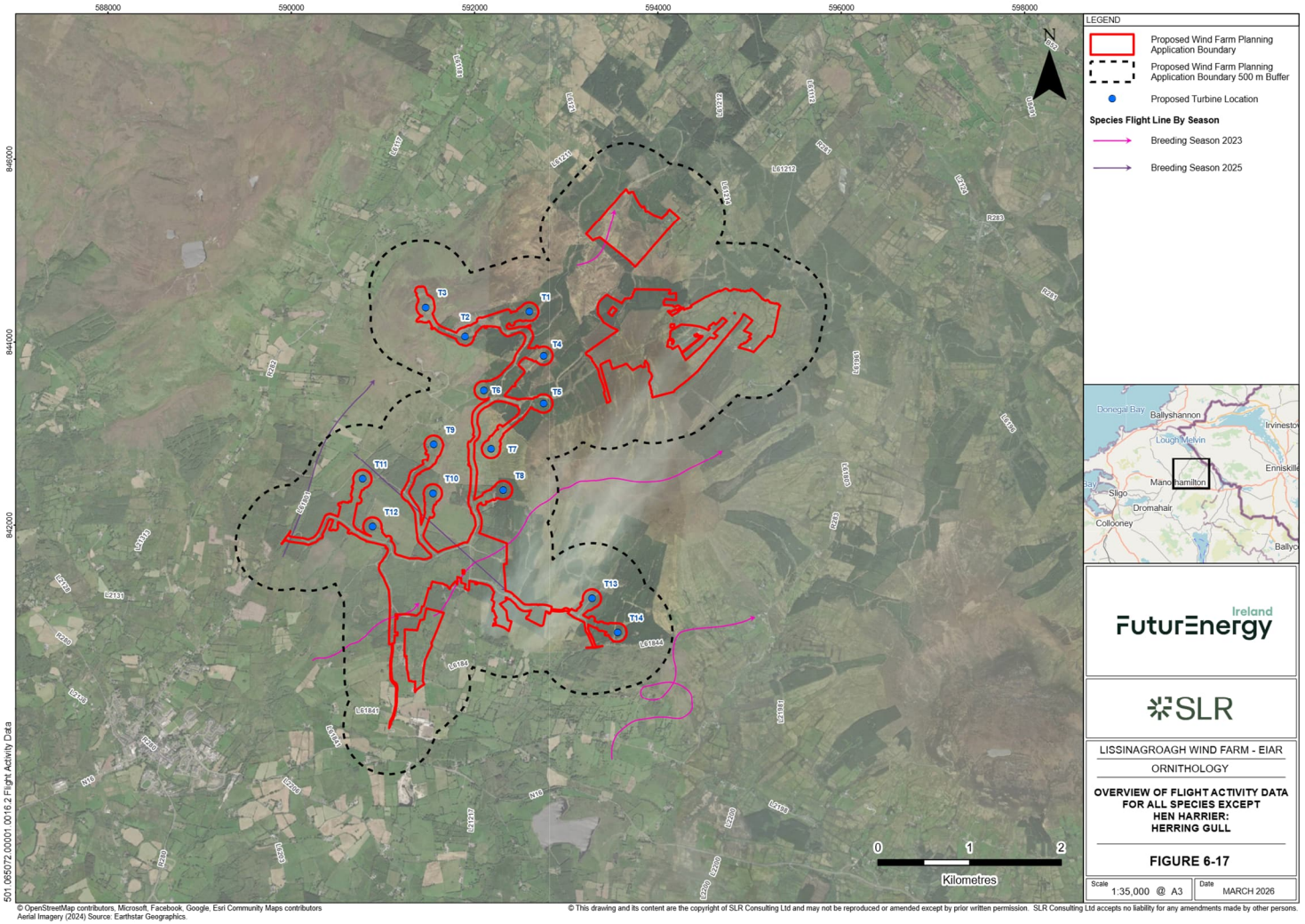


Figure 6-18: Overview of Flight Activity Data for All Species Except Hen Harrier: Lesser Black-Backed Gull

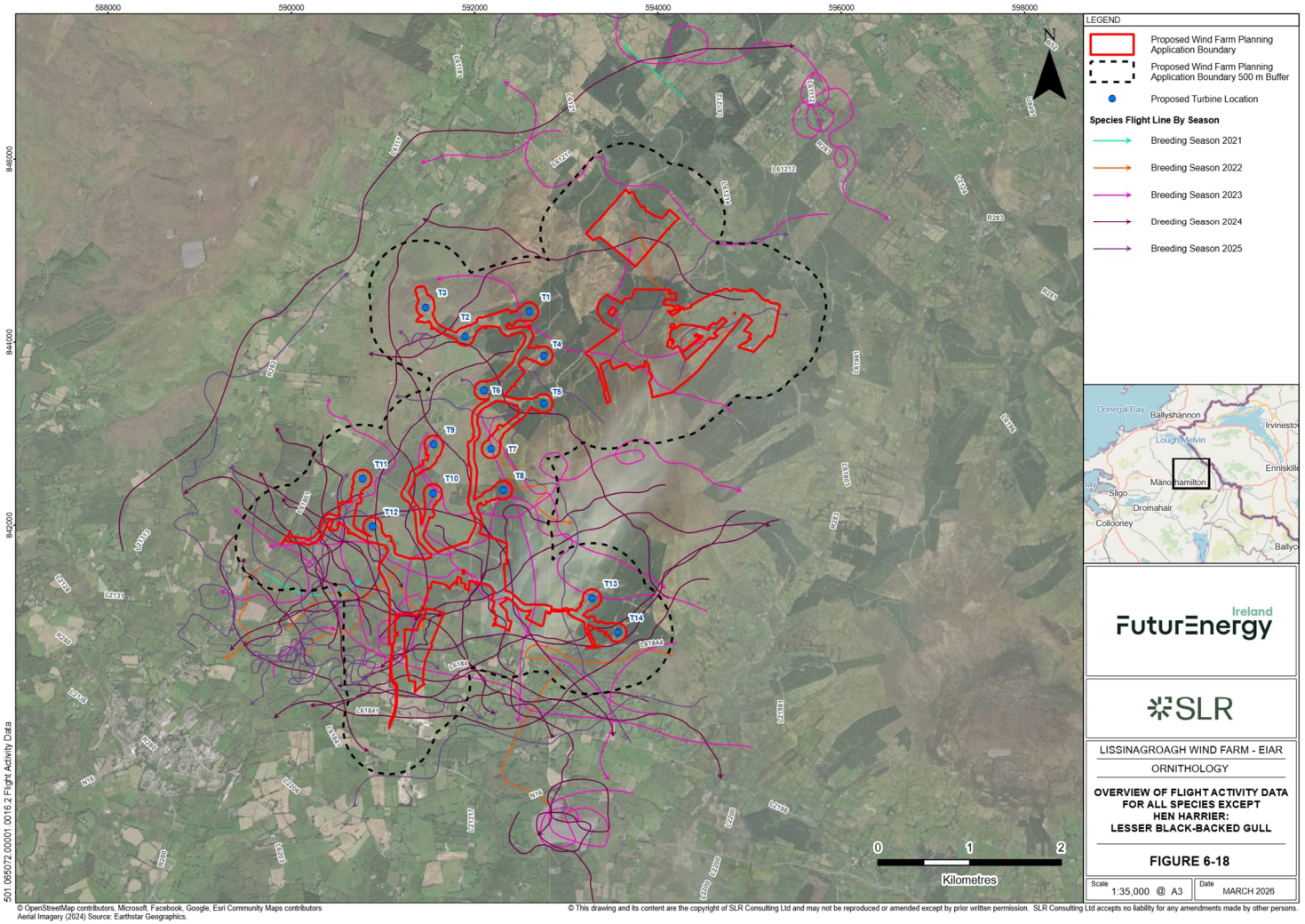


Figure 6-19: Overview of Flight Activity Data for All Species Except Hen Harrier: Little Egret

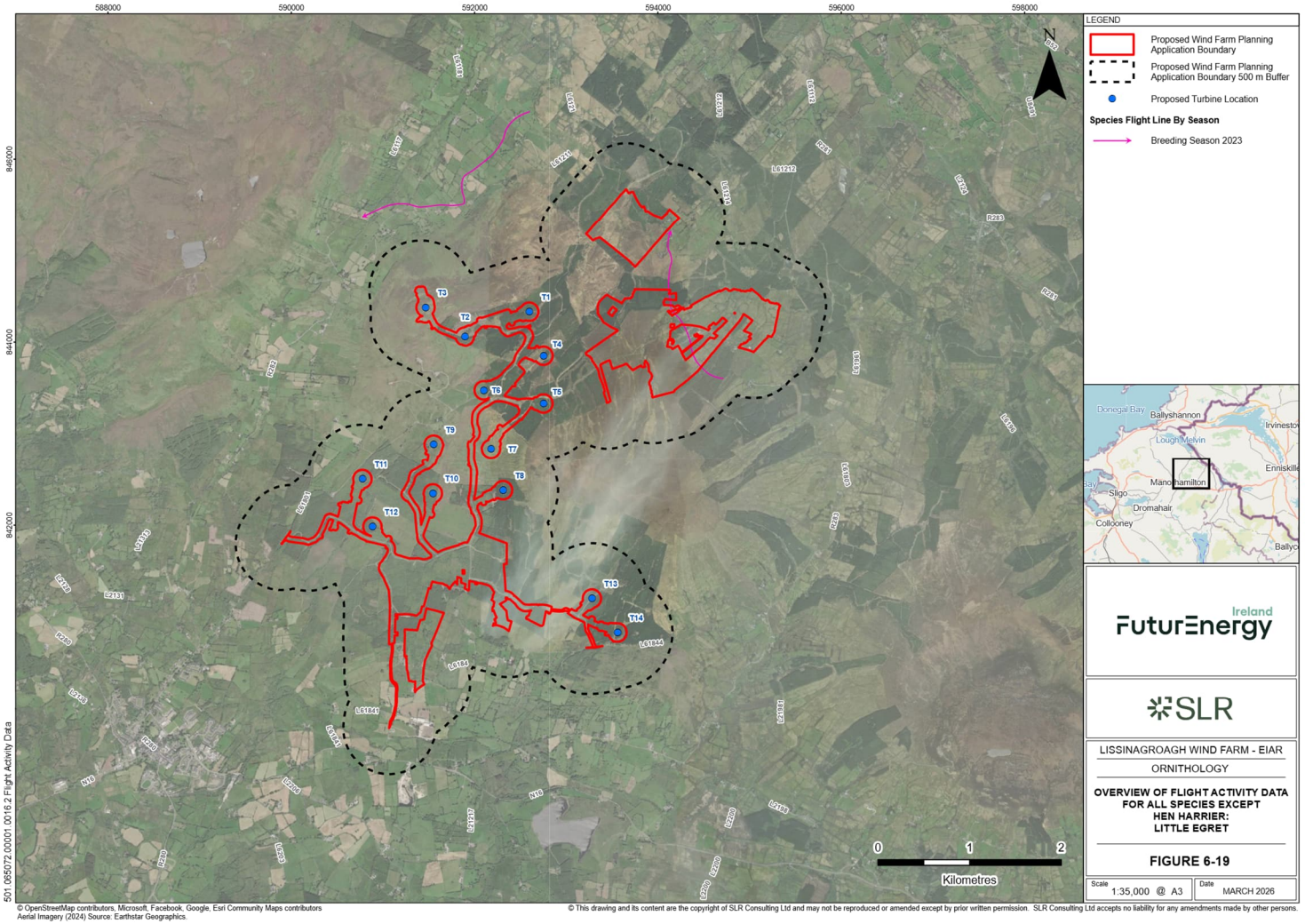


Figure 6-20: Overview of Flight Activity Data for All Species Except Hen Harrier: Mallard

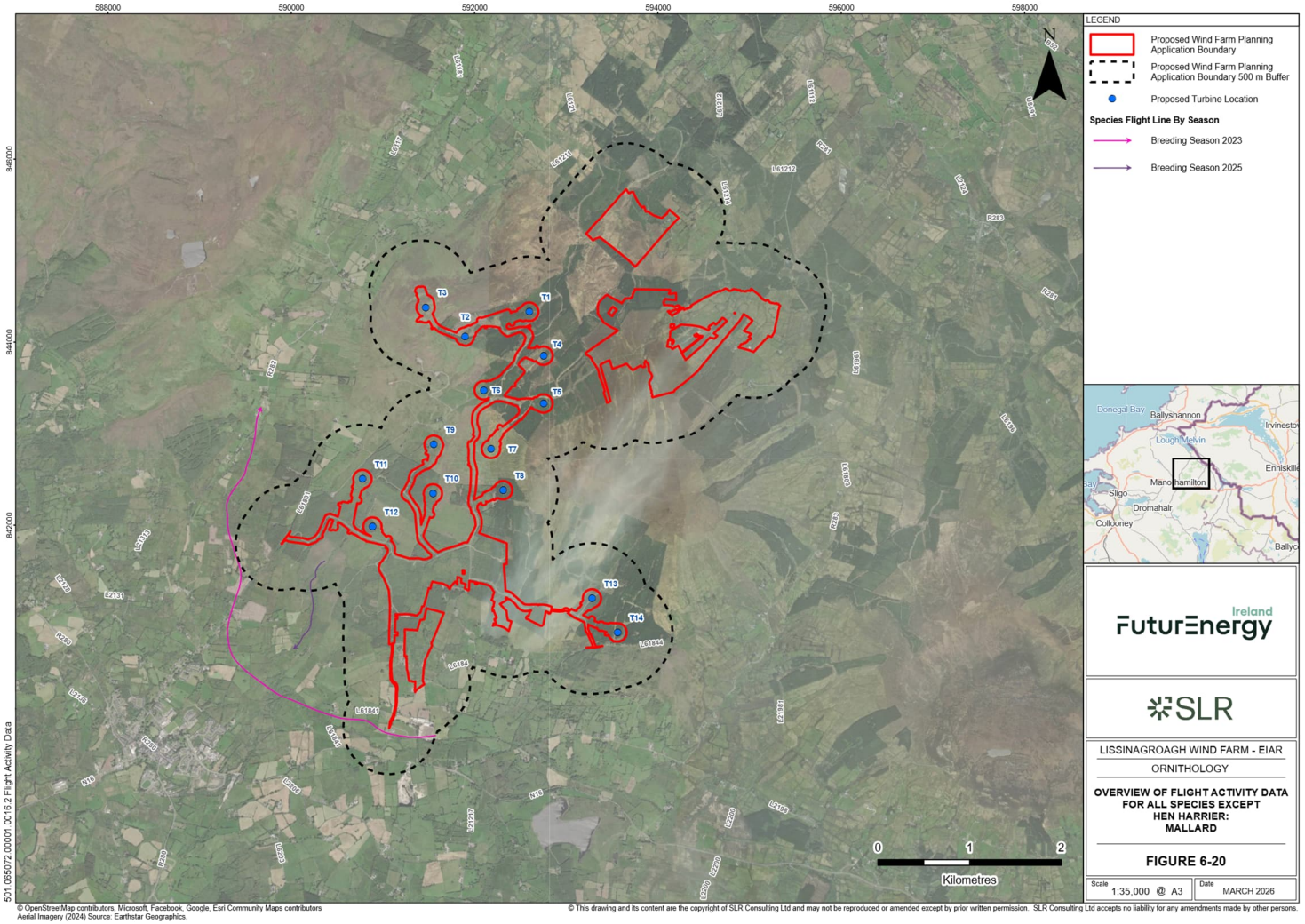


Figure 6-21: Overview of Flight Activity Data for All Species Except Hen Harrier: Merlin

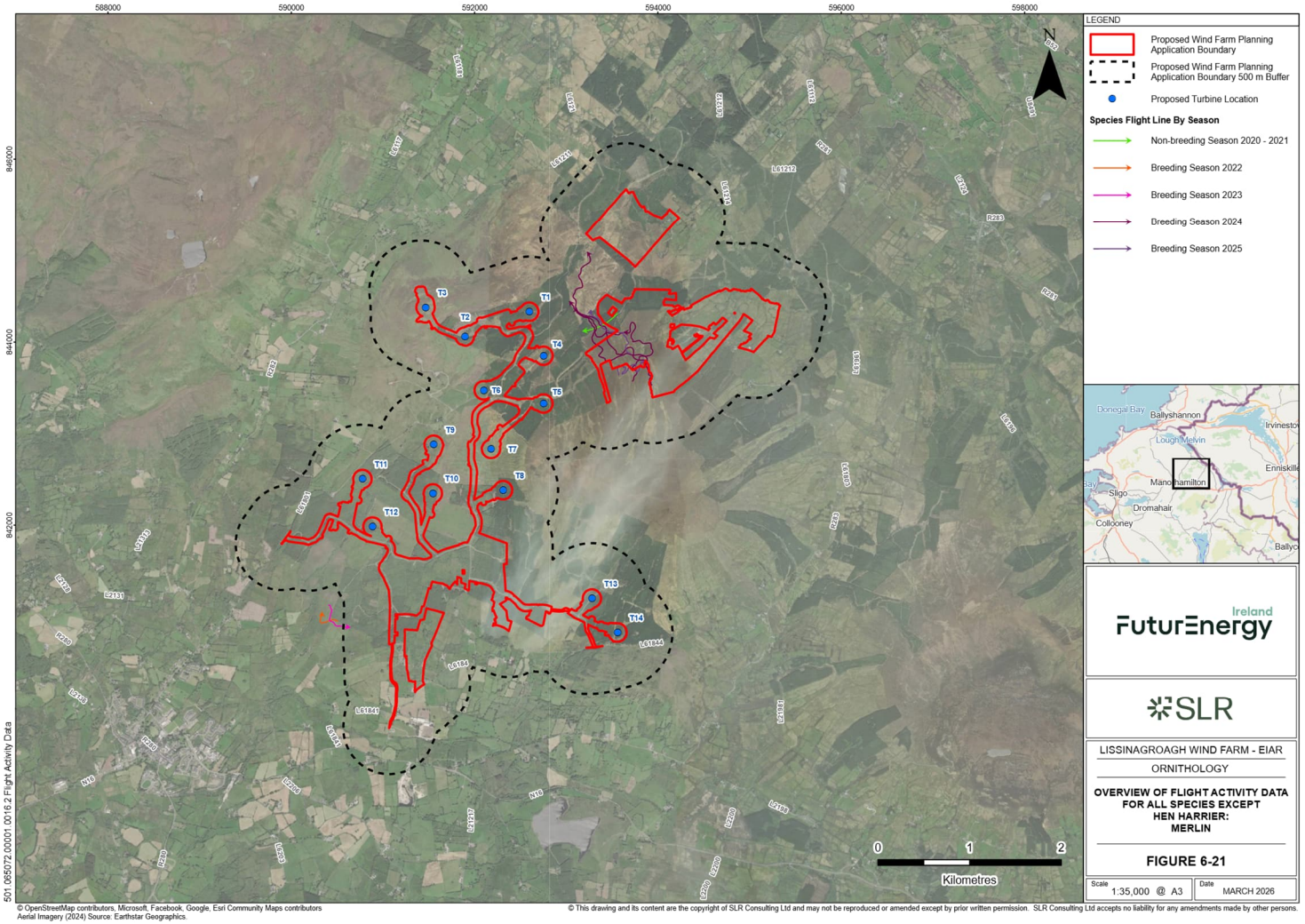


Figure 6-22: Overview of Flight Activity Data for All Species Except Hen Harrier: Peregrine

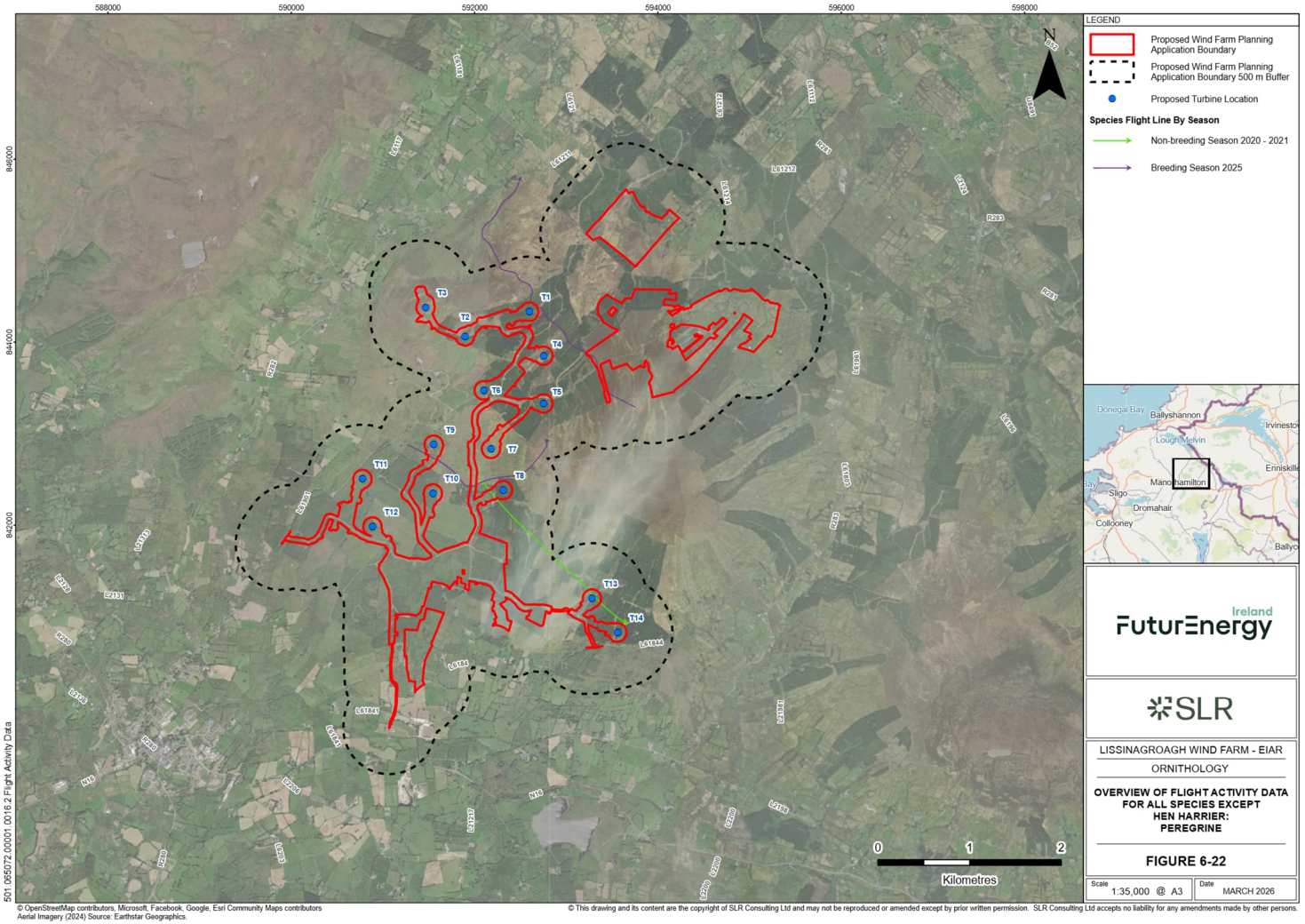


Figure 6-23: Overview of Flight Activity Data for All Species Except Hen Harrier: Red Grouse

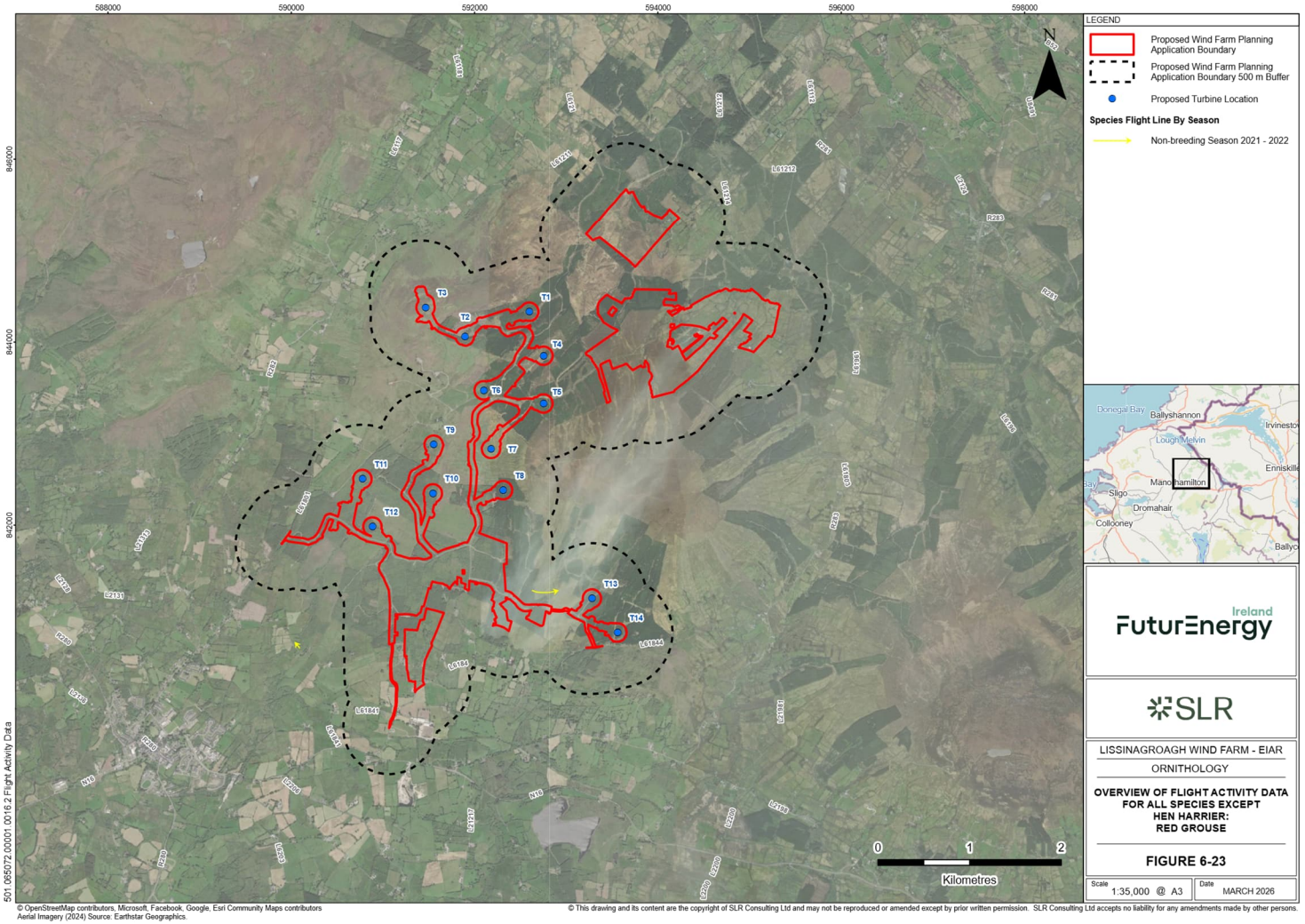


Figure 6-24: Overview of Flight Activity Data for All Species Except Hen Harrier: White-Tailed Eagle

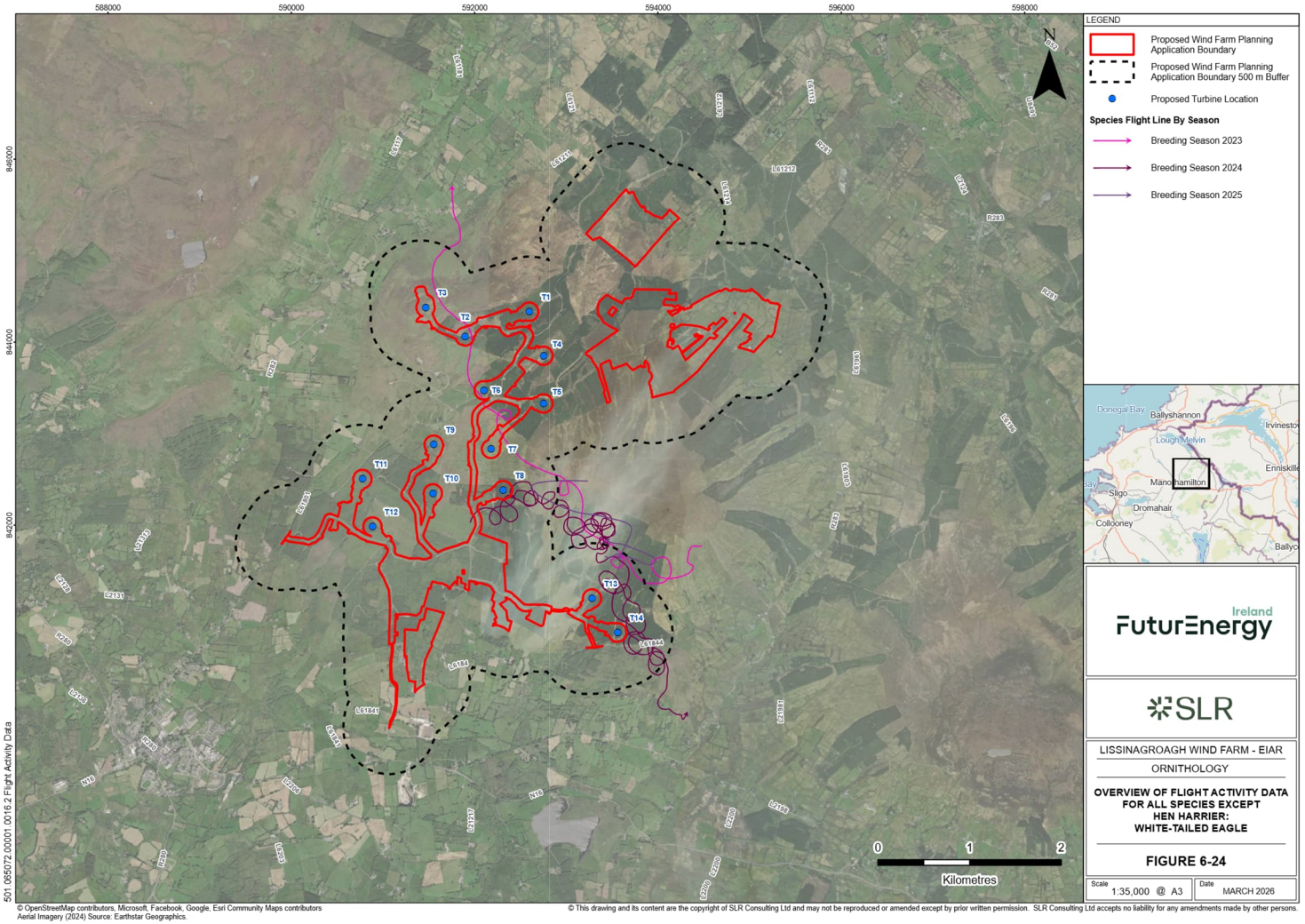
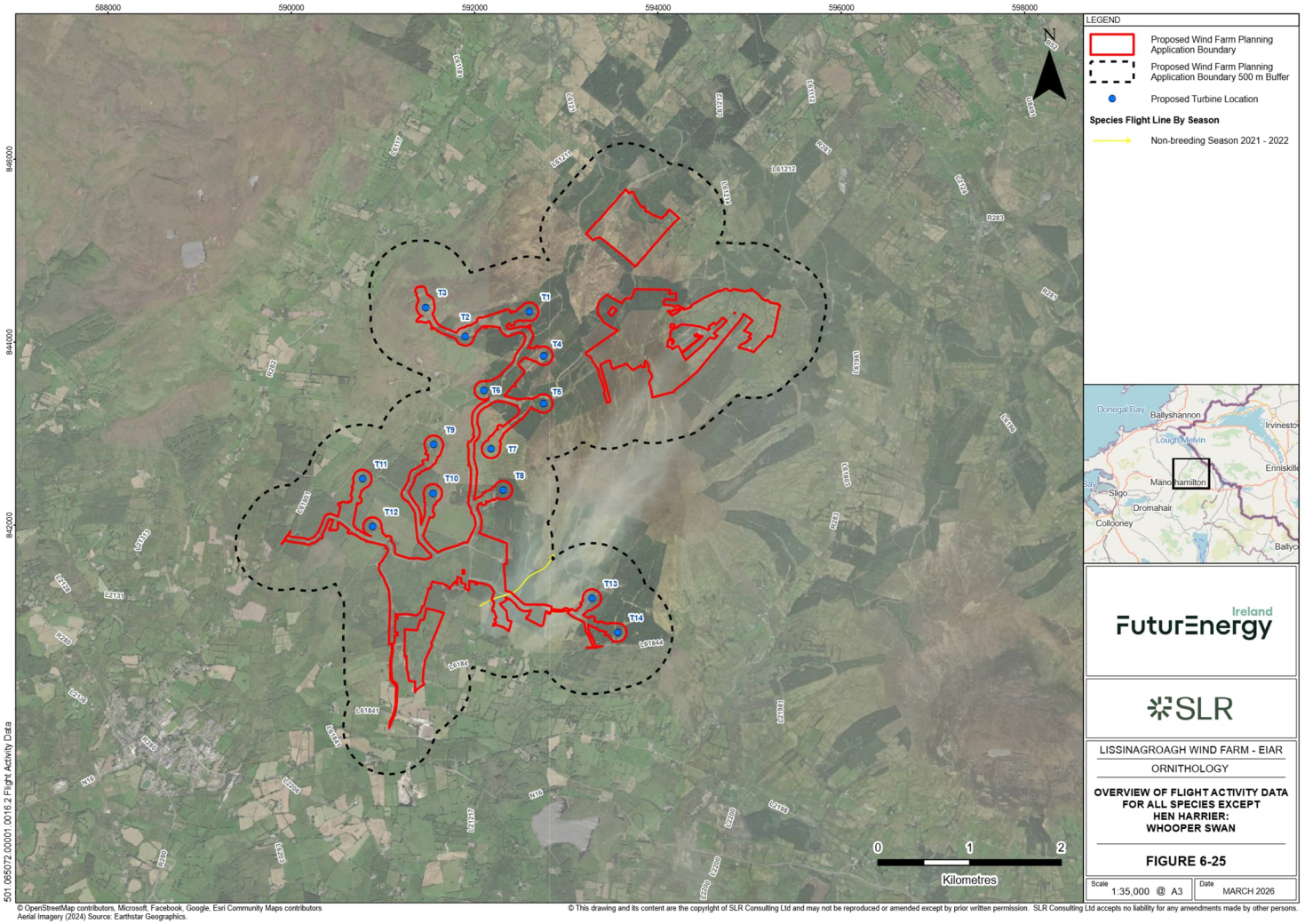


Figure 6-25: Overview of Flight Activity Data for All Species Except Hen Harrier: Whooper Swan



6.3.3.1.3 Distribution and Abundance Surveys

A holistic summary of species recorded during all non-flight activity (i.e. distribution and abundance) survey types from the 2020-21 non-breeding season onwards is given in Table 6-9. Further details are provided in Appendices 6-2 to 6-9. Note that only primary target species and any other BoCCI4 red-listed non-primary target species have been presented in the below summary table.

Table 6-9: Summary of Distribution and Abundance Survey Type Results[11]

Species	Survey Types Where Recorded	Peak Count Across All Surveys	Where Recorded	Breeding Status
Common kestrel	Breeding walkover surveys (B21 and B22) Breeding raptor surveys (B22, B23, B24 and B25) Winter walkover surveys (NB21/22)	2 (B), 1 (NB)	B: within 500 m and 1 km of proposed wind farm site, mostly in grassland areas NB: within proposed wind farm site, mostly in grassland areas	Possible breeding in 2021 Confirmed breeding in 2022 off-site, two fledged young and juveniles Possibly breeding in 2023 off-site, pair hunting Non-breeding in 2024 Confirmed breeding in 2025 off-site, two juveniles seen
Common snipe	Breeding walkover surveys (B21, B22, B23 and B24) Winter walkover surveys (NB20/21 and NB21/22) Breeding raptor surveys (B25)	2 (B), 3 (NB)	B: within proposed wind farm site and surrounding 500 m, mostly off-site NB: within proposed wind farm site	Probable breeding in 2021, 2022, 2023, 2024 and 2025 (likely two territories off-site in 2021 and 2022, five territories off-site in 2023, four territories off-site and three territories on-site in 2024, and four territories off-site in 2025)

[11] B = breeding season and NB = non-breeding season

Species	Survey Types Where Recorded	Peak Count Across All Surveys	Where Recorded	Breeding Status
Common swift *Apus apus*	Breeding walkover surveys (B21 and B22)	3 (B)	B: within proposed wind farm site and 500 m surrounding	Non-breeding in 2021 and 2022
Eurasian woodcock	Breeding woodcock surveys (B21 and B22) Winter walkover surveys (NB20/21 and NB21/22)	2 (B), 2 (NB)	B: within proposed wind farm site to south and north NB: within proposed wind farm site	Probable breeding in 2021 and 2022 (likely 2-3 territories present on-site in both years in north and south of proposed wind farm site), but most activity off-site
European golden plover	Breeding raptor surveys (B25)	113 (B)	B: within 500 m of proposed wind farm site to east	Non-breeding (likely passing through as part of migratory movements)
Golden eagle	Winter walkover surveys (NB20/21)	1 (NB)	NB: within proposed wind farm site circling over conifer plantation	Non-breeding (not observed during breeding season; immature bird)
Grey wagtail *Motacilla cinerea*	Breeding walkover surveys (B21 and B22)	2 (B)	B: within proposed wind farm site and 500 m surrounding	Possible breeding in 2021 and 2022
Hen harrier	Breeding walkover (B21 and B22) Breeding raptor surveys (B21, B22, B23, B24, B25) Winter walkover surveys (NB20/21)	9 (B), 1 (NB)	B: within site and 500 m and up to 2 km surrounding NB: within proposed wind farm site; no winter roosts present within 2 km survey area	Confirmed breeding 2021-2024. 2021: southern pair confirmed breeding on-site (three fledglings); northern pair probably breeding on-site (nest likely failed); third pair confirmed breeding c.1.5 km off-site (two fledglings). 2022: southern pair confirmed breeding c.370 m off-site (at least two fledglings). 2023: southern pair confirmed breeding c. 10 m off-site (three chicks fledged); northern pair present off-site (probable breeding but no nest was located)

Species	Survey Types Where Recorded	Peak Count Across All Surveys	Where Recorded	Breeding Status
				2024: southern pair confirmed breeding c.45 m off-site (nest likely failed); northern pair confirmed breeding c.1.8 km off-site (nest likely failed). 2025: southern and northern pair both probably breeding off-site (both nests likely failed; no exact nest locations identified); speculated a third pair could have been breeding off-site outside survey area (no nest location identified)
Lesser black-backed gull	Breeding walkover surveys (B21)	2 (B)	B: within proposed wind farm site	Non-breeding (not observed breeding)
Meadow pipit *Anthus pratensis*	Breeding walkover (B21 and B22) Winter walkover surveys (NB20/21 and NB21/22)	12 (B), 38 (NB)	B: within proposed wind farm site NB: within proposed wind farm site in NB 20/21 and within same and 500 m buffer in NB 21/22	Confirmed breeding in 2021 and 2022
Mallard	Breeding walkover surveys (B21)	1 (B)	B: within proposed wind farm site	Confirmed breeding in 2021 (in north of proposed wind farm site)
Merlin	Breeding walkover surveys (B21) Breeding raptor surveys (B21 and B23)	1 (B)	B: within proposed wind farm site	Non-breeding
Osprey	Breeding raptor surveys (B24 and B25)	1 (B)	B: within proposed wind farm site	Non-breeding

Species	Survey Types Where Recorded	Peak Count Across All Surveys	Where Recorded	Breeding Status
Peregrine	Breeding raptor surveys (B25)	1 (B)	B: within 500 m of proposed wind farm site	Non-breeding
Red grouse	Breeding walkover surveys (B21 and B22) Red grouse surveys (B22) Winter walkover (NB20/21 and NB21/22) Breeding raptor surveys (B25)	2 (B), 2 (NB)	B: within proposed wind farm site and 500 m NB: within proposed wind farm site in NB 20/21 and NB 21/22	Possible breeding in 2021 and 2025 and confirmed breeding in 2022 (likely single territory to northeast of proposed wind farm, c. 500 m off-site)
Redwing *Turdus iliacus*	Winter walkover surveys (NB20/21 and NB21/22)	75 (NB)	NB: within proposed wind farm site in NB 20/21 and within site and 500 m buffer in NB 21/22	Non-breeding (winter visitor only)
White-tailed eagle	Breeding walkover surveys (B22) Breeding raptor surveys (B22, B23, B25)	1 (B)	B: within 500 m of proposed wind farm site and c. 1 km and 2 km off-site	Non-breeding 2022: immature bird seen flying at a lough 2023: sub-adult soaring over a lough; no nesting or repeated use observed 2025: immature bird recorded on-site in Boleyboy on two occasions and once was observed roosting in August on-site.
Whooper swan	Hen harrier winter roost surveys (NB20/21)	30 (NB)	NB: c.850 m off-site and flying over northern section of proposed wind farm site (no flight heights recorded)	Non-breeding (winter visitor only)

Species	Survey Types Where Recorded	Peak Count Across All Surveys	Where Recorded	Breeding Status
	Winter walkover surveys (NB21/22)			

An overview of the breeding activity for common snipe and Eurasian woodcock as recorded by breeding walkover surveys is given in Figure 6-26 and Figure 6-27.

Figure 6-26: Overview of Breeding Activity for Common Snipe

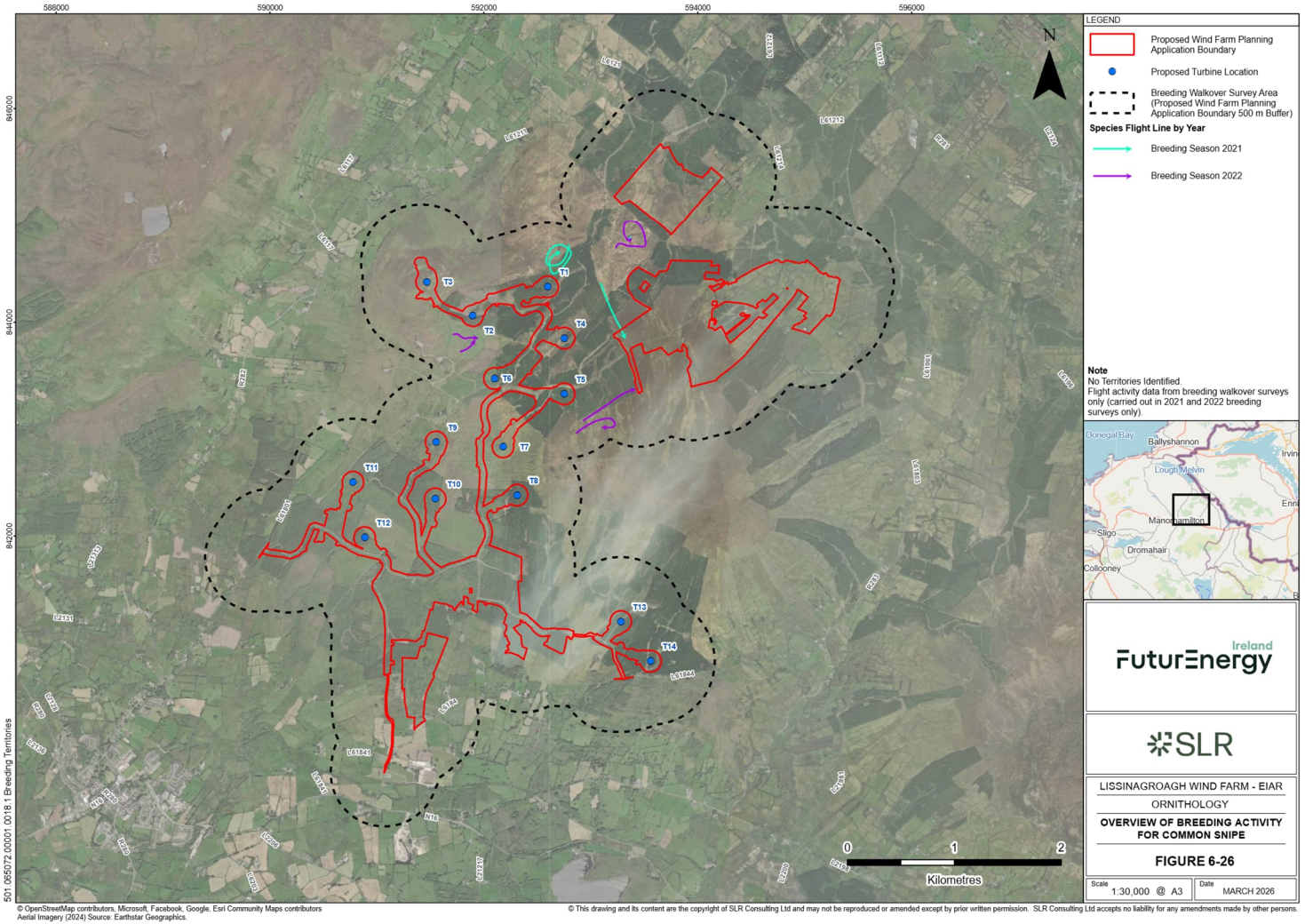
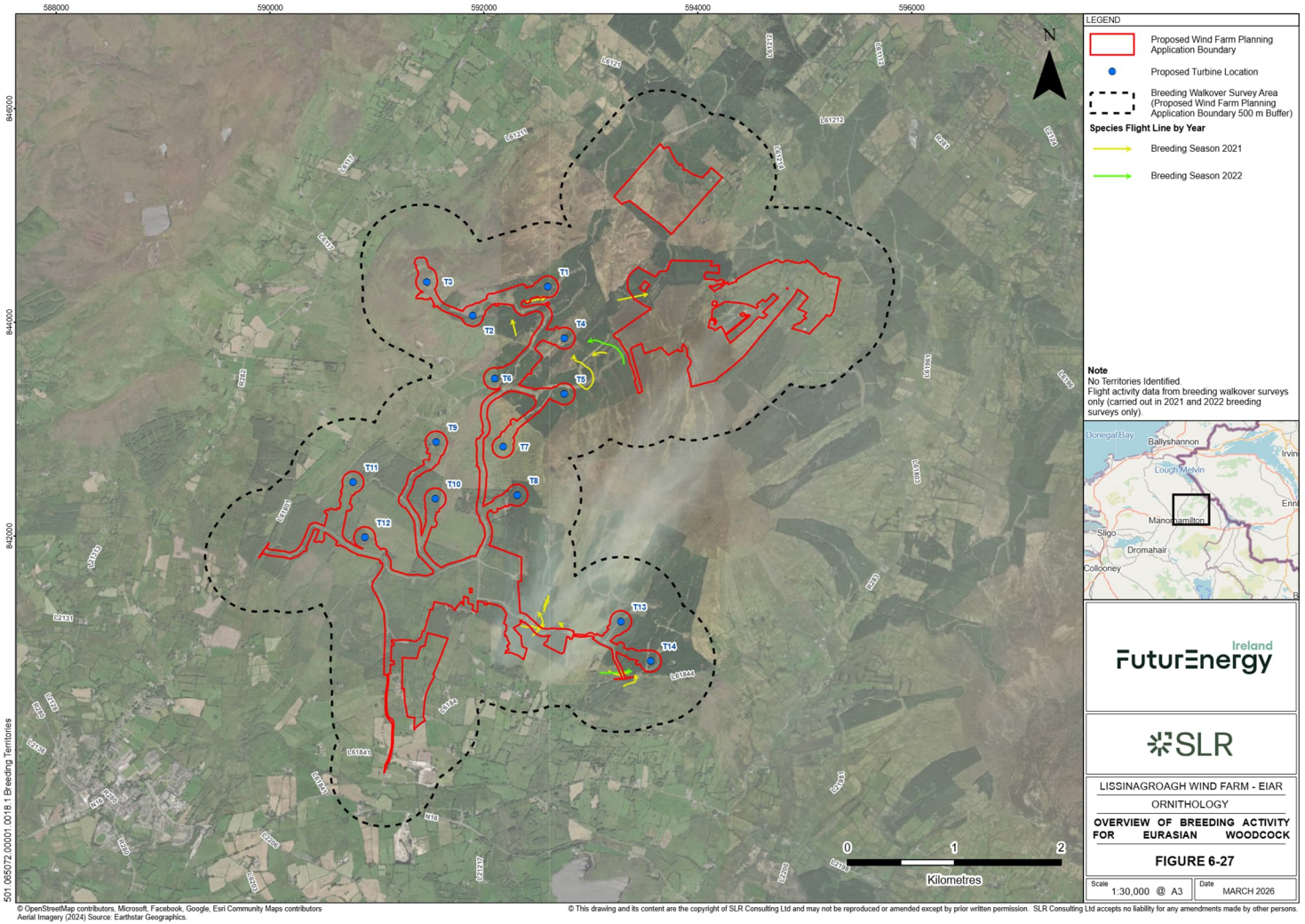


Figure 6-27: Overview of Breeding Activity for Eurasian Woodcock



6.3.3.1.3.1 Detail on Breeding Hen Harrier and Hen Harrier Foraging Surveys

Given the species' importance, a more extensive description of breeding hen harrier records has been provided below.

Surveys have consistently recorded the presence of 1-2 pairs of nesting hen harrier within the proposed wind farm site and/or the surrounding area. These comprised a 'northern' and a 'southern' pair, with the southern pair showing greater consistency of site use. In addition, a third pair was recorded approximately 1.5 – 1.8 km northeast of the proposed wind farm site boundary in 2021 and 2024. Historical, pre-2021 surveys (MKO, 2018a, 2020, 2025) recorded successful nesting attempts by the 'southern' pair in 2018, 2019 and 2020 also.

The southern pair attempted to nest annually between 2021 and 2025, using a corridor approximately 2.5 km in length and shifting nest locations within this area between 2021-2024. The southern pair has not nested within the proposed wind farm site boundary for the last four years of survey. In contrast, the northern pair attempted to nest only in 2021, 2024 and 2025, with nest sites located within a few hundred metres of each other in 2021 and 2024. The northern pair has not nested within the proposed wind farm site boundary for the last four years of survey. In 2025, no exact nesting locations were identified for either northern or southern pair.

Nesting success has varied: the southern pair successfully fledged chicks in three out of five years, with an average productivity of at least 2.67 chicks per year when breeding was successful, or 1.6 chicks per year when unsuccessful breeding attempts were taken into account. The northern pair, however, failed to rear chicks in all survey years.

A third, off-site pair outside the survey area had confirmed breeding success in 2021, fledging at least two chicks. However, they were likely disturbed in 2022, which appears to have prevented successful breeding in subsequent years. A nesting attempt in 2024 also appeared to have failed. A possible nest was suspected to be off-site and outside the survey area in 2025 to the east.

Hen harrier nesting locations are not shown due to their sensitive nature (see Section 6.3.3.1.3.1.1). Note that no exact nesting locations were identified for the 2025 breeding season.

A summary of the hen harrier foraging survey results in 2023 and 2024 is given in Table 6-10. Further details are provided in Appendices 6-7 and 6-8.

Table 6-10: Summary of Hen Harrier Foraging Survey Results

Season / Year	Total Observations	Total Foraging Observations	Total Prey Carrying / Food Passes	Foraging Areas	Notes
B23	99	63	40	Faughary, South of Saddle Hill, Tawnyfeacle (south)	Included adult males, females, pairs and fledged chicks. Confirmed fledging with three chicks.

Season / Year	Total Observations	Total Foraging Observations	Total Prey Carrying / Food Passes	Foraging Areas	Notes
B24	11	9	4	Faughary, South of Saddle Hill, Tawnyfeacle (south); northeast of Saddle Hill (north)	Included adult males and females. Both nests failed despite initial provisioning.

6.3.3.1.3.1.1 Treatment of Information on Hen Harrier

Due to the sensitivity of the Irish hen harrier population and its vulnerability to persecution, information relating to nest locations or flight activity that could inadvertently reveal nest sites must be kept confidential. In accordance with Article 42(18) of the European Communities (Birds and Natural Habitats) Regulations 2011 and Articles 7(1), 8, and 10 of the European Communities (Access to Information on the Environment) Regulations 2007–2014, detailed spatial information on hen harrier nests, or any information from which nest locations could be derived, is not included within this Chapter or its associated appendices.

Redacted sensitive information can be made available, on request, to An Coimisiún Pleanála (ACP) and relevant statutory consultees for the purpose of planning and ecological assessment.

6.3.3.2 GCR and TDR Accommodation Areas

While no dedicated bird surveys were undertaken for the GCR or TDR accommodation areas, the results of the habitat surveys and desk study (see Chapter 5 Biodiversity) suggest that the habitats present in the immediate vicinity of either element of the proposed project were too limited to likely to support important bird species.

Habitat types associated with the GCR due to be lost include hedgerow (10 m), mixed broadleaved woodland (0.01 ha) and scrub (0.01 ha), which are due to horizontal directional drilling (HDD) to avoid instream works. Habitat types associated with the TDR accommodation areas possibly affected include stone walls and other stonework (106 m), hedgerows (547 m) and treelines (52 m) alongside public roads.

The only location along either GCR or TDR accommodation areas likely to support important bird species was TDR accommodation area 13 (see Figure 2.2 in Chapter 2 Description of Proposed Project), which is in proximity (c.20 m) to Cummeen Strand SPA. This area is located at a major junction of the N15/N16/N4 roads in Sligo Town and while the accommodations area itself is unlikely to support important bird species, the nearby mudflats could support foraging and potentially roosting non-breeding SCI waders and wildfowl. Accordingly, this potential use has been acknowledged and treated on a precautionary basis in the subsequent assessment.

Therefore, any resulting impact assessment focuses on nature conservation sites only.

6.3.4 Evaluation of Ornithological Features and Identification of Features Scoped in for Detailed Assessment

An evaluation of the importance of ornithological features and a description of which were scoped in for detailed assessment is given below in Sections 6.3.4.1-6.3.4.3.

Population detail referred to in the evaluation is given in Appendix 6-10 and further details of legal and conservation status are given in Appendix 6-11.

Section 6.2.6.1.1 explains how the scale of importance was determined and the approach adopted to determine whether a species was scoped in for detailed assessment.

6.3.4.1 Proposed Wind Farm Site

Table 6-11: Evaluation of Ornithological Features and Identification of Features Scoped in for Detailed Assessment for Proposed Wind Farm Site

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and / or Importance and Justification for Evaluation	Scoped In for Detailed Assessment
Nature Conservation Sites			
Sligo / Leitrim Uplands SPA	International	SPA designated under EU Birds Directive[12] for *inter alia* breeding peregrine; therefore, evaluated as of international importance. SPA located 9.2 km from proposed wind farm site. Of the two SCI species for the SPA, only peregrine was recorded during surveys, but only during one breeding season (B25) and at very low levels (three observations). Peregrine core foraging ranges extend to approximately 2 km from a nest (NatureScot, 2016), placing the proposed wind farm site well outside the functional range of SPA birds. No hydrological / hydrogeological pathways exist. Therefore, while a weak source-pathway-receptor linkage exists, no likely significant effects are predicted, and Sligo / Leitrim Uplands SPA is scoped out of further assessment.	No
Donegal Bay SPA	International	SPA designated under the EU Birds Directive for wintering divers, sea ducks, waders, and wetland and waterbird habitats; therefore, evaluated as being of international importance. No SCI species from this SPA were recorded during surveys. The SPA is located 16.5 km from the proposed wind farm site. Downstream hydrological connectivity exists between the wind farm site and this SPA; however, with embedded mitigation (termed 'additional mitigation' in the corresponding AA Screening and NIS) in place (see EIAR Volume II Chapters 5 and 8), and given that Lough Melvin lies between the proposed wind farm site and the SPA providing substantial dilution and attenuation capacity, no effects on watercourses or wetland habitats are predicted. Therefore, while a source-pathway-receptor linkage exists, no likely significant effects are predicted, and Donegal Bay SPA is scoped out of further assessment.	No

[12] Classified under the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011), as amended, which transpose EU Directive 2009/147/EC (Birds Directive). For brevity, referred to as 'designated under EU Birds Directive'.

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and / or Importance and Justification for Evaluation	Scoped In for Detailed Assessment
Pettigoe Plataeau SPA / Ramsar site	International	SPA designated under the EU Birds Directive for *inter alia* breeding European golden plover and Ramsar site cited for internationally important populations of the same; therefore, evaluated as being of international importance. The SPA / Ramsar site is located 17 km northeast of the proposed wind farm site. Of its SCI / cited species, only European golden plover was recorded during surveys, but only as migratory birds, with no evidence of territory holding, foraging or roosting during the breeding season. European golden plover core foraging ranges typically extend to c.3 km from nest locations (NatureScot, 2016), placing the proposed wind farm site well outside the functional foraging envelope for SPA / Ramsar birds. No hydrological or hydrogeological pathways exist. Therefore, no strong source-pathway-receptor linkage exists, and Pettigoe Plateau SPA / Ramsar site is scoped out of further assessment.	No
Lough Derg (Donegal) SPA	International	SPA designated under the EU Birds Directive for breeding lesser black-backed gull and herring gull; therefore, evaluated as being of international importance. The SPA is located 31 km northeast of the proposed wind farm site. Of its SCI species, both lesser black-backed gull and herring gull were recorded during surveys, but with no evidence of territory holding, foraging or roosting during the breeding season. The mean terrestrial breeding foraging ranges for these two gull species can be up to c.30 km (Thaxter et al., 2026). According to the SPA conservation objectives document (NPWS, 2025a), the SPA no longer supports the SCI species in its designated, breeding population form and is not likely to do so in the future following the closure of a nearby landfill site, so no functional link between the SPA and proposed project exists. No hydrological or hydrogeological pathways exist. Therefore, no strong source-pathway-receptor linkage exists, and Lough Derg (Donegal) SPA is scoped out of further assessment.	No
Cuilcagh Mountain Ramsar site / ASSI	International	Ramsar site cited for internationally important populations of breeding European golden plover and permanent merlin populations. Also, ASSI cited for the same and breeding peregrine. Therefore, evaluated as of international importance. The Ramsar / ASSI site is located 16.7 km southeast of the proposed wind farm site. Of the species listed in the Ramsar citation, merlin was recorded on-site, but only once in the non-breeding season (NB20/21) and as a single non-breeding individual, with the rest of the observations made	No

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and / or Importance and Justification for Evaluation	Scoped In for Detailed Assessment
		during breeding seasons. The dearth of non-breeding season observations indicates a lack of strong ecological connection during that season. European golden plover was recorded only as migratory birds, unrelated to the breeding population for which the site is cited. Peregrine was recorded during surveys, but only during one breeding season (B25) and at very low levels (three observations). Peregrine core foraging ranges extend to approximately 2 km from a nest (NatureScot, 2016), placing the proposed wind farm site well outside the functional range of Ramsar / ASSI birds. Core foraging ranges for breeding European golden plover and merlin are c.3 km and c.5 km respectively (NatureScot, 2016), placing the wind farm site well outside the functional ranges of Ramsar / ASSI populations. No hydrological / hydrogeological pathways exist. Therefore, no strong source–pathway–receptor linkage exists and Cuilcagh Mountain Ramsar site and ASSI is scoped out of further assessment.	
Owengar Wood pNHA	National	pNHA where Eurasian woodcock is named in the site synopsis; therefore, evaluated as being of national importance. The pNHA is located 16.8 km from the proposed wind farm site. Woodcock was recorded on-site during breeding and wintering surveys; however, woodcock typically forage within very small ranges (0.06–1.25 ha; Hoodless & Hirons (2007)) in the breeding season, and winter roost within c.1 km of feeding areas (Norman, 2008). The proposed wind farm site lies well outside these foraging ranges and there is no hydrological or hydrogeological pathway to the pNHA. Therefore, no source-pathway-receptor linkage exists and Owengar Wood pNHA is scoped out of further assessment.	No
Colgagh Lough pNHA	National	pNHA designated for wintering and permanent populations of waterbirds; therefore, evaluated as of national importance. The pNHA is located 16.5 km from the proposed wind farm site. Of the species listed in the site synopsis, whooper swan and mallard were recorded during surveys. Mallard was recorded only once in the breeding season, and whooper swan only as occasional fly-overs, with no evidence of on-site roosting or foraging. Wintering whooper swan typically forage within c.5 km of roost locations (NatureScot, 2016). Breeding mallard typically have core foraging ranges of 3-10 km^2 (Mack & Clark, 2006) but range more widely in the winter, with ranges up to c.70 km^2 in size (Bengtsson et al., 2014). Mallard was only observed at the proposed project site	No

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and / or Importance and Justification for Evaluation	Scoped In for Detailed Assessment
		during the breeding season. The proposed wind farm site lies well outside these core foraging ranges for breeding mallard and wintering whooper swan. No hydrological / hydrogeological pathways exist between the proposed wind farm site and Colgagh Lough pNHA. Therefore, no strong source-pathway-receptor linkage exists and Colgagh Lough pNHA is scoped out of further assessment.	
Erne Estuary / Finner Dunes pNHA	National	pNHA designated for wintering coastal waterbirds; therefore, evaluated as of national importance. The pNHA is located 16.5 km from the proposed wind farm site. Of the species listed in the site synopsis, great cormorant was recorded on-site, but only as rare, isolated flyovers during the breeding season rather than as wintering individuals associated with the pNHA. All other pNHA-listed species were not recorded. No hydrological / hydrogeological pathways exist. Therefore, no strong source–pathway–receptor linkage exists and this pNHA is scoped out of further assessment.	No
Leitrim Uplands, South Donegal 2 and Slieve Rushen Non-Designated Hen Harrier Important Breeding Areas	National	No legal protection but part of national Irish Hen Harrier Threat Response Plan (NPWS, 2024); therefore, evaluated as being of national importance. The Leitrim Uplands non-designated important breeding area overlaps with the proposed wind farm site (only c.2% of total non-designated important breeding area), and the breeding hen harrier present at the same form part of the Leitrim Uplands breeding population. Therefore, there are pathways for effects and so this ornithological feature is scoped in for detailed assessment. South Donegal 2 and Slieve Rushen areas are 15.5 and 16.8 km from the proposed wind farm site, respectively. Hen harrier forage within 2 km of nest sites (NatureScot, 2016). The proposed wind farm site therefore lies well outside of the foraging range for breeding hen harrier from South Donegal 2 and Slieve Rushen non-designated important breeding areas. Therefore, these two areas are scoped out of further assessment.	Yes, for Leitrim Uplands No for South Donegal 2 and Slieve Rushen.
Species			
Hen harrier	National (breeding	Listed under Annex I of the EU Birds Directive and amber-listed under BoCCI4. Surveys recorded regular breeding activity associated with the Leitrim Uplands non-designated	Yes – breeding and non-

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and / or Importance and Justification for Evaluation	Scoped In for Detailed Assessment
	season) and regional / county (non-breeding season)	Important Breeding Area, with up to two breeding pairs present in most years and occasional evidence of a third pair in the wider area. Nest locations varied between years, and all confirmed nests during the last four seasons were off-site. The number of breeding pairs recorded represents >1% of the national breeding population (Appendix 6-10). Breeding-season activity was consistently high (mean c.124 observations across B21–B25 seasons). Non-breeding activity was low (mean c.14 observations across NB20/21 and NB21/22 seasons), and the non-breeding peak count was <1% of the national population (Appendix 6-10). No winter roosts were identified on or near the site but still likely some functional usage by foraging birds. Based on this evidence, the study area for this species is evaluated as being of national importance during the breeding season and of regional/county importance during the non-breeding season. Scoped in for further assessment as scale of importance is greater than local in both seasons and there is a realistic pathway for significant effects.	breeding season
Common snipe	County (breeding season) and local (non-breeding season)	Red-listed under BoCCI4 and not an SCI for any nearby SPA nor named in any nature conservation site synopsis. Surveys recorded regular breeding-season activity, with 2–7 territories across years (mainly off-site but up to three on-site in 2024). Peak breeding-season counts were low (3 birds) and considerably <1% of ROI population (Appendix 6-10), but flight activity was moderate to high with eight, 10, 25, 74 and 52 observations in B21–B25 seasons, respectively (mean c.34 observations/season). Non-breeding activity was low (six and 10 observations in N20/21 and NB21/22 seasons, respectively), and the non-breeding peak count was <1% of the ROI population (Appendix 6-10). The non-breeding ROI population estimate is likely to be an underestimate due to the cryptic nature of the species and that snipe often occur in locations outside I-WeBS sites, making it likely the non-breeding peak count was considerably <1% of the ROI population. No winter roosts or concentrations were identified.	Yes – breeding season only

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and / or Importance and Justification for Evaluation	Scoped In for Detailed Assessment
		Based on this evidence, the study area for this species is evaluated as being of county importance during the breeding season and local importance during the non-breeding season. Scoped in for further assessment for the breeding season only, as importance exceeds local and a realistic pathway for significant effects exists.	
European golden plover	County (non-breeding season and/or migratory season)	Listed under Annex I of the EU Birds Directive and red-listed under BoCCI4. An SCI for Pettigoe Plateau SPA and named in the Cuilcagh Mountain Ramsar site / ASSI citation; however, all golden plover recorded on the proposed wind farm site were migratory birds only and therefore not functionally connected to the designated populations. The peak count was 100 birds during NB21/22, which is <1% of the ROI non-breeding population (Appendix 6-10). Observations included one and 12 observations made in the NB20/21 and NB21/22 seasons across all survey types combined, respectively. There were also four, three, and two observations in the B21, B22 and B24 seasons, respectively. On average, there were c.7 and c.2 observations in the non-breeding and breeding seasons, respectively, although most observations occurred during spring and autumn migratory periods. No confirmed breeding (presence in the breeding season was limited to the migratory periods only) or non-breeding site usage. Based on this evidence, the study area for this species is evaluated as being of county importance during the migration/non-breeding season. Scoped in for further assessment as importance exceeds local level and a realistic collision pathway exists.	Yes – non-breeding and/or migratory seasons only
Lesser black-backed gull	County (breeding season only)	Amber-listed under BoCCI4. SCI for Lough Derg (Donegal) SPA. According to the SPA conservation objectives document (NPWS, 2025a), the SPA no longer supports the SCI species in its designated, breeding population form, so no functional link between the SPA and proposed project exists, and no functional connectivity was identified with any other nature conservation site.	Yes – breeding season

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and / or Importance and Justification for Evaluation	Scoped In for Detailed Assessment
		Peak counts represent <1% of the ROI population (Appendix 6-10). Flight activity levels were reasonably high throughout the study period (>10,000 seconds) but were based on low numbers of observations, being recorded 2, 8, 19 27 and 15 times in the B21, B22, B23, B24 and B25 seasons, respectively, , with a mean of c.14 observations per breeding season. All observations were made in the breeding season; however, no breeding was confirmed on-site, and all records reflected commuting birds rather than foraging or roosting individuals. Based on this evidence, the study area for this species is evaluated as being of county importance during the breeding season. Scoped in for further assessment as importance exceeds local level and a realistic collision pathway for significant effects exists.	
White-tailed eagle	County (breeding and non-breeding seasons)	Annex I species and red-listed under BoCCI4. Not an SCI for any nearby SPA, and no functional connectivity was identified with any designated site. Peak count of one bird represents >1% of the ROI population (Appendix 6-10); however, this reflects the very small national population, not any ecological reliance on the site. Only four observations of white-tailed eagle were made across the study period (all between 2023–2025), all involving immature or sub-adult individuals. Activity was very low overall. One immature bird was recorded roosting once on-site in August (B25), but no breeding, repeated roosting, territoriality, or regular foraging was identified. This species was recorded only during breeding season surveys, likely because no non-breeding surveys have been conducted since 2021/22, and it appears to have only recently been observed in the area from 2022 onward, having only been reintroduced to Ireland in 2007 (O'Rourke, 2014). The population is known to be expanding (Næss, 2025) and so pathways for significant effects may be plausible in the future. Based on this evidence, the study area for this species is evaluated as being of county importance during both the breeding and non-breeding seasons on a precautionary basis, due to conservation status and potential collision sensitivity.	Yes – breeding and non-breeding seasons

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and / or Importance and Justification for Evaluation	Scoped In for Detailed Assessment
		Scoped in for further assessment as importance exceeds local level and a precautionary collision pathway for significant effects exists, especially due to the expanding population.	
Black-headed gull	Local (breeding season only)	Amber-listed under BoCCI4. Not an SCI for any nearby SPAs, and no functional connectivity exists with designated sites. Peak count of 134 birds during the breeding season <1% of the ROI population (Appendix 6-10). Flight activity at relatively low levels throughout study period. There were one, 11, two and two observations in the B22, B23, B24 and B25 seasons across all survey types combined, respectively i.e. a mean of c.3 observations per breeding season. No breeding was confirmed, and the species was present only as commuting birds. Based on this evidence, the study area for this species is evaluated as being of local importance for this species for the season in which it was observed (the breeding season). Scoped out of further assessment as scale of importance is local and no realistic pathways for significant effects are present.	No
Common kestrel	Local (breeding and non-breeding seasons)	Red-listed under BoCCI4. Not an SCI for any nearby SPAs, and no functional connectivity exists with designated sites. Peak count of 2 birds in the breeding season and 1 bird in the non-breeding season represents <1% of the ROI population (Appendix 6-10). Flight activity was recorded at reasonably high levels throughout the study period, with two and seven observations in the NB20/21 and NB21/22 seasons, respectively; and three, 11, 8, 28 and 16 times in the B21, B22, B23, B24 and B25 seasons, respectively, giving a mean of 4.5 and c.13 observations per non-breeding and breeding seasons, respectively. No breeding was confirmed on-site, though breeding occurred off-site in some years, and all observations reflect foraging birds using habitat margins. Based on this evidence, the study area for this species is evaluated as being of local importance for the breeding and non-breeding seasons.	Yes – both breeding and non-breeding seasons

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and / or Importance and Justification for Evaluation	Scoped In for Detailed Assessment
		Scoped in as while scale of importance is local, kestrel is known to be susceptible to collision with wind turbines, it is red-listed and there is a plausible pathway for significant collision-related effects present.	
Common swift	Local (breeding season only)	Red-listed under BoCCI4. Not an SCI for any nearby SPAs, and no functional connectivity exists with designated sites. Peak count of 3 birds represents <1% of the ROI population. Activity levels were low, with 2 observations in the B21 season and 5 in the B22 season across all survey types combined. No breeding was confirmed, and all records reflect non-breeding aerial foraging flights typical of the species, and no regular, functional usage of habitats at the site. Based on this evidence, the study area for this species is evaluated as being of local importance for the only season in which it was observed (breeding season). Scoped out of further assessment as importance is local and no realistic pathway for significant effects exists.	No
Eurasian woodcock	Local (breeding and non-breeding seasons)	Red-listed under BoCCI4. Not an SCI for any nearby SPAs, and although named in the Owengar Wood pNHA synopsis, no functional connectivity exists with other nature conservation sites. Flight activity levels very low throughout study period. Peak count of 2 birds in both the breeding and non-breeding seasons represents considerably <1% of the ROI population (Appendix 6-10) and unlikely to be of county importance given that Leitrim is the most heavily forested county in Ireland, with the most potential woodcock habitat and largest numbers of woodcock likely present. Activity levels were low, with 11 observations in B21, 6 in B22, 1 in B23, and 12 and 24 observations recorded in NB20/21 and NB21/22, respectively i.e. a mean of 18 and c.4 times in the non-breeding and breeding seasons, respectively. Probable breeding occurred on-site, with 2–3 territories likely present.	Yes – both breeding and non-breeding seasons

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and / or Importance and Justification for Evaluation	Scoped In for Detailed Assessment
		Based on this evidence, the study area for this species is evaluated as being of local importance for the breeding and non-breeding season. Scoped in for further assessment as likely breeding on-site presents a realistic pathway for significant effects.	
Great cormorant	Local (breeding season only)	Amber-listed under BoCCI4. Not an SCI for any nearby SPA, and although referenced in the Erne Estuary/Finner Dunes pNHA synopsis, no functional connectivity exists with other nature conservation sites. Peak count of 3 birds in the breeding season represents considerably <1% of the ROI population (Appendix 6-10). Activity levels were very low, with only three observations across all survey types combined, and no indications of regular foraging or roosting on-site. Based on this evidence, the study area for this species is evaluated as being of local importance for the only season in which it was observed (breeding season). Scoped out of further assessment as importance is local and no realistic pathway for significant effects exists.	No
Golden eagle	Local (non-breeding population season)	Annex I species and red-listed under BoCCI4. Not an SCI for any nearby SPA, and no functional connectivity exists with other nature conservation sites. Peak count of 1 bird in the non-breeding season represents >1% of the ROI population (Appendix 6-10), but this reflects the small national population rather than any ecological value of the site. Only one observation of an immature bird was made across the entire study period in the NB20/21 season, circling over conifer plantation before flying away. As only a single, immature bird was recorded once in six seasons of surveys, there is no evidence of regular, functional site usage by breeding or roosting birds in any survey season. This species was only reintroduced to Ireland in 2001 but the population appears to have remained small and has not expanded (McAuliffe et al., 2024). It is therefore unlikely that the reintroduced population will expand to the extent that the wind farm site habitats become functionally important for this species in the foreseeable future.	No

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and / or Importance and Justification for Evaluation	Scoped In for Detailed Assessment
		Based on this evidence, the study area for this species is evaluated as being of local importance for the only season in which it was observed (non-breeding season). Scoped out of further assessment as the scale of importance is local as no realistic pathway for significant effects exists.	
Grey wagtail	Local (breeding season only)	Red-listed under BoCCI4. Not an SCI for any nearby SPAs, and no functional connectivity exists with other nature conservation sites. Peak count of 2 birds in the breeding season represents considerably <1% of the ROI population (Appendix 6-10). Activity levels were very low, with 4 observations in B21 and 2 in B22 across all survey types combined. Possible breeding on proposed wind farm site and within 500 m of the same. Based on this evidence, the study area for this species is evaluated as being of local importance for the only season in which it was observed (breeding season). Scoped out of further assessment as the scale of importance is local, best-practice guidance says passerines are not significantly impacted by wind farms (NatureScot, 2025d) and no realistic pathways for significant effects exist.	No
Herring gull	Local (breeding season only)	Amber-listed under BoCCI4. SCI for Lough Derg (Donegal) SPA. According to the SPA conservation objectives document (NPWS, 2025a), the SPA no longer supports the SCI species in its designated, breeding population form and there is no likelihood of this happening in the future due to the closure of a landfill in Donegal town, so no functional link between the SPA and proposed project exists, and no functional connectivity was identified with any other nature conservation site. Peak count of 18 birds in the breeding season represents <1% of the ROI population (Appendix 6-10). The species was recorded six times (B23 and B25 seasons only) across all survey types combined, reflecting occasional commuting flights only. No confirmed breeding or functional site usage.	No

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and / or Importance and Justification for Evaluation	Scoped In for Detailed Assessment
		Based on this evidence, the study area for this species is evaluated as being of local importance for the only season in which it was observed (breeding season). Scoped out of further assessment as the scale of importance is local and no realistic pathways for significant effects exist.	
Little egret	Local (breeding season only)	Annex I species and green-listed under BoCCI4. Not an SCI for any nearby SPA, and no functional connectivity exists with other nature conservation sites. Peak count of 3 birds in the breeding season represents <1% of the ROI population (Appendix 6-10). Recorded twice in B23 season across all survey types combined, reflecting infrequent commuting flights with no ecological function on-site. No confirmed breeding. Based on this evidence, the study area for this species is evaluated as being of local importance for the only season in which it was observed (breeding season). Scoped out of further assessment as the scale of importance is local and no realistic pathway for significant effects exists.	No
Mallard	Local (breeding season only)	Amber-listed under BoCCI4. Not an SCI for any nearby SPA, and although referenced in Colgagh Lough pNHA synopsis, no functional connectivity exists with other nature conservation sites. Peak count of 13 birds in the breeding season represents considerably <1% of the ROI population (Appendix 6-10). Recorded once in B21 and B23 seasons, with one confirmed breeding attempt on-site (no location given) in the B21 season. Based on this evidence, the study area for this species is evaluated as being of local importance for the only season in which it was observed (breeding season). Scoped out of further assessment as the scale of importance is local and no realistic pathway for significant effects exists.	No

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and / or Importance and Justification for Evaluation	Scoped In for Detailed Assessment
Meadow pipit	Local (breeding and non-breeding seasons)	Red-listed under BoCCI4. Not an SCI for any nearby SPA, and no functional connectivity exists with other nature conservation sites. Peak counts of 12 birds in the breeding season and 38 birds in the non-breeding season represent considerably <1% of the ROI population (Appendix 6-10). Activity levels were relatively high with 10 observations in the NB20/21 season, 82 in the B21 season, and 21 in the B22 season across all survey types combined. Confirmed breeding occurred on-site. Based on this evidence, the study area for this species is evaluated as being of local importance for the breeding and non-breeding seasons. Scoped out of further assessment as the scale of importance is local and best-practice guidance says passerines are not significantly impacted by wind farms (NatureScot, 2025d).	No
Merlin	Local (breeding and non-breeding seasons)	Annex I species and amber-listed under BoCCI4. Not an SCI for any nearby SPA, and although named for Cuilcagh Mountain Ramsar site / ASSI, no functional connectivity exists. Peak count of 1 bird in both breeding and non-breeding seasons represents <1% of the ROI population (Appendix 6-10). Flight activity levels very low throughout study period. Recorded once during NB20/21 season across all survey types combined; and twice in the B21 season, once in the B22 season, three times in the B23 season, five times in the B24 season and three times in the B25 season, respectively i.e. an average of four observations per breeding season. Only sporadic presence and no breeding or roosting detected, suggesting no regular, functional site usage. Based on this evidence, the study area for this species is evaluated as being of local importance for the breeding and non-breeding seasons. Scoped out of further assessment as the scale of importance is local and no realistic pathways for significant effects.	No

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and / or Importance and Justification for Evaluation	Scoped In for Detailed Assessment
Peregrine	Local (breeding season only)	Annex I species and green-listed under BoCCI4. SCI for the Sligo/Leitrim Uplands SPA and Cuilcagh Mountain ASSI; however, no functional connectivity exists. Peak count of 1 bird in the breeding season represents considerably <1% of the ROI population (Appendix 6-10). Flight activity levels very low throughout the study period. Recorded once in the NB20/21 season and three times in the B25 season across all survey types combined. No breeding was confirmed and no regular, functional usage of the site. Based on this evidence, the study area for this species is evaluated as being of local importance for the only season in which it was observed (breeding season). Scoped out of further assessment as scale of importance is local and no realistic pathway for significant effects exists.	No
Osprey	Local (breeding season only)	Annex I species. No red-list assessment under BoCCI4 given due to recent reintroduction. Not an SCI for any nearby SPA, and no functional connectivity exists with any other nature conservation site. Peak count of one bird in the breeding season (Appendix 6-10). No published national population estimates available due to recent reintroduction. Recorded once in the B24 season and once in the B25 season, both as non-breeding migrants. There was no evidence of regular site usage (breeding, foraging or roosting). This species was only recently reintroduced to Ireland in 2023 (Department of Housing, 2023) and the total number of wild birds is likely to be very low. Future population expansion is unclear, but significant pathways for significant effects are unlikely to appear in the future due to slow rate of population spread following re-introductions, as documented elsewhere in England (Mackrill, 2024). Based on this evidence, the study area for this species is evaluated as being of local importance for the only season in which it was observed (breeding season). Scoped out of further assessment as scale of importance is local, no realistic pathway for significant effects exists, and while the reintroduced population could expand in the	No

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and / or Importance and Justification for Evaluation	Scoped In for Detailed Assessment
		future, the likely rate is predicted to be so slow that there is no plausible pathway for significant effects in the future either.	
Red grouse	Local (breeding and non-breeding seasons)	Red-listed under BoCCI4. Not an SCI for any nearby SPA, and no functional connectivity exists with other nature conservation sites. Peak count of 2 birds in both the breeding and non-breeding seasons represents <1% of the ROI population (Appendix 6-10). Flight activity levels were very low throughout the study period. Recorded 7 and 8 observations in the NB20/21 and NB21/22 seasons, respectively, and 9, 3, 7, 6 and 2 observations in the B21–B25 seasons. One breeding territory occurred off-site on Dough Mountain i.e. no evidence of regular, functional usage of the site. Based on this evidence, the study area for this species is evaluated as being of local importance for the breeding and non-breeding seasons. Scoped out of further assessment as the scale of importance is local and no realistic pathway for significant effects exists.	No
Redwing	Local (non-breeding season only)	Red-listed under BoCCI4. Not an SCI and no functional connectivity exists with other nature conservation sites. Peak count of 75 birds in the non-breeding season (the species is a winter migrant) represents <1% of the ROI population (Appendix 6-10). There are no ROI population estimates available; however, likely to be large given widespread presence in Bird Atlases (Gillings et al., 2019), and so peak count is likely to be considerably <1% of ROI population. Recorded 7 times in the NB20/21 seasons and regularly in the NB21/22 season across all survey types combined. Based on this evidence, the study area for this species is evaluated as being of local importance for the only season in which it was observed (non-breeding season).	No

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and / or Importance and Justification for Evaluation	Scoped In for Detailed Assessment
		Scoped out of further assessment as the scale of importance is local and best-practice guidance says passerines are not significantly affected by wind farms (NatureScot, 2025d).	
Whooper swan	Local (non-breeding season only)	Annex I species and Amber-listed under BoCCI4. Not an SCI for any nearby SPA, and no functional connectivity was identified with any designated site. Although named in the Colgagh Lough pNHA synopsis, no pathway for effects exists due to lack of hydrological or functional linkage. Peak count of 30 birds represents <1% of the ROI population, but >1% of the regional non-breeding population (Appendix 6-10). Only three records were made during the entire survey period; all but one observation off-site. Flight activity levels were very low throughout the study period (none recorded flying over the site during flight activity surveys; only single flight line of 30 birds recorded flying over site as incidental observation during winter walkover surveys). No roosting or foraging occurred on-site. Based on this evidence, the study area for this species is evaluated as being of local importance for the non-breeding season. Scoped in for further assessment due solely to consultee request (see Section 6.2.2.3), rather than ecological significance.	Yes – non-breeding season only

6.3.4.2 GCR

The scope is limited to the consideration of nature conservation sites.

Table 6-12: Evaluation of Ornithological Features and Identification of Features Scoped in for Detailed Assessment for GCR

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and / or Importance and Justification for Evaluation	Scoped In for Detailed Assessment
Nature Conservation Sites			
Ballysadare SPA	International	SPA designated under EU Birds Directive; therefore, evaluated as of international importance. There is downstream connectivity to Ballysadare Bay SPA which is designated for *inter alia* wetland and waterbirds SCI habitats; however, with the embedded mitigation included (see Chapters 5 and 8 of Volume II of the EIAR; termed 'additional mitigation' in the corresponding AA Screening and NIS), the minor nature of the works and the hydrological distance between the works and the SPA, no impacts on watercourses and therefore wetland and waterbird SCI habitats are predicted. The closest works are 16.2 km from SPA; therefore, there is no plausible pathway for effects on SCI birds due to disturbance, and so the SPA is scoped out of detailed assessment.	No

6.3.4.3 TDR Accommodation Areas

The scope is limited to the consideration of nature conservation sites.

Table 6-13: Evaluation of Ornithological Features and Identification of Features Scoped in for Detailed Assessment for TDR Accommodation Areas

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and / or Importance and Justification for Evaluation	Scoped In for Detailed Assessment
Nature Conservation Sites			
Cummeen Strand SPA	International	SPA designated under EU Birds Directive; therefore, evaluated as of international importance.	Yes

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and / or Importance and Justification for Evaluation	Scoped In for Detailed Assessment
		There is downstream connectivity to Cummeen Strand SPA which is designated for *inter alia* wetland and waterbirds SCI habitats; however, with the embedded mitigation included (see Chapters 5 and 8 of Volume II of the EIAR; termed 'additional mitigation' in the corresponding AA Screening and NIS), no impacts on watercourses and therefore wetland and waterbird SCI habitats are predicted. The closest accommodations are 20 m from SPA with little intervening features providing screening. While the immediate habitats at the closest accommodations area are urban (roads and pavements; located at busy junction of N4/N15/N16 within Sligo Town) and modified, such as amenity grassland, mudflats are within 20 m, which could be used by SCI light-bellied brent goose, Eurasian oystercatcher and common redshank. Eurasian oystercatcher and common redshank are both present in desk study records within the overlapping 1 km grid square G6936 on the NBDC website; therefore, even though the proposed accommodations are very minor, there is a plausible pathway for effects on SCI birds due to disturbance, and so the SPA is scoped in for detailed assessment.	
Sligo / Leitrim Uplands SPA	International	SPA designated under EU Birds Directive; therefore, evaluated as of international importance. No hydrological or hydrogeological connectivity is present between the SPA and TDR accommodation areas. The closest accommodations are 216 m from the SPA with plenty of hedgerows, treelines and other intervening features providing screening to the SPA. The accommodations comprise of trimming a hedge, and the surrounding habitats comprise grassy verges, grazed, wet grassland, hedgerows and treelines adjacent to the busy N16 road, making it very unlikely the SCI species peregrine or chough from the SPA use the habitats present or nearby. There are also no desk study records for the same contained within the overlapping 1 km grid square G7442 on the NBDC website. Embedded mitigation (termed 'additional mitigation' in the corresponding AA Screening and NIS) will also be used to avoid disturbing breeding birds (see Section 6.4.1). Therefore, there is no plausible pathway for effects on SCI birds due to disturbance.	No

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and / or Importance and Justification for Evaluation	Scoped In for Detailed Assessment
		As there are no pathways for significant effects, Sligo / Leitrim Uplands SPA is scoped out of further assessment.	
Drumcliff Bay SPA	International	SPA designated under EU Birds Directive; therefore, evaluated as of international importance. No hydrological or hydrogeological connectivity is present between the SPA and TDR accommodation areas. The closest accommodations are 250 m from the SPA with plenty of hedgerows, treelines and other intervening features providing screening. Habitats at the closest accommodations area include houses, pavements, stone walls and fields used for silage, which are not suitable for SCI sanderling or bar-tailed godwit, and there are no desk study records for the same contained within the overlapping 1 km grid square G6742 on the NBDC website. The accommodations comprise clearing any obstructions to allow oversail of the blades. The accommodations area is also located along the busy N15 road. Embedded mitigation will also be used to avoid disturbing wintering birds (see Section 6.4.1; termed 'additional mitigation' in the corresponding AA Screening and NIS). Therefore, there is no plausible pathway for effects on SCI birds due to disturbance. As there are no pathways for significant effects, Drumcliff Bay SPA is scoped out of further assessment.	No
Donegal Bay SPA	International	SPA designated under EU Birds Directive; therefore, evaluated as of international importance. There is downstream connectivity to Donegal Bay SPA which is designated for *inter alia* wetland and waterbirds SCI habitats; however, with the embedded mitigation included (see Chapters 5 and 8 of Volume II of the EIAR; termed 'additional mitigation' in the corresponding AA Screening and NIS), no impacts on watercourses and therefore wetland and waterbird SCI habitats are predicted. The closest accommodations are 300 m from the SPA with plenty of houses, hedgerows, treelines and other intervening features providing screening. Habitats at the closest accommodations area include amenity grassland (centre of roundabout), roads, rough	No

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and / or Importance and Justification for Evaluation	Scoped In for Detailed Assessment
		grassland and scrub, which are not suitable for SCI species great northern diver, light-bellied brent goose, common scoter or sanderling, and there are no desk study records for the same within the overlapping 1 km grid square G7958 on the NBDC website. The accommodations area is also located along the busy N15 road. The accommodations comprise removal of road signs and clearing of roundabout of obstructions. Embedded mitigation (termed 'additional mitigation' in the corresponding AA Screening and NIS) will also be used to avoid disturbing wintering birds (see Section 6.4.1). Therefore, there is no plausible pathway for effects on SCI birds due to disturbance. As there are no pathways for significant effects, Donegal Bay SPA is scoped out of further assessment.	

6.4 Assessment of Effects and Mitigation Measures

This assessment concentrates on the effects of construction, operation and decommissioning of the proposed project upon IOFs. The assessment of effects is based on the information outlined in Chapter 2 – Description of the Proposed Project. The following likely significant effects have been assessed:

- Inadvertent destruction of nests during construction and decommissioning;
- Habitat loss or damage (permanent and temporary) due to construction and decommissioning of wind farm infrastructure, including the GCR and TDR accommodation areas;
- Disturbance to birds during construction and decommissioning due to vehicular traffic, operating plant and the presence of construction workers;
- Pollution of watercourses leading to indirect effects on wetland habitats used by bird species during construction, decommissioning and operation;
- Disturbance to birds due to the operation of the wind turbines (including barrier effects), vehicular traffic and the presence of people during operation; and
- Mortality of birds caused by collisions with turbine blades and other infrastructure.

Effects have been assessed in detail for the following IOFs shown in Table 6-14 (see Table 6-11, Table 6-12 and Table 6-13 for justification).

Table 6-14: IOFs Included for Detailed Assessment

Season	IOF		
	Wind Farm Site	**GCR**	**TDR Accommodation areas**
Breeding and non-breeding	Hen harrier, white-tailed eagle, Eurasian woodcock, common kestrel	None	None
Breeding only	Leitrim Uplands Non-Designated Important Breeding Areas for hen harrier, common snipe, lesser black-backed gull	None	None
Non-breeding only	European golden plover, whooper swan	None	Cummeen Strand SPA

6.4.1 Embedded Mitigation and Good Practice Measures

Where possible, the design of the proposed project has sought to avoid significant effects on IOFs. This is referred to as Mitigation by Design and is 'embedded' as part of the proposed project. In addition, good practice measures, as outlined below, will be employed to reduce the possibility of damage and destruction (and disturbance in the case of sensitive species such as breeding raptors), to occupied bird nests during the construction and decommissioning phases. These measures are also 'embedded' as part of the proposed project and likely significant

effects are therefore assessed on the basis that these measures will be implemented. These are sometimes termed 'primary' mitigation measures (Anderson et al., 2024).

Full details of construction mitigation measures are provided in the Construction Environmental Management Plan ("CEMP"), included as Appendix 2-4. A similar document will be produced for the decommissioning phase, with similar measures adopted as appropriate in line with best practice at the time of decommissioning.

6.4.1.1 Mitigation by Design

The layout of the proposed wind farm has been specifically designed as part of the overall mitigation strategy for breeding hen harrier. It was not appropriate to design the turbine layout around historical nesting sites as the nest sites varied year-on-year likely reflecting ongoing forestry cycles. However, turbines have been sited to maintain a minimum separation distance of 750 m from the two NEAs (see Section 6.2.2.3), ensuring that operational turbines will be located well outside zones likely to support hen harrier breeding activity. This buffer is considered sufficient to minimise disturbance to nesting birds, reduce the risk of displacement, and prevent behavioural disruption during the breeding season. For a full evaluation of the use of a 750 m buffer distance and why it is sufficient to avoid disturbance effects on breeding hen harrier; see Appendix 6-13. A summary is also given in Section 6.4.1.2.1 below.

The GCR was also designed to avoid any nature conservation sites designated for birds.

This approach is described further in Section 6.4.8 of the current Chapter and the approach to proposed project design is outlined in Chapter 2 – Description of Proposed Project.

6.4.1.2 Timing of Works, Confirmatory Pre-Commencement Surveys and Implementation of Disturbance-Free Buffer Zones

6.4.1.2.1 Wind Farm Site

Avoidance of damage to, or destruction of nests, or disturbance to sensitive species whilst nesting will be achieved through careful timing of construction and decommissioning activities; restricting activities in sensitive areas as far as practicable in the early part of the breeding season until the location and breeding status of nesting birds has been established. Clearance of uncultivated vegetation, i.e. trees and hedgerows, will be undertaken outside the main breeding bird season, from March to August inclusive where possible. If other site clearance and construction / decommissioning activities are required to take place during the main breeding bird season, confirmatory pre-commencement survey work will be undertaken so that nest destruction and disturbance to sensitive species (e.g., breeding raptors) are avoided. Where applicable, construction or decommissioning will not take place within specified disturbance-free buffer zones for certain sensitive species whilst those species are actively nesting.

Disturbance-free buffer zones around nest sites of sensitive species will be applied as set out below and will be monitored closely.

Based on survey data and the relevant literature (Goodship et al., 2022), the following disturbance-free buffer zones will be implemented to help prevent nest failure due to disturbance during construction or decommissioning. It should be noted that these distances represent a guide only and these may vary according to topography and other factors at each nest site. The appropriate buffers will be identified in accordance with the approach described in the following paragraphs.

Hen harrier was the only confirmed breeding species identified as an IOF but buffer zones for breeding common snipe and Eurasian woodcock have also been included in the possible event these two species are recorded in confirmatory pre-commencement surveys:

- Hen harrier: 1,000 m and 750 m (see below);
- Common snipe: 500 m; and
- Eurasian woodcock: 200 m.

Note that Goodship et al. (2022) recommend a 750 m disturbance-free buffer for breeding hen harrier as a default but state that where activities have a high potential for visual and auditory disturbance (e.g. forestry operations), a larger buffer zone of up to 1,000 m may be necessary. As felling of forestry will be required to accommodate turbines during construction, this larger buffer for hen harrier will be implemented for the proposed project during felling operations only, with the 750 m buffer to be used for all other activities.

Goodship et al. (2022) do not provide a disturbance-free buffer distance for breeding common snipe; however, a 47.5% decline in abundance of snipe within 500 m of wind turbines has been reported (Pearce-Higgins et al., 2009), although Devereux et al. (2008) measured snipe territories being only located further from turbines than you would expect by chance within 250 m. A precautionary approach has been adopted in this assessment, assuming that 500 m represents a reasonable disturbance-free buffer distance and therefore this buffer will be implemented for all construction activities.

There is no buffer given for Eurasian woodcock; however, research highlights that Eurasian woodcock tends to nest within 100 m of woodland edges (Brewin et al., 2022) and flight initiation distances often fall between tens to a few hundred metres for ground-nesting or cryptic species (Goodship et al., 2022). Therefore, a disturbance-free buffer of 200 m is considered robust as it combines research on nesting proximity with disturbance-mitigation principles and therefore this buffer will be implemented for all construction activities.

A suitably qualified Project Ecologist will be employed for the duration of the construction and decommissioning period. The role of the Project Ecologist will include the tasks outlined in Chapter 5 of Volume II of the EIAR but with specific roles regarding the bird interest of the proposed wind farm site:

- Prior to the start of construction, decommissioning and/or the breeding bird season, contractors will be made aware of the ornithological sensitivities within the proposed wind farm site (particularly to the potential presence of sensitive breeding species); and
- Undertake confirmatory pre-construction surveys for nesting birds throughout the construction and decommissioning period that is within the nesting season. Where active nests are found, appropriate exclusion zones as set out in this section, will be established and monitored until the nesting attempt has reached a natural conclusion (i.e. fledging). Full details are provided in the CEMP in Appendix 2-4.

6.4.1.2.2 GCR and TDR Accommodation Areas

The same measures will also apply to the GCR and TDR accommodation areas regarding the timing of works, confirmatory pre-construction checks and the use of disturbance-free buffers

around any identified nests. All vegetation clearance or ground disturbing activities will follow the same avoidance first approach implemented across the proposed wind farm site.

6.4.2 Likely Evolution of the Baseline

The proposed wind farm site comprises commercial conifer forestry plantation and agricultural lands that are currently heavily managed through a combination of agroforestry and agricultural practices. If the proposed project does not proceed, the proposed wind farm site is likely to continue to be used for forestry and agricultural purposes. This means it is likely that ongoing forestry cycles will continue to make habitats suitable and unsuitable for IOF species such as breeding hen harrier as they are felled and replanted. Forestry cycles may create uncertainty regarding the availability of suitable breeding habitats, which is likely one of many contributing factors to the recent decline of over 25% in the regional hen harrier population across the Leitrim, Slieve Rushen, Cavan complex (Ruddock et al., 2024).

While some of the adjacent landowners are signed up to hen harrier related prescriptions under agri-environment schemes, there is currently no concerted conservation action in place at the proposed wind farm site for breeding hen harrier, beyond the general measures that Coillte recommends for hen harrier management in its lands (Coillte, 2021, 2024). While the Hen Harrier Threat Response Plan (NPWS, 2024) does mention overarching actions to minimise disturbance caused by forestry-related activities to hen harrier in non-designated important breeding areas (topics F15 - F17 in the plan), there are currently no plans to implement specific conservation actions in the future at the proposed wind farm Site.

In the absence of the proposed project, it is therefore possible that the hen harrier population at the proposed wind farm site will decline over the next few years based on current trends in the wider area and the lack of concerted conservation action, although the extent of any declines cannot be predicted accurately at this time, due to the number of factors involved.

Regarding other IOF species, with the current patterns of agroforestry cycles and agricultural practices persisting, most species would be expected to continue along their existing population trajectories in the absence of the proposed project i.e. species which are declining (e.g. European golden plover; see Table 6-19) might also be expected to decline at the proposed project site while those that are increasing (e.g. white-tailed eagle; see Table 6-22) might be expected to increase. However, it is acknowledged that it is impossible to predict future population trends with any certainty.

The GCR will continue to be used as a road, and the TDR accommodation areas will remain as bounding habitats along roads in the absence of the proposed project.

6.4.3 Characterisation of Potential Impacts

The following sections describe the types of impacts that onshore wind farms may give rise to and how these may interact with IOFs for the proposed project, which has been used to inform the specific assessment of effects for the proposed project. These descriptions apply across the construction, operational, and decommissioning phases. The magnitude and significance of these impacts for each IOF are evaluated in Sections 6.4.4 and 6.4.5.

6.4.3.1 Construction and Decommissioning

Construction and decommissioning activities involve ground works, vegetation clearance, forestry felling, increased human presence, machinery operation, and vehicle movements.

These can lead to several types of impact. Potential construction phase impacts are described below.

Decommissioning effects are predicted to be like those described for construction due to similar activities taking place, although they will be reduced in magnitude and there will not be any permanent habitat loss. Therefore, they have not been repeated in full for brevity with a brief summary given below.

Decommissioning will involve the controlled removal and off-site transport of all above-ground infrastructure, including turbine towers, nacelles, blades, transformers, and associated electrical and control equipment. These works will be undertaken using mobile cranes and heavy-goods vehicles operating on the existing access track network, thereby minimising the requirement for additional land disturbance. Subsurface infrastructure, including turbine foundations, underground cabling, and ducting, will be left *in situ*. As a result, decommissioning activities do not entail significant ground-breaking or soil removal, and no substantial earthworks are required beyond minor reinstatement of disturbed areas. Temporary construction compounds, laydown areas, and ancillary facilities will be demobilised, and the site will be restored, insofar as practicable, to its pre-construction condition in accordance with landowner agreements and regulatory obligations. Overall, the scale and intensity of decommissioning works are materially lower than those associated with the construction phase, and the potential for environmental impacts is correspondingly reduced.

6.4.3.1.1 Direct Impacts

6.4.3.1.1.1 Nest Damage or Destruction

Construction and decommissioning activities pose a direct risk to nesting birds through the potential accidental damage or destruction of active nests, eggs or chicks. This is particularly relevant for ground-nesting and low-shrub nesting species that may establish nests within or near the development footprint (Pearce-Higgins et al., 2012), including turbine bases, access tracks, laydown areas, substation and temporary compounds. Vegetation clearance, excavation, and the movement of heavy machinery during the breeding season (typically March to August) can result in the unintentional breach of legal protections under Section 22 of the Wildlife Act 1976 (as amended) and the EU Birds Directive (2009/147/EC).

However, good practice, embedded mitigation measures will avoid damage and destruction to occupied bird nests during the construction and decommissioning phases, if any bird species are confirmed as breeding. These have been previously described in Section 6.4.1.

6.4.3.1.1.2 Habitat Loss

The construction phase will result in the permanent and temporary loss of habitats that could be used by birds for breeding, foraging, and shelter. This includes the direct footprint of turbines, access roads, and associated infrastructure, as well as temporary working areas. The scale and ecological value of the affected habitats will influence the magnitude of this impact. Loss of structurally diverse grassland, heath, or wetland habitats may disproportionately affect species with specific habitat requirements, such as waders, raptors, or ground-nesting passerines (Bennun et al., 2021). While some habitat loss may be reversible post-construction, the fragmentation of habitat and reduction in habitat quality during construction can have lasting effects on local bird assemblages, potentially leading to reductions in local abundance and species diversity (Fernández-Bellon et al., 2019).

Construction of the proposed project will lead to a total direct loss of 152.29 ha of habitats. Most of the habitats to be lost are commercial conifer plantation WD4 (133.1 ha), which are generally of lower value to biodiversity and IOF species more generally.

No permanent habitat loss will occur during decommissioning; all works will be temporary in nature, and habitats will be reinstated.

Direct habitat loss could affect IOF species breeding within the proposed wind farm site, which include hen harrier, common snipe and Eurasian woodcock.

None of the habitats to be lost are of particular importance for wintering IOFs because there were no large aggregations of wintering wildfowl or waders recorded foraging or roosting within the proposed wind farm site. There were also no winter roosts for raptors recorded during surveys.

As the GCR will be almost entirely buried underground within or immediately adjacent to existing roads, only a minimal amount of bounding habitat (10 m of hedgerow WL1, 0.01 ha of mixed broadleaved woodland WD1 and 0.01 ha of scrub WS1) will be temporarily lost (this is to accommodate horizontal directional drilling rigs rather than to accommodate the GCR itself).

Activities at TDR accommodation areas will be minor in nature, involving vegetation trimming, small-scale tree removal and temporary alterations to roadside features. Temporary habitat losses form the great majority of total habitat change, representing between 85-90% of all habitats affected and will be reinstated following the completion of accommodations. Only very small permanent losses of hedgerow WL1 (116 m) and treelines WL2 (52 m) will occur (less than 10-15% of total habitats affected).

6.4.3.1.1.3 Disturbance / Displacement

Construction and decommissioning-related disturbance, including noise, vibration, visual intrusion, and increased human activity, can lead to the temporary displacement of birds from otherwise suitable breeding, roosting or foraging areas. This is particularly relevant for disturbance-sensitive species such as raptors and waders (Tolvanen et al., 2023). Displacement may result in reduced territory occupancy, lower breeding success, or increased energetic costs associated with suboptimal habitats. The effects are likely to be most pronounced during the breeding season (predominantly between March and August) but may also affect overwintering or migratory species depending on the timing of works. The spatial extent of disturbance will vary depending on species-specific sensitivity and the intensity of construction activities, and the availability of suitable displacement habitats in the surrounding area.

Disturbance and thus, displacement could affect IOF species breeding within or nearby the proposed wind farm site, which include hen harrier, common snipe and Eurasian woodcock.

Disturbance and displacement are unlikely to affect wintering IOFs because there were no large aggregations of wintering wildfowl or waders recorded foraging or roosting within the proposed wind farm site. There were also no winter roosts for raptors recorded during surveys.

Significant disturbance/displacement effects are unlikely to occur along the GCR or TDR accommodation areas, with the GCRs proposed to be buried within or adjacent to existing roads or heavily modified cultivated habitats (e.g. agricultural grasslands) and the accommodations at the TDR accommodation areas being minor (e.g. trimming of hedgerows, removal of small, individual trees, and removal of road signs and street furniture).

Any disturbance/displacement from construction activities while the cable is being buried within the road is unlikely to be significantly greater than that from typical traffic levels. The GCR does not pass through or within 1 km of any sites designated for their ornithological interest. The only such site that could be affected by accommodations at any TDR accommodation area is Cummeen Strand SPA, which is c.20 m from accommodation area 13, although it is acknowledged this is unlikely given the TDR accommodation area is located in the central of a busy junction in Sligo town with high background levels of disturbance.

The potential impacts associated with construction or decommissioning activities are only likely to occur for as long as the construction or decommissioning phase continues and are thus generally short-term and reversible in nature. The only circumstance in which such effects would not be reversible is if disturbance during construction or decommissioning were severe enough to cause the local breeding population to disappear, and the species does not subsequently return or recruit new individuals to re-establish the population.

However, good practice, embedded mitigation measures will avoid disturbance to occupied bird nests during the construction and decommissioning phases, if any bird species are confirmed as breeding. These have been previously described in Section 6.4.1.

6.4.3.1.2 Indirect Impacts

If hydrocarbon spills during the construction or decommissioning of the proposed project led to pollution of surface water-dependent wetland habitats and / or construction and decommissioning activities led to the dewatering of groundwater-dependent habitats within nearby nature conservation sites for birds, it could result in indirect habitat loss for SCI bird species or habitats. The same is true for wetland sites that could be used by bird species from nearby designated sites, even if those wetland sites are not designated themselves.

It was concluded there were no significant negative effects on surface water- or groundwater-dependent habitats in Chapter 5 - Biodiversity, or Chapter 8 - Hydrology and Hydrogeology (see Section 8.4.2 in Chapter 8 for a description of the embedded mitigation), which precludes the possibility of negative effects on IOFs that use such habitats.

6.4.3.2 Operation

6.4.3.2.1 Direct Impacts

Potential direct impacts include:

- Disturbance / displacement and barrier effects; and
- Collision with wind turbines.

No operational impacts are likely for the GCR, which will be buried underground and located almost entirely within or adjacent to the existing road network. The same is also true for the TDR accommodation areas because the proposed accommodations will be limited to the construction stage.

There will be a single, 100 m tall meteorological mast within the proposed wind farm site. The structure will be a self-supporting lattice mast, with no guy wires required for stability. NatureScot guidance on collision risk associated with power lines and meteorological masts highlights that the primary collision hazard is presented by the supporting guy wires, which can be difficult for birds to detect in flight and have been associated with bird mortality NatureScot (2025b).

Because lattice masts do not use guy wires, they remove the main mechanism identified by NatureScot as contributing to avian collision risk. The lattice tower itself is more visually conspicuous and has a wider physical form than thin support wires, meaning birds are more likely to detect and avoid it. NatureScot's guidance specifically frames the concern around guyed structures, rather than freestanding lattice towers, further reducing concern for mortality due to this design type NatureScot (2025b).

Considering the absence of guy wires and the narrow overall footprint of the structure, the collision risk associated with this lattice met mast is assessed as extremely low. Consequently, no likely significant negative effects on bird populations are predicted because of the operation, or presence of the mast.

The remaining proposed elements are considered in further detail below.

6.4.3.2.1.1 Disturbance / Displacement and Barrier Effects

The operation of wind turbines and associated human activities for maintenance purposes (including maintenance of buffer areas surrounding turbines as part of the mitigation for potential operational effects on bats) both have the potential to cause disturbance and displace birds from the proposed project site. Disturbance effects during the operational phase may be less than during the construction phase, as species may become habituated to wind turbines and disturbance due to human activities would be considerably reduced.

Studies have shown that, in general, species are not displaced beyond 500 m to 800 m from wind turbines (Drewitt & Langston, 2006; Goodship et al., 2022; Hötker et al., 2006; Pearce-Higgins et al., 2009), and, in some cases, birds do not appear to have been displaced at all (Devereux et al., 2008; Douglas et al., 2011; Fielding & Haworth, 2013; Whitfield et al., 2010).

Individual turbines, or the wind farm as a whole, may present a barrier to the movement of birds, restricting or displacing birds from much larger areas. The effect this would have on a population, if affected, could be subtle, and may be difficult to predict. If birds regularly must fly over or around obstacles or are forced into suboptimal habitats, this may result in greater energy expenditure. By implication, this will reduce the efficiency with which they accumulate reserves, potentially affecting their survival or breeding success. However, logically, barrier effects can only be possible if there is clear evidence birds are regularly flying through a site, or regularly using the habitats within a site, which are optimal for foraging, breeding or roosting.

Disturbance/displacement and barrier effects during operation may affect species in the breeding season or roosting and foraging species outside of the breeding season, within the relevant parts of the study area, i.e. close to the proposed wind turbines.

Disturbance associated with the on-site substation and operational access tracks will not be significant during the operational phase. Operational activity is very limited, consisting mainly of infrequent light-vehicle access for routine maintenance (typically several times per year) and remote monitoring. These activities generate only low levels of noise, traffic and human presence, all of which are of short duration and highly predictable. Maintenance visits are also confined to existing tracks and infrastructure and therefore do not introduce new disturbance sources or affect additional habitat. In addition, birds present within or near wind farm sites rapidly habituate to predictable, low-intensity human activity associated with standard operations. For these reasons, no significant disturbance effects on birds, including sensitive species recorded in the wider area, are predicted during operation.

Similarly, disturbance/displacement and barrier effects for the GCR and TDR accommodation areas will not be significant during the operational phase because the grid cable will remain buried in the ground for the duration of the operational phase and the TDR accommodation areas are required for the construction phase only.

The species most likely to suffer from disturbance/displacement is breeding hen harrier. This is because between 1-2 breeding pairs have been recorded within the proposed wind farm site, or more frequently in the immediate surrounds over the survey period (3 nests within proposed wind farm site and eight off-site in the study area) and best-practice guidance (Goodship et al., 2022) states that while hen harrier may nest as close as 200 to 300 m from operational turbines, a precautionary buffer of 300-750 m should be applied during the breeding season to minimise disturbance.

Other important, wide-ranging species may suffer from some disturbance from wind turbines while foraging, but effects are less likely to be significant given the large size of their respective foraging ranges and the wide availability of more optimal, alternative foraging habitats located outside the proposed wind farm site and because the site is less important for them.

6.4.3.2.1.2 Collision

Collision of a bird with turbine rotor blades is generally fatal. The consequences of such mortality depend on the size, density, and demography of the affected population. In species with low population densities and low reproductive rates such as raptors, each additional loss can represent a higher proportion of the local population, with greater potential for negative population-level effects than in abundant, fast-reproducing species such as passerines (Beston et al., 2016). Large birds such as raptors and waterfowl also tend to be long-lived and have low annual productivity, which increases their sensitivity to additional mortality from turbine collisions (Carrete et al., 2012; Katzner et al., 2016).

The likelihood of collision is influenced by several interacting factors, including the size, manoeuvrability, and flight behaviour of the species, their use of the proposed wind farm site, environmental conditions, and the design and layout of the wind farm itself. Collision risk is typically greatest for species that spend a high proportion of time flying within the rotor-swept zone, such as foraging or displaying raptors, and for birds that undertake regular low-level flights between feeding and roosting areas (e.g. swans, geese, and other wildfowl). Risk increases in areas where large concentrations of birds occur (e.g. migration bottlenecks) and during poor visibility or negative weather conditions that reduce birds' ability to detect or avoid turbines (Drewitt & Langston, 2006; Langston & Pullan, 2003). Raptors may also be more vulnerable where wind farms coincide with areas of high prey density or where suitable perching structures are present near turbines (Percival, 2005).

Although passerines nesting or foraging within a wind farm might appear to be at regular risk of collision, evidence indicates that small birds generally collide with turbines infrequently compared with larger species. Most passerines fly below the height of the turbine blades or migrate at altitudes above rotor level. Moreover, many species migrate nocturnally and traverse wind farm sites rapidly, limiting their exposure time (Bradarić et al., 2024; Mills et al., 2011).

Empirical monitoring studies consistently show that raptors, gulls, and large waterbirds are overrepresented in collision records relative to their abundance, while passerines constitute only a small proportion of fatalities (Erickson et al., 2014; Thaxter et al., 2017). This pattern

reflects behavioural and aerodynamic differences but also the influence of detection bias: small carcasses are removed more rapidly by scavengers and are harder to locate during searches (Devault et al., 2017). Even after correction for such biases, however, passerines remain among the least affected groups.

From a population perspective, most passerine species are widespread, abundant, and characterised by high reproductive output ('fast' life-history traits). Consequently, additional mortality from wind turbine collisions is generally unlikely to result in measurable population effects. In contrast, species with small or declining populations, slow reproduction, and high site fidelity, such as target raptor species and large, less manoeuvrable waterbirds (e.g. swans and geese), are of higher sensitivity to collision impacts. Populations with a favourable conservation status (stable or increasing) are also more capable of compensating for small increases in mortality through density-dependent processes, whereas populations already in decline may not be able to do so.

It is important to note that operational disturbance and collision risk effects are spatially mutually exclusive (see Section 6.2.2 for further discussion): a bird that avoids the wind farm due to disturbance cannot simultaneously be at risk of collision. However, they are not temporally exclusive as a bird may initially avoid the proposed wind farm site but later habituate, at which point it could be exposed to collision risk. In addition, habitat change associated with construction or ongoing forestry management may alter collision risk over time, for example by attracting open-ground species to recently felled areas or forest species to maturing stands.

IOF species that were scoped in for detailed assessment and considered at risk of collision with the proposed project, based on flight activity data recorded, were subjected to CRM (see Appendix 6-14) and consisted of:

- Common kestrel
- Common snipe;
- Eurasian woodcock;
- European golden plover;
- Hen harrier;
- Lesser black-backed gull;
- White-tailed eagle; and
- Whooper swan.

6.4.3.2.1.2.1 Rationale for Prediction of Effect

It has been assumed that any impact which does not increase adult mortality by more than 1% of the existing background mortality rate can be considered insignificant (Percival, 2003). This approach is inherently precautionary when applied to non-breeding populations because adult birds typically have the highest survival rates whereas in practice juvenile or sub-adult birds, which have lower survival rates, are likely to make up a proportion of any mortality. High adult survival means that natural (background) mortality rates (for adult birds) may be very low. As a result, even a small number of turbine-related deaths can represent more than a 1% increase above this low baseline. Using adult survival rates therefore represents a precautionary

approach, making it more likely for predicted collision mortality to exceed the 1% threshold and thus increasing the likelihood of identifying a likely significant effect.

Where excess mortality is >1% of background levels, a more detailed assessment of the predicted mortality over the 35-year lifespan of the proposed project has been provided. This considers each species' population size, recent population trends and ecology following NatureScot (2025c) guidance, as well as providing information on empirically documented cases of collision for further context (Dürr, 2025; NPWS, 2024; B. G. O'Donoghue et al., 2020). Significant negative effects are only likely where the number of predicted deaths due to the proposed project are likely to result in appreciable differences to projected rates of population decline or recovery.

Note that recent background trends may not continue over the lifespan of the proposed project, even if the proposed project did not go ahead. This is because population declines or increases may eventually plateau, depending on the drivers for the population trend. However, we have assumed that the recent trends will continue, as is standard and accepted practice in EIA.

Sources of empirically documented collisions in Europe come from the Dürr (2025) database (data from 2002-2025). While the Dürr database does not perfectly reflect reality (not all wind farm projects and countries carry out post-construction monitoring in the same way, with the same intensity, with the same level of detail and reporting), it represents the best estimate available of the empirical effects of collision on European birds. Collisions reported in the Republic of Ireland and Northern Ireland are conflated within the 'GB' column in the Dürr (2025) dataset and have been manually extracted so that only those for the island of Ireland are reported in this Chapter. Other additional datasets have been consulted for evidence of documented collisions in the Republic of Ireland included the RAPTOR protocol report (B. G. O'Donoghue et al., 2020) (data are from 2011-2019) and Irish Hen Harrier Threat Response plan (NPWS, 2024).

6.4.3.2.1.2.2 Summary of CRM outputs

Table 6-15 summarises the outcome of the CRM, accompanied by relevant supplementary data to support the evaluation of the potential significance of predicted collision mortality for each species. Adult survival rates are taken from BTO BirdFacts (BTO, 2025a). Annual background mortality is calculated as population size multiplied by background mortality rates (i.e. 1-survival rates). For further details regarding the CRM refer to Appendix 6-14. The evaluation of potential significance of collision mortality is given in Section 6.4.5.

Table 6-15: CRM Outputs and Population Data

Species	Number of Collisions / Year	Population Type[13]	Population Size	Adult Survival Rates	Background Mortality (Deaths / Year)	% Increase on Background Mortality Due to Collision	Total Number of Collisions Over 35-Year Lifespan	Population Trend	Empirically Documented Collisions Europe	Empirically Documented Collisions Ireland
Common snipe	0.54	ROI (nb)	835	0.481	458	0.12	18.1	-50% 1998 to 2018	19	0
Common kestrel	0.34	ROI (b and nb)	13,500	0.88	1,620	0.02	11.9	- 53% 1998 to 2018	928	2 (B. G. O'Donoghue et al., 2020)
Eurasian woodcock	0.00	ROI (b and nb)	27,434	0.61	10,699	0	0	-74% 1988 to 2011	23	0
European golden plover	0.10	ROI (nb / migratory)	80,707	0.73	21,791	0.0004	3.5	-16.5% 2019-2024	47	0
Hen harrier	0.06	ROI (b and nb)	212	0.81	40	0.19	2.1	-29% 1998 to 2018	30	One in Antrim in NI (Dürr, 2025);

[13] Key: nb = non-breeding and b = breeding populations

Species	Number of Collisions / Year	Population Type[13]	Population Size	Adult Survival Rates	Background Mortality (Deaths / Year)	% Increase on Background Mortality Due to Collision	Total Number of Collisions Over 35-Year Lifespan	Population Trend	Empirically Documented Collisions Europe	Empirically Documented Collisions Ireland
		Regional (b)	14		2.67	2.31				one possible and four probable / confirmed incidences of turbine strike (NPWS, 2024); (B. G. O'Donoghue et al., 2020)
Lesser black-backed gull	0.08	ROI (b)	14,224	0.913	1,237	0.0065	2.8	Increase (no magnitude given) 2012 to 2018	372	1
White-tailed eagle	0.064	ROI (b)	24	0.936	1.5	2.6	2.24	100% increase (2012 to 2018)	574	Three in Kerry in ROI (B. G. O'Donoghue et al., 2020); three in Donegal in ROI (Donegal Daily, 2025)
Whooper swan	0.00	ROI (nb)	14,467	0.801	2,879	0.00	0.00	24.9% increase 2015 to 2020	10	0

6.4.3.2.1.2.3 Nocturnal Migration and Aviation Lighting

Baseline flight activity surveys were only conducted during daylight hours. Therefore, it is possible that collision risk to nocturnal birds, especially nocturnal migrants, could be underestimated. However, this is unlikely to be the case for the following reasons.

Following the latest NatureScot CRM guidance (Band, 2024), collision risk estimates have been corrected for all species known to have nocturnal or crepuscular flight activity to account for any nocturnal flight activity that may have been missed by diurnal surveys.

Empirical evidence indicates that strictly nocturnal migrants do not face elevated collision risk at onshore wind farms. Studies from Germany and the Netherlands (e.g. Welcker et al. (2017) and Krijgsveld et al. (2009)) report that nocturnal migrants form only a small proportion of total bird collisions and occur at similar or lower rates than diurnal migrants. This reflects high-altitude night migration, short exposure times over land, and effective avoidance behaviour.

Aviation obstruction lighting has the potential to influence nocturnal migrants; however, available evidence from onshore wind farms in North America shows low collision rates in the context of population-level effects (typically 1-7 birds per turbine per year; Kerlinger et al. (2010)) and large-scale mortality events are not reported for modern, medium-intensity lit turbines, which are being proposed and are required to comply with ICAO Annex 14-based obstacle lighting schemes agreed with the Irish Aviation Authority (IAA, 2025). The risk is further reduced at the proposed project site because the site is inland and far from coastal concentrations of nocturnally active seabirds, which are the species groups shown to be most sensitive to artificial lighting (NatureScot, 2020). Therefore, no significant negative effects are likely in association with aviation lighting.

6.4.3.2.2 Indirect Impacts

If hydrocarbon spills during the operation of the proposed project led to pollution of surface water-dependent wetland habitats and / or pollution of groundwater-dependent habitats within nearby nature conservation sites for birds, it could result in indirect habitat loss for SCI bird species or habitats. The same is true for wetland sites that could be used by bird species from nearby designated sites, even if those wetland sites are not designated themselves.

It was concluded there were no significant negative effects on surface water or groundwater-dependent habitats in Chapter 5: Biodiversity, or Chapter 8: Hydrology and Hydrogeology (see Section 8.4.2 in Chapter 8 for a description of the embedded mitigation), which precludes the possibility of negative effects on IOFs that use such habitats.

6.4.4 Assessment of Likely Significant Effects for Nature Conservation Sites

SPAs are considered fully in the AA Screening and Natura Impact Statement (NIS) also submitted with this planning application.

The only SPA that was screened in for the NIS and taken forward for further assessment in this Chapter was Cummeen Strand SPA due the proximity of one of the TDR accommodation areas to the SPA (20 m), point of interest 13. This SPA is designated for non-breeding light-bellied brent goose, Eurasian oystercatcher, common redshank and wetland and waterbird habitats. There is also downstream connectivity to the SPA via the Sligo second order watercourse (EPA code 35S23) and so, in the absence of mitigation, there could be potential pollution effects on surface-water fed wetland and waterbird SCI habitats.

Given the proximity of the SPA to the accommodations area, there is the potential for temporary disturbance to SCI birds during the accommodations, which will comprise of temporary removal of road signs, trees, lamp posts and traffic lights.

The accommodations area is located on a busy junction with high levels of traffic and pedestrian activity. The proposed measures comprise the short-term, temporary removal of traffic lights, poles/signage and a small number of immature saplings within an existing busy road median. All accommodations are landward of the shoreline, confined to the paved island, and will be undertaken during normal daytime hours using hand tools and light plant. No access onto intertidal habitats is required.

The TIDE Waterbird Disturbance & Mitigation Toolkit (*TIDE Toolbox - TIDE Tools*, n.d.) indicates that (i) visual stimuli usually drive responses before noise, (ii) the urban/traffic context and habituation are critical in predicting effects, and (iii) steady background noise ≤~55–60 dB at the receptor is generally low effect, while moderate levels (60–72 dB) can also be low where such levels are typical and regular in urban settings.

For light-bellied brent goose, the toolkit notes high sensitivity with first-reaction distances ~105 m (foraging) and ~205 m (roosting) and a general tendency to avoid highly disturbed urban margins; oystercatcher exhibit moderate sensitivity and rapid habituation, typically reacting at 25–200 m in disturbed estuaries; common redshank are visually tolerant but noise-sensitive, with ≤~70 dB at the bird generally acceptable (with caution above 55–60 dB) and routine foraging observed close to plant in urbanized locales (while avoiding workers on foot at <~75 m). In heavily trafficked, pedestrian-active waterfronts, the increment from brief, minor, landward, accommodation measures is negligible relative to baseline.

Consequently, no effects above existing background levels are predicted for the SPA SCI species. Should any birds briefly flush due to incidental cues, rapid return and continued use is expected once the transient stimulus ceases, consistent with habituation patterns described in the TIDE toolkit.

It was also concluded, following the implementation of embedded mitigation measures, that there were no significant negative cumulative effects on surface water-dependent habitats in Chapter 5: Biodiversity, or Chapter 8: Hydrology and Hydrogeology (see Section 8.4.2 in Chapter 8 for a description of the embedded mitigation), which precludes the possibility of negative effects on wetland and waterbird SCI habitats from Cummeen Strand SPA also.

With the embedded mitigation measures in place, no significant effects on Cummeen Strand SPA are predicted.

All other nature conservation sites were scoped out from detailed assessment apart from the Leitrim Uplands non-designated important breeding area for hen harrier. This has been discussed in Table 6-20 as part of the impact assessment for hen harrier.

6.4.5 Assessment of Likely Significant Effects for Species

The impact assessment for species focuses on impacts from the proposed wind farm only. As stated in Section 6.4.3 impacts from the GCR and TDR accommodation areas on bird species have been assessed as non-significant.

6.4.5.1 Common Kestrel

There are no likely significant negative effects predicted for common kestrel (breeding and non-breeding seasons) as shown in Table 6-16.

Table 6-16: Summary of Impact Assessment for Common Kestrel (Breeding and Non-Breeding Seasons)

Impact	Impact Assessment	Significance of Effect
Construction and Decommissioning Phases		
Nest Damage or Destruction	No breeding recorded within the proposed wind farm site (off-site only), so no potential damage to nests possible pending the results of the confirmatory pre-commencement surveys.	Not significant
Habitat Loss	Relative to the other IOF species recorded, the high levels (i.e. >10,000 seconds) of flight activity within and surrounding the proposed wind farm site demonstrates regular site usage (present in every survey season but the NB20/21 season) and it is likely this species uses the habitats present for foraging. Common kestrel typically forages in open habitats that support small mammals, such as grasslands, agricultural landscapes and roadside verges, avoiding dense woodland and heavily forested areas (Village & Brockie, 2010). Figure 6-12 shows that most kestrel flight activity occurs over grassland habitats within the centre of the site, away from proposed infrastructure. Most of the habitats due to be lost are commercial conifer plantation (133.1 ha out of 152.29 ha), which are of low foraging value to this species; therefore, no significant habitat loss is likely.	Not significant
Disturbance / Displacement	Kestrel are only considered susceptible to disturbance within 200 m of the proposed wind farm site (Goodship et al., 2022). No evidence of breeding or roosting occurs within this distance, so significant disturbance or displacement of breeding or roosting kestrels is not predicted. Some disturbance to foraging birds is possible but this is unlikely to be significant due to the temporary and localised nature of any disturbance, and availability of extensive alternative foraging habitat in the wider area (most habitats within the proposed wind farm footprint are closed canopy conifer plantation (133.1 ha out of 152.29 ha), which are not suitable for foraging	Not significant

Impact	Impact Assessment	Significance of Effect
	common kestrel). Figure 6-12 shows that most kestrel flight activity occurs over grassland habitats within the centre of the site, away from proposed infrastructure.	
Indirect Impacts	This species is not dependent on nearby wetland or groundwater-dependent habitats; therefore, there is no potential for indirect impacts due to pollution or surface water or lowering of groundwater.	Not significant
Operational Phase		
Disturbance / Displacement	No sensitive locations (breeding or roosting) within the proposed wind farm site were identified during surveys (see above); therefore, no significant disturbance or displacement of breeding or roosting kestrels is likely. Some disturbance to foraging birds is possible but this is unlikely to be significant due to the availability of extensive alternative foraging habitat in the wider area (most habitats within the proposed wind farm footprint are closed canopy conifer plantation, which are not suitable for foraging common kestrel) and that most kestrel flight activity occurs over grassland habitats within the centre of the site, away from proposed infrastructure.	Not significant
Barrier Effect	There were 74 flight lines recorded for this species during surveys (>10,000 seconds) and the species was present in every survey season except the NB20/21 season, suggesting that the species does regularly overfly the proposed wind farm site; however, Figure 6-12 shows most of the flight lines were of birds foraging over the centre of the site, away from proposed infrastructure. The turbine layout is dispersed and not orientated in a linear fashion; therefore, any energetic costs incurred due to a barrier effect are likely to be minimal and not significant.	Not significant
Collision	As shown in Table 6-15, the CRM predicted 0.34 collisions per year, or 11.9 collisions over the 35-year lifespan of the proposed project, which is largely driven by the results from the breeding 2024 season only. This annual rate of collision corresponds to a 0.02% increase in background mortality for the ROI population, which is considerably less than the 1% increase in background mortality threshold typically used to determine significance. Population data for kestrel at a regional / county level were not available and a quantitative assessment against background mortality rates at a regional / county or local level is not possible.	Not significant

Impact	Impact Assessment	Significance of Effect
	However, given that majority of the flight lines recorded were on the margins of the collision risk zone and were generally well away from any proposed turbine locations, and that collision risk estimates for all survey seasons apart from the breeding 2024 season were much lower, it is likely that the predicted collision rate is an overestimate. While kestrel has a relatively high number of recorded turbine collisions in Europe, there were only two incidents recorded in Ireland. Taken together, the likely maximum number of deaths due to the proposed project is extremely small relative to the national population and would not result in any appreciable change to population trajectory at ROI and regional / county scales. The level of predicted mortality is therefore assessed as not significant and would not hinder any conservation actions undertaken for the recovery of the population.	
Indirect Impacts	This species is not dependent on nearby wetland or groundwater-dependent habitats; therefore, there is no potential for indirect impacts due to pollution or surface water or lowering of groundwater.	Not significant

6.4.5.2 Common Snipe

No likely significant negative effects are predicted for common snipe (breeding season) as shown in Table 6-17.

Table 6-17: Summary of Impact Assessment for Common Snipe (Breeding Season)

Impact	Impact Assessment	Significance of Effect
Construction and Decommissioning Phases		
Nest Damage or Destruction	Probably breeding within the proposed wind farm site, so potential damage to nests possible; however, with the embedded mitigation as described in Section 6.4.1, this is unlikely.	Not significant
Habitat Loss	No evidence of large numbers of this species regularly foraging or roosting within the proposed wind farm site. As shown in Figure 6-13, most flight activity occurred away from any proposed infrastructure, particularly towards Dough Mountain.	Not significant

Impact	Impact Assessment	Significance of Effect
	Most of the habitats due to be lost are commercial conifer plantation (133.1 ha out of 152.29 ha), which are of low value to this species, which tend to prefer wet grassland or peatland habitats for breeding (BirdWatch Ireland, 2025c); therefore, no significant habitat loss is likely.	
Disturbance / Displacement	Probably breeding on- or nearby to site (likely three territories present); see Figure 6-26; however, with the embedded mitigation as described in Section 6.4.1, disturbance is unlikely, so no significant disturbance / displacement is predicted.	Not significant
Indirect Impacts	There are no nearby surface water-fed wetland or groundwater-dependent habitats present within or associated with any nearby nature conservation sites designated for this IOF. Furthermore, with the embedded mitigation described in Chapter 5: Biodiversity and Chapter 8: Hydrology and Hydrogeology, there are no significant effects on surface water and groundwater predicted. Therefore, there can also be no potential for significant indirect impacts on common snipe due to surface water pollution or lowering of groundwater.	Not significant
Operational Phase		
Disturbance / Displacement	No sensitive foraging or roosting locations within the proposed wind farm site were identified during surveys (see above); however, there may be up to three breeding territories within or nearby the site, although this was not true for every survey year. Assuming a 47.5% decline in abundance of snipe within 500 m of operational turbines (Pearce-Higgins et al., 2009), there could be some loss of breeding snipe territories, adopting a precautionary approach. It is anticipated that, the occasional breeding attempts by snipe would relocate to other parts of the site or surrounding area, away from turbines. This conclusion is supported by data from the breeding surveys, which suggest that snipe breeding territories occupy different parts of the site from year to year and typically are located outside the site. On this basis, no significant effects are predicted.	Not significant
Barrier Effect	There is no evidence this species is regularly flying through the proposed wind farm site (Figure 6-13 shows that the majority of flight lines occurred off-site towards Dough Mountain) or regularly using the habitats within the proposed wind farm site for foraging or roosting, and the turbine layout is dispersed and not orientated in a linear fashion; therefore, any energetic costs incurred due to a barrier effect are likely to be minimal and not significant.	Not significant

Impact	Impact Assessment	Significance of Effect
Collision	As shown in Table 6-15, the CRM predicted 0.54 collisions per year, or 18.9 collisions over the 35-year lifespan of the proposed project, mostly driven by the results from the breeding 2025 season. This annual rate of collision corresponds to a 0.12% increase in background mortality for the ROI population. However, this percentage is likely to be an overestimate because ROI population figures derived from I-WeBS counts inevitably under-record cryptic, dispersed wetland species such as common snipe, meaning the true national population is larger than reported. Consequently, the proportional contribution of predicted turbine-related mortality is likely to be lower. As this 0.12% increase is less than a 1% increase in background mortality, it is unlikely that collision related mortality will have a significant impact on common snipe at a ROI level. Common snipe has a relatively low number of recorded turbine collisions in Europe and none in Ireland. This pattern is consistent with the species' flight behaviour, which is low, erratic, and typically at heights below the rotor-swept zone (eBird, 2026), and its tendency to remain within wetland habitats rather than engage in high-altitude or long-distance commuting flights through turbine arrays (Gale, 2023; Minias et al., 2013). Population data for common snipe at a regional level were not available and a quantitative assessment against background mortality rates at a regional or local level is not possible. Given that most of the flight lines recorded were on the margins of the collision risk zone, generally well away from any proposed turbine locations, and that collision risk estimates for all survey seasons apart from the breeding 2025 season were much lower, it is likely that the predicted collision rate is an overestimate. Accordingly, the assessment represents a precautionary, worst-case estimate, and in practice mortality is likely to be lower. Taken together, the likely maximum number of deaths due to the proposed project is extremely small relative to the national and county populations and would not result in any appreciable change to population trajectory at ROI and county scales. The level of predicted mortality is therefore assessed as not significant and would not hinder any conservation actions undertaken for the recovery of the population. This statement also considers movements at night, given that a correction factor was applied during the CRM process to account for any nocturnal activity that could potentially have been missed during diurnal flight activity surveys, following the latest best-practice guidance for CRM (NatureScot, 2024).	Not significant
Indirect Impacts	There are no nearby surface water-fed wetland or groundwater-dependent habitats present within or associated with any nearby nature conservation sites designated for this IOF. Furthermore, with the embedded mitigation described in Chapter 5: Biodiversity and Chapter 8: Hydrology and	Not significant

Impact	Impact Assessment	Significance of Effect
	Hydrogeology, there are no significant effects on surface water and groundwater predicted. Therefore, there can also be no potential for significant indirect impacts on common snipe due to surface water pollution or lowering of groundwater.	

6.4.5.3 Eurasian Woodcock

No likely significant negative effects are predicted for Eurasian woodcock (breeding and non-breeding seasons) as shown in Table 6-18.

Table 6-18: Summary of Impact Assessment for Eurasian Woodcock (Breeding and Non-Breeding Seasons)

Impact	Impact Assessment	Significance of Effect
Construction and Decommissioning Phases		
Nest Damage or Destruction	Probably breeding within the proposed wind farm site, so potential damage to nests is possible; however, with the embedded mitigation as described in Section 6.4.1, this is unlikely.	Not significant
Habitat Loss	Probably breeding; likely 2-3 breeding territories present in the north and south of the proposed wind farm site, with two c. 100 m from areas that will be felled for project infrastructure and one c.250 m away (see Figure 6-27). Based on the survey results, it does not appear any of the probable territories overlap with proposed infrastructure; however, as a precaution, it has been assessed that there may be some minor, non-significant temporary losses of the edge of territories, c. <1 ha. Most of the habitats due to be lost are commercial conifer plantation (133.1 ha out of 152.29 ha). Eurasian woodcock depend on a mosaic of woodland cover for daytime roosting and nearby open areas such as glades and rides for nocturnal foraging and courtship flights ("roding") (Engler et al., 2025). While they often occupy conifer plantations, their territorial presence is maintained by adjacent structural diversity, rather than the plantation canopy alone. Conifer removal can temporarily disrupt roosting habitat but does not necessarily result in permanent territory loss, provided structural features such as glades, rides, and edges are preserved or enhanced (Blakesley & Buckley, 2010; Braña et al., 2010).	Not significant

Impact	Impact Assessment	Significance of Effect
	Large-scale clear-felling for turbine infrastructure may degrade habitat quality significantly if it removes essential cover and diminishes invertebrate-rich foraging grounds (Braña et al., 2010; Engler et al., 2025). The proposed wind farm site is surrounded by a very large area of conifer plantation, which includes many forestry tracks, glades and rides. These will still be present following felling for the proposed project, and it is therefore likely that while there may be temporary disruption to roosting areas, it is unlikely any permanent loss of territories will occur given the wide availability of displacement habitats and lack of evidence that the population is at carrying capacity (e.g. the numbers of woodcock inside the displacement zones are less than those where habitat loss is predicted to occur). Therefore, no significant, long-term effects are predicted.	
Disturbance / Displacement	Probable breeding occurs within the proposed wind farm site and so disturbance to breeding woodcock could occur; however, with the embedded mitigation as described in Section 6.4.1, this is considered unlikely.	Not significant
Indirect Impacts	There are no nearby surface water-fed wetland or groundwater-dependent habitats present within or associated with any nearby nature conservation sites designated for this IOF. Furthermore, with the embedded mitigation described in Chapter 5: Biodiversity and Chapter 8: Hydrology and Hydrogeology, there are no significant effects on surface water and groundwater predicted. Therefore, there can also be no potential for significant indirect impacts on Eurasian woodcock due to surface water pollution or lowering of groundwater.	Not significant
Operational Phase		
Disturbance / Displacement	Probable breeding occurs within the proposed wind farm site and so disturbance to breeding woodcock could occur, as some of the identified territories are <200 m from proposed turbine locations (see Section 6.4.1.2); however, given the wide availability of alternative conifer habitats, including glades, rides and edges, it is anticipated that in reality, the occasional breeding attempts by woodcock would relocate to other parts of the site or surrounding area, away from turbines. It is therefore unlikely any permanent loss of the number of breeding territories will occur.	Not significant

Impact	Impact Assessment	Significance of Effect
Barrier Effect	Although woodcock was recorded using habitats within the proposed wind farm site (mean of 18 observations in the non-breeding season and 4 during the breeding season), flight activity was highly localized. Most flight lines were short and associated with movements between nearby foraging areas and breeding territories (see Figure 6-14), rather than long-distance commuting flights. This indicates that woodcock are not reliant on extensive cross-site movements. Furthermore, studies of woodcock interactions with wind farms in Ireland have found no evidence of significant barrier effects, as birds typically make short flights within forestry blocks and do not exhibit large-scale avoidance behaviour (Gittings, 2019). Barrier effects are generally associated with species undertaking long-distance migratory flights or wide-ranging movements, where wind farms can impose additional energetic costs (Masden et al., 2009), but these costs are negligible for species like woodcock whose movements are highly localized. In addition, the turbine layout at the proposed wind farm is dispersed and non-linear, avoiding the creation of a continuous physical barrier. Consequently, any potential increase in energetic costs due to displacement or barrier effects is expected to be minimal and not significant.	Not significant
Collision	As shown in Table 6-15, the CRM predicted 0 collisions per year or over the 35-year lifespan of the proposed project. Consequently, it is unlikely that collision related mortality will have a significant impact on Eurasian woodcock. It is acknowledged that nocturnal flight activity could have been missed by diurnal flight activity surveys; however, it was not possible to apply correction factors during the CRM process to account for any nocturnal activity that could potentially have been missed during diurnal flight activity surveys (NatureScot, 2024) because there were no diurnal flights within the collision risk zone. Although woodcock undertake nocturnal flights and seasonal migrations, available European collision datasets indicate that recorded turbine collisions for Eurasian woodcock are relatively low, especially when compared with larger or more aerial species. This pattern aligns with the woodcock's characteristic behaviour, showing a strong tendency to remain within woodland and wetland edge habitats (Heward et al., 2018; Hoodless et al., 2009), reducing the likelihood of routine high-altitude transit through turbine arrays. Accordingly, the proposed project will not hinder any conservation actions undertaken for the recovery of the population and will not give rise to any significant effects as a result of collision.	Not significant

Impact	Impact Assessment	Significance of Effect
Indirect Impacts	There are no nearby surface water-fed wetland or groundwater-dependent habitats present within or associated with any nearby nature conservation sites designated for this IOF. Furthermore, with the embedded mitigation described in Chapter 5: Biodiversity and Chapter 8: Hydrology and Hydrogeology, there are no significant effects on surface water and groundwater predicted. Therefore, there can also be no potential for significant indirect impacts on Eurasian woodcock due to surface water pollution or lowering of groundwater.	Not significant

6.4.5.4 European Golden Plover

No likely significant negative effects are predicted for non-breeding / migratory European golden plover as shown in Table 6-19.

Table 6-19: Summary of Impact Assessment for European Golden Plover (Non-Breeding / Migratory Seasons)

Impact	Impact Assessment	Significance of Effect
Construction and Decommissioning Phases		
Nest Damage or Destruction	N/A as only non-breeding / migratory season brought forward for detailed assessment.	N/A
Habitat Loss	There is no evidence of large numbers of this species regularly foraging or roosting within the proposed wind farm site. As shown in Figure 6-15, all flight activity recorded was off-site, towards to the edge of the 500 m survey buffer near Dough Mountain. Wintering or migratory golden plover tend to prefer wet grassland, bogs and agricultural fields (BirdWatch Ireland, 2025a). Most of the habitats due to be lost are commercial conifer plantation (133.1 ha out of 152.29 ha), which are of low value to this species; therefore, no significant habitat loss is likely.	Not significant
Disturbance / Displacement	No sensitive locations (foraging or roosting) within the proposed wind farm site were identified during surveys (activity was off-site and largely comprised of birds circling overhead, apparently on migration). Non-breeding golden plover requires a buffer of 200-500 m to avoid disturbance while foraging or roosting (Goodship et al., 2022). While the closest flight location was c.300 m from any proposed infrastructure, as the birds appeared to be passing through the area only, no significant disturbance / displacement is likely.	Not significant

Impact	Impact Assessment	Significance of Effect
Indirect Impacts	There are no nearby surface water-fed wetland or groundwater-dependent habitats present within or associated with any nearby nature conservation sites designated for this IOF. Furthermore, with the embedded mitigation described in Chapter 5: Biodiversity and Chapter 8: Hydrology and Hydrogeology, there are no significant effects on surface water and groundwater predicted. Therefore, there can also be no potential for significant indirect impacts on European golden plover due to surface water pollution or lowering of groundwater.	Not significant
Operational Phase		
Disturbance / Displacement	No sensitive locations (foraging or roosting) within the proposed wind farm site were identified during surveys; therefore, no significant disturbance / displacement is likely.	Not significant
Barrier Effect	There is no evidence this species is regularly flying through the proposed wind farm site (see Figure 6-15; all flight activity was recorded off-site, towards the edge of the 500 m survey buffer near Dough Mountain) and no evidence it was regularly using the habitats within the proposed wind farm site for foraging or roosting (there were a mean of seven and three observations made of this species during the non-breeding and breeding seasons, respectively, but most activity occurred over Dough Mountain off-site and appeared to be of birds on migration), and the turbine layout is dispersed and not orientated in a linear fashion; therefore, any energetic costs incurred due to a barrier effect are likely to be minimal. No significant barrier effects are predicted.	Not significant
Collision	As shown in Table 6-15, the CRM predicted 0.1 collisions per year, or 3.5 collisions over the 35-year lifespan of the proposed project. This annual rate of collision corresponds to a 0.0004% increase in background mortality for the ROI population and a 0.02% increase for the County Leitrim population. However, these percentages are likely to be overestimates because ROI population figures derived from I-WeBS counts inevitably under-record species that do not solely rely on wetlands, such as European golden plover, meaning the true national population is larger than reported. Consequently, the proportional contribution of predicted turbine-related mortality is likely to be lower. Regardless, as both percentage increases are considerably less than a 1% increase in background mortality, it is unlikely that collision related mortality will have a significant effect on European golden plover. Accordingly, the assessment represents a precautionary, worst-case estimate, and in practice, mortality is likely to be lower.	Not significant

Impact	Impact Assessment	Significance of Effect
	European golden plover has a relatively low number of recorded turbine collisions in Europe and none in Ireland. Taken together, the likely maximum number of deaths due to the proposed project is extremely small relative to the national and county population and would not result in any appreciable change to population trajectory at ROI and county scales. The level of predicted mortality is therefore assessed as not significant and would not hinder any conservation actions undertaken for the recovery of the population. This statement also considers movements at night, given that a correction factor was applied during the CRM process to account for any nocturnal activity that could potentially have been missed during diurnal flight activity surveys, following the latest best-practice guidance for CRM (NatureScot, 2024).	
Indirect Impacts	There are no nearby surface water-fed wetland or groundwater-dependent habitats present within or associated with any nearby nature conservation sites designated for this IOF. Furthermore, with the embedded mitigation described in Chapter 5: Biodiversity and Chapter 8: Hydrology and Hydrogeology, there are no significant effects on surface water and groundwater predicted. Therefore, there can also be no potential for significant indirect impacts on European golden plover due to surface water pollution or lowering of groundwater.	Not significant

6.4.5.5 Hen Harrier

There are likely significant effects of disturbance / displacement on breeding hen harrier populations during the operational phase as shown in Table 6-20; however, no other significant effects are predicted. As the proposed wind farm site forms part of the Leitrim Uplands non-designated important breeding area for hen harrier, any impacts on hen harrier also apply for the non-designated important breeding area.

Table 6-20: Summary of Impact Assessment for Hen Harrier (Breeding and Non-Breeding Seasons)

Impact	Impact Assessment	Significance of Effect
Construction and Decommissioning Phases		

Impact	Impact Assessment	Significance of Effect
Nest Damage or Destruction	Confirmed breeding (up to two pairs have nested within in the proposed wind farm site or up to three pairs in the wider area during the study period, although most nesting activity has occurred off-site over the last five years of surveys); so potential damage to nests is possible if nesting occurs within the proposed project footprint immediately prior to construction; however, with the embedded mitigation as described in Section 6.4.1, nest damage or destruction is unlikely.	Not significant
Habitat Loss	Most of the habitats due to be lost (133.1 ha out of 152.29 ha) are closed canopy commercial conifer plantation, which are of low value to this IOF species for nesting, foraging and roosting ((Caravaggi et al., 2019; Madders, 2000; O'Donoghue, 2020). Therefore, while there could be some loss of foraging habitats to this species, it is not likely to be significant. None of the historical nest locations are located within the proposed project footprint even if some have been located within the proposed wind farm site, so there is no likelihood that any previously known nest sites will be lost based on survey data. The same is true for winter roosts; there is no evidence of this species using the study area for roosting and so there can be no loss of roosting habitat. There is also overlap with the effective habitat loss due to displacement under operation and all that habitat directly lost during construction is also covered under the assessment of operational disturbance.	Not significant
Disturbance / Displacement	As stated above, confirmed breeding occurs within and nearby the proposed wind farm site, so potential disturbance to nesting hen harrier is possible; however, with embedded mitigation as described in Section 6.4.1, this is unlikely. There are no winter roosts present and so no disturbance to roosting hen harrier in the winter is possible. There could be some disturbance to foraging birds during construction; however, this is unlikely to be significant due to the temporary and localised nature of any disturbance and availability of extensive alternative foraging habitat in the wider area (most habitats within the proposed wind farm footprint are closed canopy conifer plantation, which are not suitable for foraging hen harrier).	Not significant
Indirect Impacts	This species is not dependent on nearby wetland or groundwater-dependent habitats; therefore, there is no potential for indirect impacts due to pollution or surface water or lowering of groundwater.	Not significant
Operational Phase		

Impact	Impact Assessment	Significance of Effect
Disturbance / Displacement	No winter roosting within the proposed wind farm site was identified during surveys; therefore, no disturbance / displacement to winter roosts is likely. As shown in the OBMP (Appendix 6-13), nesting hen harrier require a buffer of 750 m to avoid disturbance from operational turbines (Goodship et al., 2022). If any hen harrier nest <750 m from operational turbines, they could be subsequently disturbed (particularly if they select a nesting site during a period of turbine downtime), which could potentially result in displacement. It is acknowledged that in some survey years, only a single pair has been recorded and that one or both pairs may not necessarily be displaced due to the proposed project. However, adopting a precautionary approach, displacement of up to two nesting pairs is possible. Similarly, operational turbines could disturb foraging hen harrier. Hen harrier has been shown to avoid foraging near operational turbines by at least 250 m (Pearce-Higgins et al., 2009). This displacement would result in the effective loss of foraging habitat for this species. Potential loss of hen harrier foraging habitats due to operational displacement has been assessed comprehensively in the Hen Harrier Foraging Habitat Loss Report (Appendix 6-12). The analysis integrated desk-based research, field surveys, and GIS-based assessment to quantify habitat displacement effects based on both current and future habitat suitability over the lifespan of the proposed project. When planned forestry cycles were accounted for, it was predicted that up to 140 ha of foraging habitat could be lost to foraging hen harrier over the lifespan of the proposed project, which corresponded to 76 ha and 64 ha of higher and lower suitability habitats, respectively. This could potentially have a significant effect on up to two pairs of foraging hen harrier.	Significant, long-term, negative at the national scale for breeding and foraging hen harrier and in relation to the Leitrim Uplands non-designated important breeding area for hen harrier
Barrier Effect	This species regularly flies through the proposed wind farm site and uses the habitats within and surrounding the proposed wind farm site for breeding and foraging; however, the turbine layout is dispersed and not orientated in a linear fashion; therefore, any energetic costs incurred due to a barrier effect are likely to be minimal. Studies in Ireland and Scotland have found no evidence of significant energetic costs or population-level impacts attributable to wind farms, with barrier effects being highly variable and often negligible when turbine layouts are dispersed and non-linear (Haworth & Fielding, 2012; M. W. Wilson et al., 2017). No significant barrier effects are predicted.	Not significant
Collision	As shown in Table 6-15, the CRM predicts 0.06 collisions per year (2.1 over 35 years). Adopting a precautionary approach whereby it is assumed that the predicted collisions relate to adult birds (which have much higher survival rates than juvenile birds), this level of mortality equates to a 0.19%	Not significant

Impact	Impact Assessment	Significance of Effect
	increase in annual background mortality at the ROI scale and 2.31% at the regional Leitrim–Slieve Rushen–Cavan breeding-area scale. The national-scale increase is well below the commonly applied 1% threshold, indicating no significant effect at ROI level. The 1% value is not a statutory threshold for birds, but a commonly used screening indicator. Significance is determined by whether additional mortality could influence population trajectory, and at this magnitude no such effect is plausible. At the regional scale, the 2.31% increase in background mortality is above the 1% threshold, albeit this is based on the precautionary assumption that all predicted collisions relate to adult birds. If juvenile survival rates are applied, the predicted increase in background mortality falls to 0.56%, which would be below the 1% threshold. The true effect is likely to fall between 0.56% and 2.31%, depending on annual productivity and the proportion of locally fledged juveniles flying at rotor height. Displacement of foraging birds within 250 m of turbines has been assumed and operates upstream of collision risk; birds displaced from the area surrounding turbines due to disturbance are not simultaneously exposed to blade strike. Assuming displacement occurs, actual flight activity within/around the site during operation will be considerably lower than the baseline flight activity levels on which the CRM was based. The number of collisions predicted by the CRM is directly proportionate to the levels of flight activity within the immediate vicinity of the turbines. If displacement substantially reduces flight activity in the vicinity of the turbines, then the actual collision risk will be considerably lower than the modelled collision risk. Based on the above, the likely number of deaths due to the proposed project is extremely small relative to the national and regional populations and is unlikely to result in any appreciable change to population trajectory at ROI or regional scales. The level of predicted mortality is therefore assessed as not significant and would not hinder any conservation actions undertaken for the recovery of the population. Given that the hen harrier population at the proposed project site aligns with those known for the Leitrim Uplands non-designated important breeding population, the same conclusions regarding collision apply to the Leitrim Uplands population also.	
Indirect Impacts	This species is not dependent on nearby wetland or groundwater-dependent habitats; therefore, there is no potential for indirect impacts due to pollution or lowering of groundwater.	Not significant

6.4.5.6 Lesser Black-Backed Gull

No likely significant negative effects are predicted for lesser black-backed gull (breeding season) as shown in Table 6-21.

Table 6-21: Summary of Impact Assessment for Lesser Black-Backed Gull (Breeding Season)

Impact	Impact Assessment	Significance of Effect
Construction and Decommissioning Phases		
Nest Damage or Destruction	No confirmed breeding was detected, and conifer and grassland are unsuitable breeding habitats for this species, which tend to nest on offshore islands, islands in inland lakes, sand dunes and coastal cliffs (BirdWatch Ireland, 2025b); therefore, no nest damage or destruction is likely.	Not significant
Habitat Loss	No evidence of this species breeding and no evidence of large numbers of this species regularly foraging / roosting within the proposed wind farm site was recorded during surveys (most flight lines were associated with birds commuting; see Figure 6-18). Most of the habitats due to be lost are commercial conifer plantation (133.1 ha out of 152.29 ha), which are of low value to this species (BirdWatch Ireland, 2025b); therefore, no significant habitat loss is likely.	Not significant
Disturbance / Displacement	No sensitive locations (breeding, foraging or roosting) within the proposed wind farm site were identified during surveys, with most flight lines comprising birds commuting over the site; therefore, no significant disturbance / displacement is likely.	Not significant
Indirect Impacts	There are no nearby surface water-fed wetland or groundwater-dependent habitats present within or associated with any nearby nature conservation sites designated for this IOF. Furthermore, with the embedded mitigation described in Chapter 5: Biodiversity and Chapter 8: Hydrology and Hydrogeology, there are no significant effects on surface water and groundwater predicted. Therefore, there can also be no potential for significant indirect impacts on lesser black-backed gull due to surface water pollution or lowering of groundwater.	Not significant
Operational Phase		
Disturbance / Displacement	No sensitive locations (breeding, foraging or roosting) within the proposed wind farm site were identified during surveys; therefore, no significant disturbance / displacement is likely.	Not significant

Impact	Impact Assessment	Significance of Effect
Barrier Effect	Although 71 flight lines of lesser black-backed gull were recorded passing through or over the proposed wind farm site (observations reflect cumulative total, with observations made in every breeding season, giving a mean of 14 flight lines per breeding season; see Figure 6-18), there is no evidence that the species regularly uses habitats within the site for breeding, foraging, or roosting. This is important because barrier effects are most likely where turbines intersect core foraging routes or commuting corridors between breeding and feeding areas (Drewitt & Langston, 2006). Lesser black-backed gulls in Ireland typically breed on coastal islands and cliffs and forage extensively in marine and coastal zones, often traveling tens of kilometres offshore (BirdWatch Ireland, 2025b). The recorded flights are therefore likely incidental rather than indicative of essential movement pathways. Furthermore, the turbine layout is dispersed and non-linear, avoiding the creation of a continuous barrier that could force detours or increase energetic costs. Therefore, no significant barrier effects are predicted.	Not significant
Collision	As shown in Table 6-15, the CRM predicted 0.08 collisions per year, or 2.8 collisions over the 35-year lifespan of the proposed project. This annual rate of collision corresponds to a 0.0065% increase in background mortality for the ROI population. As this is considerably less than a 1% increase in background mortality, it is unlikely that collision related mortality will have a significant impact on lesser black-backed gull. While lesser black-backed gull has a relatively high number of recorded turbine collisions in Europe, there was only a single incident recorded in Ireland. Research using GPS telemetry suggesting that collision sensitivity for lesser black-backed gull is typically highest near breeding colonies (Thaxter et al., 2019), which are absent from the proposed project site. There are also no SPAs designated for breeding lesser black-backed gull present within c.30 km (the mean foraging range plus standard deviation for breeding lesser black-backed gull (Thaxter et al., 2026). As stated in Table 6-11, Lough Derg (Donegal) SPA is designated for breeding lesser black-backed gull and is located c. 31 km from the proposed wind farm site; however, there have been no active breeding colonies in this SPA since 1999 after the closure of a nearby landfill at Donegal town. Taken together, the likely maximum number of deaths due to the proposed project is extremely small relative to the national and county population and would not result in any appreciable change to population trajectory at ROI and county scales. The level of predicted mortality is therefore assessed as not significant and would not hinder any conservation actions undertaken for the maintenance of the population.	Not significant

Impact	Impact Assessment	Significance of Effect
Indirect Impacts	There are no nearby surface water-fed wetland or groundwater-dependent habitats present within or associated with any nearby nature conservation sites designated for this IOF. Furthermore, with the embedded mitigation described in Chapter 5: Biodiversity and Chapter 8: Hydrology and Hydrogeology, there are no significant effects on surface water and groundwater predicted. Therefore, there can also be no potential for significant indirect impacts on lesser black-backed gull due to surface water pollution or lowering of groundwater.	Not significant

6.4.5.7 White-Tailed Eagle

No likely significant negative effects are predicted for white-tailed eagle (breeding season) as shown in Table 6-22.

Table 6-22: Summary of Impact Assessment for White-Tailed Eagle (Breeding Season)

Impact	Impact Assessment	Significance of Effect
Construction and Decommissioning Phases		
Nest Damage or Destruction	No confirmed or suspected breeding was recorded during survey period; therefore, no nest damage or destruction is likely pending the results of the confirmatory pre-commencement surveys. NPWS provided data that suggested a tentative breeding attempt 5-6 km from the wind farm site in 2025, so there may be a small, limited increase in eagle activity in the wider area; however, as stated below, the habitats at the wind farm site are not suitable for breeding eagles and so nesting is not predicted to occur on-site in the future.	Not significant
Habitat Loss	A small number of mainly immature eagles were recorded during the last three breeding seasons (four observations in total, each comprising a single flight line; see Figure 6-24). While activity increased from 2023 onwards, consistent with wider regional trends of gradual range expansion, records remained infrequent and comprised mainly birds flying high over the proposed wind farm site or commuting. Apart from a single observation made of a roosting immature eagle in the 2025 breeding season, there was no evidence of regular foraging or roosting on-site. Most of the habitats due to be lost are commercial conifer plantation (133.1 ha out of 152.29 ha), which is generally of low value to this species, which typically prefers habitats located near open water (Hardey et al.,	Not significant

Impact	Impact Assessment	Significance of Effect
	2013). Although a small increase in occasional eagle passage may occur in future years (as evidenced by a tentative breeding attempt 5-6 km from the wind farm site in 2025), current evidence indicates that the habitats to be lost are of limited ecological value to this species, and therefore no significant habitat loss is likely.	
Disturbance / Displacement	Surveys confirmed that no sensitive locations for white-tailed eagle, such as breeding, foraging, or regularly used roosting sites, occur within or close to the proposed wind farm site. Although a modest increase in occasional eagle activity has been recorded from 2023 onwards, these observations mostly involve birds transiting the area rather than regularly using habitat features within or adjacent to the wind farm site. This species requires a disturbance-free buffer of approximately 250–500 m during both breeding and non-breeding seasons (Goodship et al., 2022) and no such locations were identified within this distance. While limited increases in eagle presence may lead to more flyovers in future years (e.g. NPWS provided data that suggested a tentative breeding attempt 5-6 km from the wind farm site in 2025), the absence of breeding territories, foraging hotspots, or regular roosts means that significant disturbance or displacement effects remain unlikely.	Not significant
Indirect Impacts	There are no nearby surface water-fed wetland or groundwater-dependent habitats present within or associated with any nearby nature conservation sites designated for this IOF. Furthermore, with the embedded mitigation described in Chapter 5: Biodiversity and Chapter 8: Hydrology and Hydrogeology, there are no significant effects on surface water and groundwater predicted. Therefore, there can also be no potential for significant indirect impacts on white-tailed eagle due to surface water pollution or lowering of groundwater.	Not significant
Operational Phase		
Disturbance / Displacement	As explained above, no sensitive locations (breeding, foraging or regularly used roosting areas) within the proposed wind farm site were identified during surveys; therefore, no significant disturbance / displacement is likely. While limited increases in eagle presence may lead to more flyovers in future years, the absence of confirmed breeding territories, foraging hotspots, or regular roosts means that significant disturbance or displacement effects remain unlikely.	Not significant
Barrier Effect	There is no evidence this species is regularly flying through the proposed wind farm site (the only flight lines recorded were of birds flying high over the site and another two of an immature bird	Not significant

Impact	Impact Assessment	Significance of Effect
	flying over the site and roosting in the same area on a single occasion for the B23-B25 seasons; see Figure 6-24). Although observations have increased slightly from 2023 onwards, these remain infrequent and primarily involve transiting immature birds rather than individuals using the site for foraging or roosting. Activity levels of four observations across three breeding seasons, none of which relate to breeding, foraging, or regular roosting behaviour, indicate that the site does not form part of any established movement corridor. In addition, the turbine layout is dispersed and not arranged in a linear configuration that could present a substantial navigational barrier. While occasional eagle passage may increase as the regional population expands, any additional energetic costs arising from a barrier effect are expected to be minimal and not significant.	
Collision	As shown in Table 6-15, the CRM predicts 0.064 collisions per year, totalling 2.24 collisions over the 35-year operational period and equating to a 2.6% increase in annual background mortality. Although this exceeds the 1% screening threshold, the estimate assumes all affected birds are adults. Site-specific survey data indicate that eagle activity at the proposed development is dominated by immature, dispersing individuals rather than territory-holding adults. As juvenile survival (40%) is substantially lower than adult survival (94%), applying the appropriate juvenile survival rate reduces the predicted increase in background mortality to 0.28%, which is below the 1% threshold. The true effect is therefore expected to lie between 0.28% and 2.6%, with the lower value being more biologically realistic for the proposed project. At the wider scale, 574 white-tailed eagle collisions have been recorded in Europe compared to only six in Ireland, despite rapid population growth since their reintroduction Ireland's reintroduced white-tailed eagle population continues to expand and is now considered robust and self-sustaining (Næss, 2025). Satellite-tracked juveniles routinely disperse widely across the country (NPWS, 2026), which explains the predominance of immature birds at upland wind-farm sites. While this ongoing expansion introduces some uncertainty into forward collision-risk estimates, evidence from European reintroduction programmes shows that juveniles typically undertake broad exploratory movements before settling in high-quality, favoured habitats (e.g., waterbodies and semi-open landscapes), with the best habitats occupied first as populations grow (Treinys et al., 2015). This settlement behaviour is further supported by movement ecology research demonstrating strong site affiliation as birds mature (Eskildsen et al., 2024). There is no indication that the proposed wind-farm site represents such a favoured location, particularly given the absence	Not significant

Impact	Impact Assessment	Significance of Effect
	of open waterbodies. Future eagle activity at the site is therefore unlikely to substantially exceed that assumed in the CRM. Taken together, these lines of evidence including low predicted mortality at the site, the predominance of juveniles, the lack of favoured locations, and a strongly increasing national population, indicate that project-related collision mortality is not likely to be significant at the ROI scale and represents only a marginal, non-significant addition to background mortality. The proposed project is therefore not likely to hinder ongoing conservation actions nor affect the long-term viability of white-tailed eagles in Ireland. Given there is some uncertainty over future eagle expansion, monitoring and adaptive mitigation is proposed (see Sections 6.4.6 and 6.4.11).	
Indirect Impacts	There are no nearby surface water-fed wetland or groundwater-dependent habitats present within or associated with any nearby nature conservation sites designated for this IOF. Furthermore, with the embedded mitigation described in Chapter 5: Biodiversity and Chapter 8: Hydrology and Hydrogeology, there are no significant effects on surface water and groundwater predicted. Therefore, there can also be no potential for significant indirect impacts on white-tailed eagle due to surface water pollution or lowering of groundwater.	Not significant

6.4.5.8 Whooper Swan

No likely significant negative effects are predicted for whooper swan as shown in Table 6-23.

Table 6-23: Summary of Impact Assessment for Whooper Swan (Non-Breeding)

Impact	Impact Assessment	Significance of Effect
Construction and Decommissioning Phases		
Nest Damage or Destruction	N/A as only non-breeding population brought forward for detailed assessment.	N/A
Habitat Loss	There is no evidence of this species regularly foraging or roosting within the proposed wind farm site (only a single flight line overflew the site, with another two flight lines recorded off-site; see	Not significant

Impact	Impact Assessment	Significance of Effect
	Figure 6-25). Most of the habitats due to be lost are commercial conifer plantation, which are of low value to this species, which prefer lowland open farmland surrounding wetlands for winter foraging / roosting (BirdWatch Ireland, 2025d); therefore, no significant habitat loss is likely.	
Disturbance / Displacement	No sensitive locations (foraging or roosting) within the proposed wind farm site were identified during surveys and the handful of observations recorded were of birds overflying either the site or the surrounds. This species requires a disturbance-free buffer of approximately 200–600 m from foraging or roost sites during the non-breeding seasons (Goodship et al., 2022) and no such locations were identified within this distance. Accordingly, no significant disturbance or displacement is likely.	Not significant
Indirect Impacts	There are no nearby surface water-fed wetland or groundwater-dependent habitats present within or associated with any nearby nature conservation sites designated for this IOF. Furthermore, with the embedded mitigation described in Chapter 5: Biodiversity and Chapter 8: Hydrology and Hydrogeology, there are no significant effects on surface water and groundwater predicted. Therefore, there can also be no potential for significant indirect impacts on whooper swan due to surface water pollution or lowering of groundwater.	Not significant
Operational Phase		
Disturbance / Displacement	No sensitive locations (foraging or roosting) within the proposed wind farm site were identified during surveys or within 200-600 m of the site; therefore, no significant disturbance / displacement is likely.	Not significant
Barrier Effect	There is no evidence this species is regularly flying through the proposed wind farm site (only a single flight line was recorded over the site; see Figure 6-25) or regularly using the habitats within the proposed wind farm site for foraging or roosting (no foraging areas or roosts were detected), and the turbine layout is dispersed and not orientated in a linear fashion; therefore, any energetic costs incurred due to a barrier effect are likely to be minimal and not significant.	Not significant
Collision	Whooper swan was only recorded once during flight activity surveys, and this observation occurred outside of the collision risk zone (i.e. >500 m from proposed turbine locations), although a single flight line was recorded of 30 birds overflying the site during a winter walkover survey. For the latter, no flight heights were recorded and so it could not be used for collision risk modelling. This notwithstanding, the collective evidence (very low frequency of occurrence across all flight activity	Not significant

Impact	Impact Assessment	Significance of Effect
	surveys, the absence of recorded flights within the 500 m of proposed turbine locations, and lack of evidence for regular use of the proposed wind farm site and study area) suggests the collision risk posed to whooper swan during the day is negligible and not significant. It is acknowledged that collision risk to whooper swan migrating at night could have been underestimated as only diurnal flight activity surveys were undertaken. However, evidence from Jia et al. (2021) indicates that approximately 52% of whooper swan migratory flights occur during daylight hours. It is therefore reasonable to expect that if significant migratory movements were occurring over the proposed project site at night, at least some diurnal flights would have been detected during the survey period. Furthermore, any flights missed at night should be no more than recorded during the day. If any flight lines had been recorded by flight activity surveys within the collision risk zone (500 m buffer surrounding the turbines) in the day, it would have been possible to have applied a correction factor to account for nocturnal flights during collision risk modelling; however, as diurnal collision risk was effectively zero, this was not possible. Thus, the paucity of whooper swan observations suggests that the proposed wind farm site does not lie on a major migratory flight corridor for whooper swan, and that the collision risk estimate provided (i.e. negligible collision risk) is accurate.	
Indirect Impacts	There are no nearby surface water-fed wetland or groundwater-dependent habitats present within or associated with any nearby nature conservation sites designated for this IOF. Furthermore, with the embedded mitigation described in Chapter 5: Biodiversity and Chapter 8: Hydrology and Hydrogeology, there are no significant effects on surface water and groundwater predicted. Therefore, there can also be no potential for significant indirect impacts on whooper swan due to surface water pollution or lowering of groundwater.	Not significant

6.4.6 Additional Mitigation Measures and Residual Effects

Proposed additional mitigation measures, where appropriate are given in Table 6-24 for any IOFs for which potentially significant effects are identified in Sections 6.4.4 and 6.4.5. Mitigation has only been proposed for effects that were identified as potentially significant in Sections 6.4.4 and 6.4.5, and only additional mitigation (sometimes termed 'secondary mitigation') measures (Anderson et al., 2024) have been identified here, i.e. the embedded, good-practice measures set out in Section 6.4.1, which have been taken into account within the assessments in Sections 6.4.4 and 6.4.5, are not repeated here.

For clarity, precautionary best-practice measures relating to operational collision risk are also included in this section, even though the assessment concludes that collision effects are not significant. These measures are presented to follow best-practice guidance and to demonstrate how collision risk will continue to be managed during operation.

Compensation measures are not included in this section. Compensation is distinct from additional mitigation, as it addresses situations where potentially significant effects remain after all feasible mitigation has been applied. Details of any required compensation measures are presented in Section 6.4.9.

Table 6-24: Additional Mitigation Measures for IOFs for which Potentially Significant Effects are Identified

IOF	Effect Type	Additional Mitigation	Potential Effect Significance
Hen harrier	Loss of foraging habitat during construction and effective loss of foraging habitat due to disturbance / displacement due to operational turbines, potentially resulting in the displacement of up to two nesting pairs.	No additional mitigation available – measures given in Section 6.4.8, will offset significant effects. It was not appropriate to design the turbine layout around historical nesting sites as the nest sites varied year-on-year and likely reflected ongoing forestry cycles.	Potentially significant, negative, long-term at national scale – compensation measures proposed to offset this in Section 6.4.9.1.
Common kestrel, common snipe, Eurasian woodcock, European golden plover, hen harrier, lesser black-backed gull, white-tailed eagle	Collision with operational turbines.	No likely significant effects are predicted due to collision risk; however, precautionary, best practice secondary mitigation is proposed to address potential changes in exposure over the operational lifespan of the proposed project. The following precautionary, best practice mitigation measures will be implemented to prevent common kestrel and white-tailed eagle from colliding with operational turbines: • Reduction in habitat suitability (**common kestrel**): Prey availability in bat mitigation felling buffers will be reduced via the following habitat management measures implemented throughout the operational phase: creation of uniformly short vegetation heights via infrequent mowing or trimming of vegetation; removal of timber / brash from felling and chipping of tree stumps to ground level; spread and compaction of chipped wood and spoil to create a flat surface to prevent rapid colonisation of new vegetation; and piping / filling over of open field / forestry drains. This is a passive habitat management measure proven to reduce kestrel collision rates (Garcia-Rosa & Tande, 2023; Pescador et al., 2019); and • Carcass and attractant management (**white-tailed eagle**): Any livestock carcasses or other large animal	Not significant

IOF	Effect Type	Additional Mitigation	Potential Significance Effect
		remains (including fallen stock) within the operational proposed project site and along site access routes will be removed as soon as practicable (and in any case within 24 hours of discovery) and disposed of in accordance with relevant animal by-product requirements, to avoid attracting scavenging raptors into the turbine envelope. Carcass removal is recognised as a practical measure to reduce eagle exposure to anthropogenic mortality risks by reducing attraction to hazardous areas (Lonsdorf et al., 2023) A post-construction monitoring programme, which will include adaptive management if required, will also be implemented for all IOF species (Section 6.4.11) as a best-practice measure to confirm that the conclusions of the EIAR remain unchanged.	

6.4.7 Cumulative Effects

Potential cumulative effects on IOFs were assessed in relation to operational, consented, and planned wind farms, as well as other relevant developments for which planning applications have been submitted within 20 km of the proposed project. This 20 km radius follows the IWEA (2012) guidelines and corresponds to the largest core foraging distance for any SCI bird given by NatureScot (2016) guidance. It is therefore considered sufficient to encompass the typical movement ranges of the primary IOF species, enabling a meaningful assessment of cumulative risks including collision mortality, displacement, and habitat fragmentation.

While a 20 km study area was used initially, this was then reappraised during the impact assessment process, depending on the magnitude of potential project impacts. Non-wind farm projects were only considered where located within 1 km of the proposed project, due to the lower potential for impacts on IOFs. The same 1 km threshold was applied to GCR and TDR accommodation areas following the same logic i.e. there is lower potential for impacts on IOFs due to the localised nature of habitat loss and disturbance.

Cumulative effects related solely to hydro(geo)logical connectivity for designated bird conservation sites are not considered in this assessment. Effects from the proposed project alone have already been scoped out due to embedded mitigation described in Section 6.4.1, and therefore no cumulative hydrological effects are possible, which also aligns with the conclusions of Chapter 8 – Hydrology and Hydrogeology.

A summary of the wind farms and other projects considered is provided in Sections 6.4.7.1, 6.4.7.2 and 6.4.7.3 for the proposed wind farm, the GCR and TDR accommodation areas, respectively.

A complete list of plans and projects included in the EIA cumulative assessment is provided in Appendix 1-6, with details of data sources and search time periods given there.

For several existing wind farms in the wider region, no ornithological assessments or species-specific collision risk data were available. In the absence of evidence that the same sensitive species utilise both the proposed wind farm site and these other projects, and given the separation distances involved, there is no identified ecological pathway through which a measurable cumulative collision risk would arise for such projects.

6.4.7.1 Wind Farm Site

Developments considered for assessment of cumulative effects for the proposed wind farm site are given in Table 6-25. Note that assessment of likely significant cumulative effects is given in Section 6.4.7.1.2.

Table 6-25: Other Developments within 20 km of the Proposed Wind farm Site

Development Type	Name	Distance and Direction	Status	Details	IOFs Recorded at Both Proposed Project and Other Development	Potential for Cumulative Impacts
Wind Farm	Faughary Wind Farm	220 m west	Operational	3 no. wind turbines 105 m hub height and 82 m rotor diameter, Leitrim County Council Planning Reference 04/550 and 11/207. Source of information: compliance reports from 2015-2019 prepared by Woodrow Sustainable Solutions Ltd.	Hen harrier	Yes – in proximity to proposed project so cumulative collision risk during operational phase and contribution to effective loss of foraging habitat due to disturbance / displacement possible.
	Carrickeeny Wind Farm	6.8 km west	Operational	4 no. turbines 49 m hub height and 52 m rotor diameter, Leitrim County Council Planning Reference 04/815	No documents available on Leitrim County Council website	No - given the separation distance and number of turbines, significant cumulative impacts are very unlikely. This is because the further away two wind farms are from each other, the lower the likelihood that populations will be affected by both wind farms. The fewer turbines that are present in each wind farm, the lower the additive risk.

Development Type	Name	Distance and Direction	Status	Details	IOFs Recorded at Both Proposed Project and Other Development	Potential for Cumulative Impacts
	Tullynamoyle Wind Farm	9.1 km south	Operational	15 no. wind turbines 64 m hub height and 63 m rotor diameter. Leitrim County Council Planning References 05/691, 13/52, 15/93, 15/164, 21/57. ACP Planning Reference PL12.312895 Source of information: Environmental Impact Statement ("EIS") prepared by Jennings O'Donovan & Partners Ltd in 2013, 2015.	European golden plover, hen harrier.	Yes – cumulative collision risk impacts possible for these species.
	Tullynamoyle Wind Farm New	11.1 km south	Consented	4 no. wind turbines, Leitrim 81-82 m height and 133-138 m rotor diameter, ACP Planning Reference PL12.312895 Source of information: EIAR prepared by Jennings O'Donovan & Partners Ltd in 2020	Common kestrel, hen harrier, European golden plover	Yes – cumulative collision risk impacts possible for these species.
	Callagheen Wind Farm	11.7 km northeast	Operational	13 no. wind turbines hub height 60 m and rotor diameter 62 m, Fermanagh and Omagh District Council, NIPS Planning Reference L/2001/1514/F	No documents available	No - given the separation distance, significant cumulative impacts are very unlikely
	Callagheen single turbine	12.2 km northeast	Operational	Replacement to existing turbine, Fermanagh and Omagh District Council, NIPS Planning Reference LA10/2019/1354/F	No documents available	No - given the separation distance and number of turbines, significant cumulative impacts are very unlikely

Development Type	Name	Distance and Direction	Status	Details	IOFs Recorded at Both Proposed Project and Other Development	Potential for Cumulative Impacts
	Callagheen single turbine	12.2 km northeast	Live case	1 no. wind turbine with 84 m hub height and 61 m rotor and ground mount solar array, Fermanagh and Omagh District Council, NIPS Planning Reference LA10/2024/0018/F. Source of information: Preliminary Ecological Appraisal prepared by Erne Environmental Ltd in 2024	Common snipe	Yes – cumulative collision risk impacts possible for these species
	Ora More Wind Farm	13.4 km east	Operational	6 no. wind turbines 75 m hub height and 103 m rotor diameter, Fermanagh and Omagh District Council, NIPS Planning Reference L/2005/3070/F, L/2013/0540/F and L/2013/0625/F). Source of information: EIA prepared by RES UK & Ireland Ltd in 2013.	Hen harrier, European golden plover, common snipe, common kestrel, whooper swan	Yes – cumulative collision risk impacts possible for these species.
	Derrykillew Wind Farm	16.2 km northeast	Consented	5 no. wind turbines 79.5 m hub height and 113 m rotor diameter, ACP Planning Reference PL05E.245108 and Donegal County Council Planning Reference 14/51400. Source of information: EIS prepared by Jennings O'Donovan & Partners Ltd in 2014.	None	None – if IOFs not recorded at both projects, cumulative impacts not possible

Development Type	Name	Distance and Direction	Status	Details	IOFs Recorded at Both Proposed Project and Other Development	Potential for Cumulative Impacts
	Garvagh Glebe Wind Farm	16.8 km southwest	Operational	12 no. wind turbines 105 m hub height and rotor diameter 130 m, Leitrim County Council Planning Reference Unknown	None	None – if IOFs not recorded at both projects, cumulative impacts not possible
	Croagh Wind Farm	18.8 km southwest	Live case	10 no. wind turbines hub height 105 m and rotor diameter 140 m, Sligo County Council Planning Reference 20/251, Leitrim County Council Planning Reference 20/120 and ACP Planning Reference 321866. Source of information: CRM report prepared by MKO in 2020.	Whooper swan, European golden plover, hen harrier, Eurasian woodcock, common kestrel, common snipe	Yes – cumulative collision risk impacts possible for these species if planning consent obtained
	Black Banks Wind Farm	19.4 km south	Operational	4 no. wind turbines hub height 105 m and rotor diameter 130 m, Leitrim County Council Planning Reference not available online.	No documents available	No - given the separation distance and number of turbines, significant cumulative impacts are very unlikely.
	Acres Wind Farm	19.5 northwest	Operational	6 no. wind turbines 72.5 m hub height and rotor diameter 103 m, Donegal County Council Planning refs 05/127, 06/20377 and 12/50968. Source of information: Environmental Report prepared by Fehily Timony in 2012.	None	None – if IOFs not recorded at both projects, cumulative impacts not possible

Development Type	Name	Distance and Direction	Status	Details	IOFs Recorded at Both Proposed Project and Other Development	Potential for Cumulative Impacts
	Moneenatieve Wind Farm	19.9 km south	Operational	2 no. turbines, hub height 95 m and rotor diameter 58 m, Leitrim County Council Planning Reference 007.	No documents available	No - given the separation distance and number of turbines, significant cumulative impacts are very unlikely.
Other	Numerous - a complete list of plans and projects included in the EIA cumulative assessment is provided in Appendix 1-6	Within 1 km	Various	Agriculture, dwelling houses, forestry operations	No documents available	No - ongoing forestry and agricultural operations have been considered as part of the project alone, and dwelling houses are not considered likely to give rise to cumulative effects on IOFs.

As set out in Table 6-25, there are five wind farms and one single turbine with the potential to have cumulative negative effects on IOFs.

Other projects within the local area are limited to agricultural and forestry operations and construction of dwelling houses. As stated above, agricultural and forestry operations form part of the baseline for the proposed project in that they are currently shaping bird populations and will continue to do so irrespective of the proposed project. They are not treated as separate cumulative projects because they constitute the established land-use regime and their associated effects are already captured within the baseline.

Dwelling houses are not considered likely to give rise to cumulative effects on IOFs due to their very small spatial footprint, the fact they do not generate collision-risk pathways and produced only highly localised disturbance levels that do not extend into the open upland and forestry habitats present at the proposed project. Therefore, they do not overlap ecologically or spatially with the impact pathways relevant to this assessment.

The likely cumulative effects are described in Sections 6.4.7.1.1 and 6.4.7.1.2 below.

6.4.7.1.1 Cumulative Disturbance / Displacement

The only wind farm project that has the potential to impact on cumulative disturbance / displacement, for breeding and foraging hen harrier, is Faughary Wind Farm. All other wind farm projects are at sufficient remove (i.e. the nearest is 6.8 km away) that cumulative disturbance / displacement effects are highly unlikely. As highlighted in Table 6-20, displacement of nesting and foraging hen harriers is possible within a certain distance of operational turbines. Therefore, there is potential that the proposed project could act in combination with Faughary wind farm to cause disturbance / displacement to hen harriers during the breeding season.

Faughary Wind Farm has been operational for the duration of the survey period for the proposed project and therefore forms part of the baseline. Surveys carried out for the proposed project over the last five years demonstrate that breeding hen harrier continue to occupy the area despite the presence of the operational Faughary Wind Farm (Section 6.3.3.1.3.1). Post-construction monitoring data for Faughary Wind Farm from 2015, 2017 and 2019 also shows continued hen harrier presence and activity in and around the Faughary Wind Farm and the proposed wind farm site

As an established operational wind farm, Faughary Wind Farm already influences hen harrier distribution. Any displacement zone associated with Faughary is an existing constraint and is fully reflected in the current patterns of bird use recorded for the proposed project. As such, birds displaced by the proposed project would not experience any additional displacement pressure arising from Faughary: its effects are already accounted for in the proposed project-alone assessment (see Table 6-20). Therefore, Faughary cannot give rise to a cumulative displacement effect when considered in combination with the proposed project.

6.4.7.1.2 Cumulative Collision Risk

Assessment of cumulative collision risk is provided in Table 6-26 below. Calculation of cumulative collision risk was only possible for species where a quantitative assessment of collision has been made for the other wind farms under consideration.

Cumulative collision risk was calculated by summing the predicted annual collision mortality outputs (after avoidance has been applied) for the proposed project with equivalent CRM

outputs from other operational, consented, and in-planning wind farms that overlap with the same bird populations following NatureScot (2025a) best-practice guidance. Each wind farm's contribution to cumulative mortality is therefore represented by its final CRM output (post-avoidance predicted annual collisions), ensuring that cumulative totals reflect consistent assumptions regarding flight activity, collision probability, turbine parameters, and species-specific avoidance rates. The summed total provides the cumulative predicted annual mortality for each species, which is then evaluated against relevant population baselines.

Table 6-26: Impact Assessment for Cumulative Collision Risk

IOF Species	Collision Risk from proposed project (collisions / year)	Other Projects With Ecological Connectivity	Collision Risk from Other Projects (collisions / year)	Cumulative Collision Risk (collisions / year)	Significance of Cumulative Collision Risk and Justification
European golden plover	0.10	Tullynamoyle Wind Farm	No quantitative estimates given – collision risk assessed as negligible	22.10	Not significant. The predicted cumulative collision mortality for European golden plover represents an estimated 0.1–4.9% increase on background mortality for the ROI and County Leitrim populations, respectively. As noted for the proposed project alone, these values are likely to be precautionary overestimates, as population figures based on I-WeBS counts inevitably under-record species that do not rely exclusively on wetland habitats. True population sizes are therefore expected to be higher than reported, which would reduce the proportional contribution of predicted turbine-related mortality. There is currently no species-specific avoidance rate for European golden plover (NatureScot, 2025f). In alignment with NatureScot (2024) best-practice guidance, where detailed avoidance data are unavailable, avoidance rates should be informed by post-construction monitoring evidence from existing wind farms. As such, while the cumulative collision estimates presented here apply the default avoidance rate of 98%, empirically derived monitoring data from four UK wind farms indicate a substantially higher avoidance rate of 99.8% for this species (Gittings, 2022). This represents the most robust and relevant dataset available and demonstrates that the default avoidance rate is likely to be overly conservative. Consequently, actual collision mortality is expected to be far lower than predicted and below a 1% increase on background mortality rates. It is also noted that only 0.1% of the cumulative total of 22.10 collisions per year is attributable to the proposed project. Furthermore, the planning application for Croagh Wind Farm is
		Tullynamoyle Wind Farm New	No quantitative estimates given – collision risk assessed as negligible		
		Ora More Wind Farm	No quantitative estimates given – assessed not significant		
		Croagh Wind Farm	22		

IOF Species	Collision Risk from proposed project (collisions / year)	Other Projects With Ecological Connectivity	Collision Risk from Other Projects (collisions / year)	Cumulative Collision Risk (collisions / year)	Significance of Cumulative Collision Risk and Justification
					currently awaiting ACP decision. If this development does not proceed, the cumulative collision risk would revert to that associated with the proposed project alone (0.1 collisions per year).
Hen harrier	0.06	Faughary Wind Farm	None recorded by post-construction monitoring surveys at Faughary	0.072	Not significant. The predicted cumulative collision mortality for hen harrier represents an estimated 0.22% increase in background mortality for the ROI population, and a 0.66–2.71% increase for the combined Leitrim, Slieve Rushen, and Cavan regional population, depending on whether adult or juvenile survival rates are applied. These percentage increases are only slightly higher than those predicted for the proposed project alone. As with the project-alone assessment, the same rationale outlined in Table 6-20 applies to the cumulative assessment: • The predicted increases remain below (ROI population) or only marginally above (the regional population) the commonly applied 1% threshold for assessing significance; • At the regional scale, the upper end of the range assumes all birds are adults, despite much lower juvenile survival; applying juvenile survival, which is appropriate given that the site supports breeding birds, reduces the predicted increase to well below 1%, indicating a non-significant effect;
		Tullynamoyle Wind Farm	No quantitative estimates given – collision risk assessed as low		
		Tullynamoyle Wind Farm New	No quantitative estimates given – assessed as low significance		
		Croagh Wind Farm	0.002		
		Ora More Wind Farm	0.01		

IOF Species	Collision Risk from proposed project (collisions / year)	Other Projects With Ecological Connectivity	Collision Risk from Other Projects (collisions / year)	Cumulative Collision Risk (collisions / year)	Significance of Cumulative Collision Risk and Justification
					• The hen harrier population is experiencing a continuing decline driven predominantly by low productivity and wider landscape pressures, rather than by wind-farm collision mortality, meaning that the cumulative project-related contribution represents only a small, non-significant fraction of existing background mortality; and • Displacement within 250 m of turbines, combined with a high avoidance rate (99%), is expected to further reduce actual exposure to collision. Taken together, these factors indicate that cumulative collision mortality is extremely small relative to the national and region population and would not result in any appreciable change to population trajectory at ROI and regional scales. The level of predicted mortality is therefore assessed as not significant and would not hinder any conservation actions undertaken for the recovery of the population. The planning application for Croagh Wind Farm is currently awaiting ACP decision. Should the application be unsuccessful, the cumulative collision risk would be less than described here.
Eurasian woodcock	0	Croagh Wind Farm	0	0	Not significant. No collisions were predicted for the proposed project, so no cumulative collision risk is possible

IOF Species	Collision Risk from proposed project (collisions / year)	Other Projects With Ecological Connectivity	Collision Risk from Other Projects (collisions / year)	Cumulative Collision Risk (collisions / year)	Significance of Cumulative Collision Risk and Justification
Common kestrel	0.34	Tullynamoyle Wind Farm New	No quantitative estimates given – assessed as being of very low significances	0.458	Not significant. The predicted cumulative collision mortality for common kestrel equates to an estimated 0.03% increase in background mortality for the ROI population. As this percentage increase is only slightly higher than that predicted for the proposed project alone, the same reasoning applies for the cumulative assessment: project-related collision mortality would remain not significant at both the national and regional scales, representing only a negligible additional contribution to overall population-level mortality. The planning application for Croagh Wind Farm is currently awaiting ACP decision. Should the application be unsuccessful, the cumulative collision risk would revert to that associated with the proposed project alone.
		Croagh Wind Farm	0.118		
		Ora More Wind Farm	No quantitative estimates given – assessed as negligible		
Common snipe	0.54	Croagh Wind Farm	0.097	0.637	Not significant. The predicted cumulative collision mortality for common snipe represents an estimated 0.14–17.5% increase in background mortality for the ROI and County Leitrim populations, respectively. As noted for the proposed project alone, these values are likely to be conservative overestimates because population figures derived from I-WeBS counts routinely under-record species that do not rely exclusively on wetlands, such as snipe. True population sizes are therefore expected to be higher than reported, meaning the proportional contribution of predicted turbine-related mortality would in reality be much lower and not significant. The planning application for Croagh Wind Farm is currently awaiting ACP decision. Should the application be unsuccessful,
		Ora More Wind Farm	No quantitative estimates given – assessed as negligible		
		Callagheen Single Turbine	No estimates given		

IOF Species	Collision Risk from proposed project (collisions / year)	Other Projects With Ecological Connectivity	Collision Risk from Other Projects (collisions / year)	Cumulative Collision Risk (collisions / year)	Significance of Cumulative Collision Risk and Justification
					the cumulative collision risk would revert to that associated with the proposed project alone.
Whooper swan	0	Croagh Wind Farm	0.220	0	Not significant. No collisions were predicted for the proposed project, so no cumulative collision risk is possible
		Ora More Wind Farm	No quantitative estimates given – assessed as negligible		

It was also concluded there were no significant negative cumulative effects on surface water-dependent and groundwater-dependent habitats in Chapter 5: Biodiversity and Chapter 8: Hydrology and Hydrogeology, which precludes the possibility of significant cumulative negative effects on IOFs that use such habitats.

6.4.7.2 GCR

A full list of other projects within 1 km of the GCR is given in Appendix 1.6 of Volume III of this EIAR. These include domestic dwellings, forest road entrances, fences, refurbishments of existing buildings and small-scale flood relief works, none of which introduce significant additional pressures on IOFs. There are no other large infrastructure projects or habitat-altering activities in proximity that would interact with the GCR works.

There are no significant effects predicted on IOFs because of the GCR alone. Based on this, alongside the lack of other projects with the potential to lead to significant cumulative effects on IOFs, no significant negative cumulative effects on IOFs because of the GCR are likely.

6.4.7.3 TDR Accommodation Areas

A full list of other developments within 1 km of the TDR accommodation areas is given in Appendix 1.6 of Volume III of this EIAR. These include solar panels on building roofs, construction of a new ESB substation, further extractions from existing quarries, creation of a telecoms support structure, roadworks, construction of agricultural sheds and construction of 91 dwelling houses and alterations to other properties.

For brevity, only those that are within 1 km of accommodations area 13, which is 20 m from Cummeen Strand SPA, and the only accommodations area at which likely significant effects are possible, have been presented below. The very minor nature of the accommodations and its location on a major

junction within Sligo town, along with the measures given in Section 6.4.4 suggests that there will be no significant effects due to the TDR alone, and therefore no potential for cumulative effects.

Table 6-27: Other Developments within 1 km of the TDR Accommodations Area 13

Development Type	Name	Distance and Direction	Status	Details	IOFs Recorded at Both proposed project and Other Development	Connectivity to proposed project and Potential for Cumulative Impacts
Energy	Sligo Regional Hospital	838 m southeast	Consented in 2019; likely completed	Development of new gas compound, new boiler house and ancillary works Sligo County Council reference 18327	N/A	No – large number of other buildings within intervening distance and TDR accommodations unlikely to take place at same time as works at hospital
	Sligo University Hospital Campus	838 m southeast	Consented in October 2025	Installation of 2,300 photovoltaic panels, Sligo County Council reference 2560353	N/A	No – large number of other buildings within intervening distance, which will provide screening, such that any cumulative disturbance effects at accommodations area 13 are very unlikely
	Markievicz House	183 m southwest	Consented 2020; likely completed	Development consisting of the construction of an LPG gas compound and four additional car park spaces, Sligo	N/A	No – large building within intervening distance and TDR accommodations unlikely to take place at same time as

Development Type	Name	Distance and Direction	Status	Details	IOFs Recorded at Both proposed project and Other Development	Connectivity to proposed project and Potential for Cumulative Impacts
				County Council reference 20199		works at Markievicz House

As set out in Table 6-27, there is no potential for significant cumulative effects on IOFs for the TDR accommodation areas.

6.4.8 Transboundary Effects

Given the proximity of the proposed project to the Northern Ireland border, approximately 3 km, a review of potential transboundary ornithological effects was undertaken to ensure that ecological pathways extending beyond the jurisdiction were fully considered. This process included an examination of relevant Northern Ireland designated nature conservation sites, such as SPAs, Ramsar Sites, and ASSIs, alongside an appraisal of potential hydrological or landscape-scale linkages that might connect the site to sensitive habitats across the border (see Table 6-11). No functional hydrological pathways or ecological corridors were identified that could give rise to likely significant effects for these designated nature conservation sites.

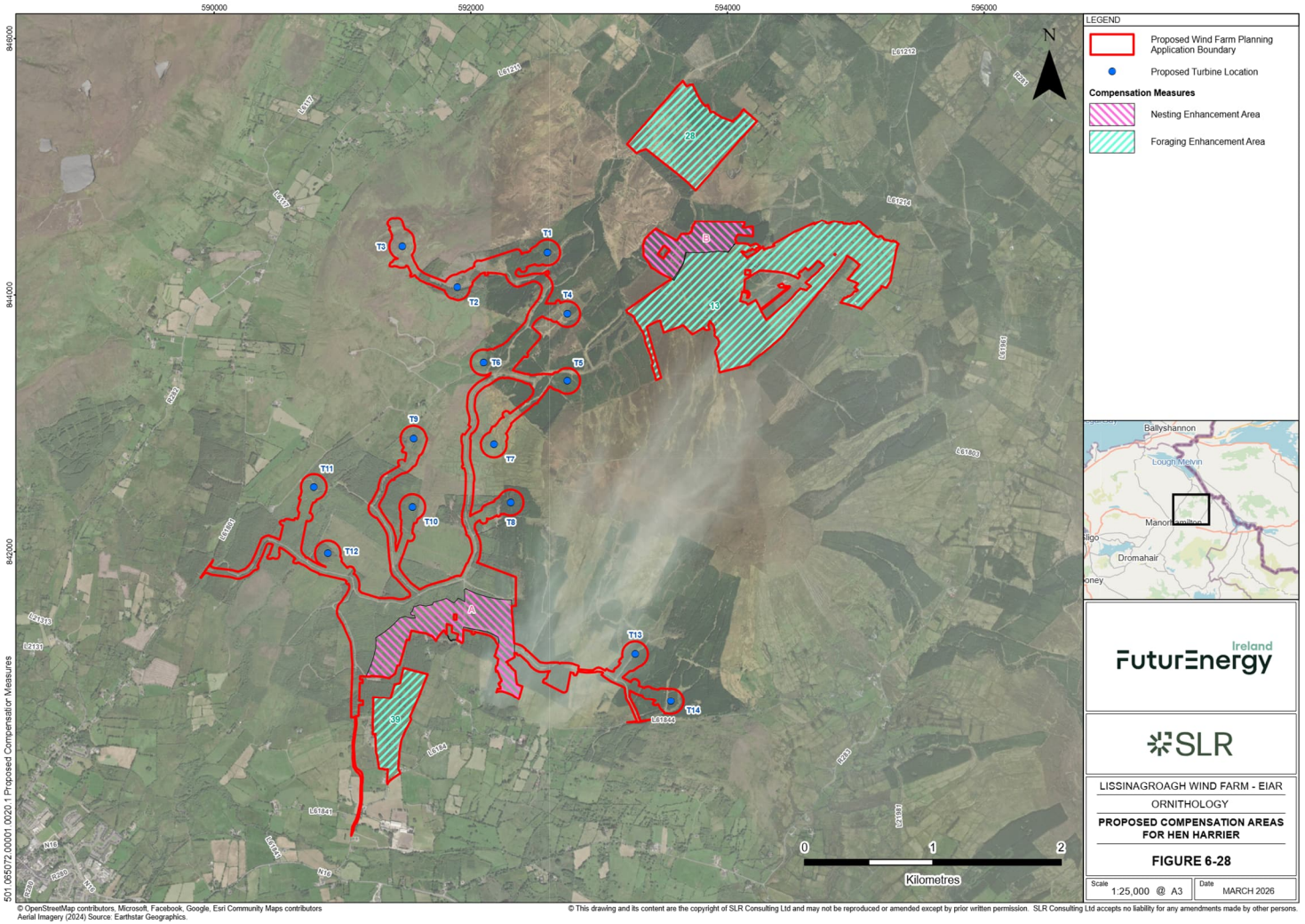
In addition, cross-border bird movements were evaluated through baseline survey and desk study data (e.g. from CEDaR; see Section 6.3.3.1.1), which did not indicate regular flight lines between the proposed project site and Northern Ireland for species that could potentially use Northern Ireland upland or wetland sites, such as European golden plover. To address potential operational effects, particularly collision risk, wind farms within Northern Ireland that lie within 20 km of the proposed project were reviewed within the cumulative assessment, with no evidence of overlapping flight activity or shared foraging ranges that would elevate cross-border collision risk.

Taken together, the assessment concludes that the proposed project is not predicted to give rise to likely significant transboundary effects on ornithological receptors in Northern Ireland, either alone or in combination with other projects.

6.4.9 Proposed Compensation Measures

Compensation has been proposed to offset a potentially significant negative effect on hen harrier, as summarised below. Mitigation for these effects is not possible, with the rationale explained further in Table 6-1 (see NPWS recommendation to follow mitigation hierarchy). The locations of the proposed measures are shown in Figure 6-28 and further details are provided in the OBMP (Appendix 6-13).

Figure 6-28: Locations of Proposed Compensation Measures



6.4.9.1 Hen Harrier

Section 6.4.5.5 concluded that the proposed project is likely to result in significant disturbance and displacement of breeding hen harrier, particularly due to the presence and operation of wind turbines. This disturbance is likely to affect both nesting and foraging hen harrier, potentially leading to the displacement of nesting birds and the effective loss of foraging habitat and a significant residual negative effect for the species is considered likely based on a precautionary approach (see Section 6.4.6).

Given the national importance of even a single breeding pair of hen harrier, a precautionary approach to compensation has been adopted, assuming the need to compensate for the potential loss of two breeding pairs and approximately 140 ha of foraging habitat.

The compensation strategy has been informed by a review of relevant scientific literature and best-practice guidance on hen harrier ecology, disturbance sensitivity and habitat requirements, together with consideration of national policy and programme learning, as outlined in the OBMP; Appendix 6-13. This includes review of the Hen Harrier Threat Response Plan (NPWS, 2024; Ruddock et al., 2024) and its recommended cross-sector actions and enabling measures (including emphasis on landowner incentives and agri-environment approaches). The strategy also drew on precedent and learning from planning processes for comparable wind farm projects where breeding hen harrier were present (a full list of sources consulted is included in the OBMP; Appendix 6-13).

The OBMP (Appendix 6-13), sets out a comprehensive strategy for the creation and long-term management of suitable nesting and foraging habitats. Two dedicated nesting enhancement areas (NEAs) will be established, comprising 18.3 ha and 35.85 ha respectively, giving a combined total of 54.15 ha. These areas have been strategically located at least 750 m from all proposed turbine locations (Goodship et al. (2022) recommend a disturbance-free buffer of up to 750 metres around nesting sites) and positioned near known nest sites to maximise the likelihood of uptake by breeding hen harrier.

The NEAs will be created from low-yield conifer plantation and will be managed to comprise of a mosaic of heath and scrub habitats. Hen harrier breeding territories in Ireland are strongly associated with heath/shrub and bog habitats, and breeding success is positively influenced by these habitats at the landscape scale (Caravaggi et al., 2019). Although pre-thicket conifer plantations are also used for nesting, the available evidence indicates that breeding success is higher in open-moorland habitats (heath/shrub and bog) than in forestry habitats, which tend to provide suitable structure only during the early pre-thicket phase (Caravaggi et al., 2019). This suggests that maintaining and restoring open habitats is likely to be more beneficial for breeding hen harriers than the rotational forestry currently present on site.

Restoration will include felling of existing forestry, hydrological enhancement, and vegetation management to create structurally diverse habitats suitable for nesting and foraging. Importantly, these NEAs will be managed directly by the developer for the full operational lifespan of the wind farm (anticipated to be 35 years), ensuring that nesting habitat provision, disturbance controls, and all restoration commitments are implemented and maintained throughout the project duration.

Evidence from elsewhere in Ireland demonstrates that hen harrier nest distribution responds to the availability of suitable nesting habitat at the landscape scale. For example, national survey analyses have shown strong selection for, and a positive relationship between nest

numbers and the extent of, suitable early-stage plantation habitats, indicating that breeding hen harrier can quickly establish nests in newly available suitable habitat where it occurs (M. Wilson et al., 2006). This responsiveness indicates that potentially suitable nesting habitat is likely to be quickly discovered and used by hen harriers, particularly if in proximity to previous nesting locations, which is the case for the proposed NEAs. As highlighted above, high quality heath and scrub habitats should be preferred by hen harrier over early-stage plantation habitat currently used for nesting at the site.

Good practice-measures to manage disturbance during the operational phase of the wind farm will be implemented (see Section 6.4.8 for further details). Forestry operations within 750 metres of NEAs for hen harrier will be restricted during the breeding season (1 March to 15 August), and recreational access will be controlled through signage, fencing, and landowner agreements. Training will be provided to contractors and landowners to ensure compliance with disturbance protocols.

In addition to nesting habitat provision, the OBMP proposes the enhancement of three folios of land totalling 164.25 ha to compensate for the predicted loss of foraging habitat. These lands are all located within 2 km of the NEAs, so are within the core foraging range of breeding hen harrier while also being located at least 450 m (most lands are >750 m) from all proposed turbine locations so are unlikely to be affected by disturbance from turbines. Enhancement measures will include *inter alia* changes to grazing regimes, rush management, hedgerow establishment and improvement, scrub development, and reduction or cessation of fertiliser application. Peatland habitats within the enhancement lands will also be restored through hydrological management, control of invasive species, and sensitive vegetation management. These measures are fully consistent with the habitat management actions promoted through national hen harrier conservation policy, including the Hen Harrier Threat Response Plan (NPWS, 2024), which emphasises targeted changes to grazing regimes, rush control, restoration of peatland hydrology, scrub development and the use of agri-environmental incentives as key mechanisms to improve foraging conditions and overall territory quality for breeding hen harriers. Comparable prescriptions formed the core of the Hen Harrier Project EIP (2017–2023), where results-based scoring demonstrated measurable improvements in prey availability and habitat structure under the same suite of management interventions (Sullivan & Monaghan, 2023).

Together with the NEAs, which will also provide suitable foraging habitat as well as nesting habitat, the total area of land enhanced for foraging hen harrier will amount to 218.4 ha, significantly exceeding the estimate of the area of lands from which they are likely to be displaced. The foraging enhancement lands located outside the NEAs will be secured through legally binding agreements with participating farmers, requiring them to implement and maintain the prescribed habitat management measures for the full operational period of the wind farm. This provides a contractual guarantee that all off-site (i.e. non-NEA) foraging compensation measures will be delivered and remain in place for as long as required.

The habitat enhancements proposed will deliver foraging conditions of higher ecological quality than much of the habitat anticipated to be lost or functionally displaced. Existing foraging areas within the wind farm site are largely characterised by commercial forestry in late pre-thicket or thicket stages, intensively grazed grassland, and areas subject to fertiliser application, all of which support lower prey densities and reduced structural heterogeneity. In contrast, the enhanced lands will be managed to increase vegetation diversity, prey abundance

and open-ground structure, attributes consistently associated with higher hen harrier foraging success in Irish upland landscapes (Caravaggi et al., 2019; M. Wilson et al., 2006). The shift from agriculturally improved or forestry-dominated habitats to sensitively managed semi-natural grassland, scrub and restored peatland therefore represents a net qualitative gain in foraging resource availability.

This approach is aligned with the policy direction of national hen harrier conservation delivery, which explicitly recognises that outcomes for hen harrier depend on supporting and incentivising landowners to manage habitat appropriately, i.e. through agri-environmental or similar schemes and enabling measures (NPWS, 2024). The Hen Harrier Project EIP (2017–2023) further demonstrates that, where farmers are supported and incentivised through results-based approaches, measurable habitat improvements can be delivered at scale, providing an evidence-backed model for habitat management as a conservation mechanism for hen harrier and associated upland biodiversity (Sullivan & Monaghan, 2023).

More generally, the use of habitat restoration and long-term management as compensation for residual ecological effects is an established principle in European nature conservation law and guidance, provided that compensatory measures are targeted, technically feasible, secured for the long term, and designed with appropriate timing and monitoring to maintain ecological coherence (European Commission, 2012, 2021; Hoorick, 2014).

The measures proposed in the OBMP represent a significant commitment to the conservation of hen harrier and are designed to deliver long-term ecological benefits that would not otherwise be realised if the proposed project did not proceed. As described in Section 6.4.2, in the absence of the proposed project, hen harrier would be dependent on the availability of pre-thicket forestry habitats, which would cycle in accordance with ongoing forestry cycles. The measures proposed in the OBMP would provide fixed nesting areas that would have guaranteed availability to breeding hen harrier over the lifespan of the proposed project. The strategy aligns with national conservation objectives and best-practice guidance, and its implementation will be secured through planning conditions and formal agreements with landowners for the operational lifespan of the wind farm, anticipated to be 35 years. As such the likelihood of success for the proposed compensatory measures is high.

It is recognised that there will be a temporal lag between the initial implementation of the proposed compensation measures and full functional delivery, as restoration ecology and conservation responses can take time to manifest. The design therefore seeks to front-load habitat works and secure long-term management to reduce 'interim losses' and improve the likelihood of timely uptake. This is consistent with European guidance, which highlights that the timing and effectiveness of compensation is critical and that higher ratios may be required where immediate functional equivalence cannot be demonstrated (European Commission, 2012, 2021). More broadly, the existence of ecological time lags is well recognised in conservation evaluation, reinforcing the need for milestones, monitoring and adaptive management to demonstrate progress towards intended outcomes (Watts et al., 2020).

With the early implementation of (i) habitat works, (ii) operational disturbance management and seasonal restrictions, and (iii) OBMP monitoring with adaptive-management triggers, no significant short-term gap before compensation benefits accrue is anticipated; these measures ensure interim effects remain not significant while compensation habitats establish. Should monitoring indicate otherwise, adaptive measures will be employed as set out in the OBMP.

Overall, taking account of the scale of habitat provision (218.4 ha enhanced relative to an estimated 140 ha foraging habitat loss), the siting and disturbance buffers, the evidence base for habitat selection and responsiveness, and the long-term security and management of the measures, and the commitment that the managed areas would provide better quality habitat than that which is present currently, the likelihood of success for the proposed compensatory measures is considered high and no likely significant effects on hen harrier remain.

6.4.10 Proposed Biodiversity Enhancements

The compensatory measures for breeding and foraging hen harrier described above will also deliver wider biodiversity enhancements across the proposed wind farm site and surrounding landscape. The creation and long-term management of structurally diverse heath and scrub mosaics within the NEAs, together with the extensive programme of foraging habitat enhancement, will generate significant ancillary benefits for a range of upland bird species. In particular, improved habitat structure, hydrological restoration and increased invertebrate availability are expected to enhance breeding and foraging conditions for IOFs such as common snipe and European golden plover, plus a variety of non-IOF upland and lowland passerines. Collectively, these measures are likely to result in a long-term, positive ecological effect at the local scale for these species.

6.4.10.1Ancillary Benefits

In addition, a suite of compensatory measures are proposed for non-avian ecological receptors, as detailed in Chapter 5 Biodiversity and OBMP Appendix 6-13. While these measures are secured as compensation for non-avian features, several measures are expected to deliver ancillary benefits for birds. These have been acknowledged for context but are not counted as formal enhancements for birds. These include:

- **Peatland enhancement and restoration** to compensate for loss of upland blanket bog and wet heath habitats. Restoration actions such as drain blocking, hydrological rewetting, and suppression of invasive species will support the recovery of peat forming vegetation, improve water retention, and enhance carbon sequestration potential. Improved peatland condition will also benefit invertebrate communities and wetland associated bird species, including important prey resources for hen harrier;
- **Marsh fritillary *Euphydryas aurinia* habitat enhancement**, including management of wet grassland to promote devil's-bit scabious *Succisa pratensis*, the larval food plant of the species. These measures will strengthen the ecological resilience of local marsh fritillary populations and improve connectivity between habitat patches at the wider landscape scale;
- **Broadleaved woodland enhancement and restoration** to compensate for loss of broadleaved woodland habitats. Woodland planting and hydrological restoration activities will help establish new woodlands, particularly of the alluvial type. This will also provide shelter and foraging resources for birds, bats and terrestrial invertebrates; and
- **Compensatory hedgerow replanting and enhancement**, improving linear habitat networks, shelter and foraging resources for birds, bats and terrestrial invertebrates. Strengthened hedgerow structure will also benefit small mammal populations, thereby supporting prey availability for raptors such as hen harrier.

Collectively, these compensatory measures will reinforce ecological functioning across the proposed wind farm site by increasing habitat heterogeneity, improving prey abundance and supporting a broad assemblage of upland and lowland bird species. They will also complement the hen harrier compensation measures by expanding the availability of high-quality foraging areas and improving ecological connectivity throughout the landscape.

6.4.11 Proposed Monitoring

Proposed monitoring has been described in detail within the OBMP (Appendix 6-13) with a summary also provided below. Monitoring reports will be shared with the Planning Authority and NPWS with adaptive mitigation implemented if monitoring identifies any significant issues. Such adaptive mitigation measures would be developed and agreed with the Planning Authority and NPWS prior to the finalisation of the BMP.

6.4.11.1Birds

Bird monitoring has been informed by NatureScot (2009) best-practice guidance and will comprise the following elements described below.

Breeding raptor surveys will be undertaken in the year prior to the proposed project becoming operational, and in years 1, 2, 3, 5 and every five years thereafter for the lifespan of the proposed project once the proposed project has become operational.

VP surveys and carcass searches will be undertaken in years 1, 2, 3, 5, 10 and 15 once the proposed project has become operational.

6.4.11.1.1 Breeding raptor surveys

Targeted breeding raptor surveys will be undertaken during the breeding season (April to August inclusive) focussing on nesting hen harrier within the proposed wind farm site using the methodology outlined in Hardey et al. (2013). This will be used to establish whether hen harriers are using the NEAs (and/or other areas within 2 km of the proposed wind farm site) for nesting as well as indicators of breeding success, such as fledging rates.

6.4.11.1.2 VP surveys

Targeted VP surveys will be undertaken to assess hen harrier usage of the proposed wind farm site and foraging enhancement lands in the breeding season (April to August inclusive) using the methodology outlined in NatureScot (2025d) guidance. This will involve six hours of survey per vantage point per month with vantage point viewsheds covering the proposed wind farm site plus enhancement lands.

6.4.11.1.3 Carcass searches

Carcass searches will be undertaken at least once a month around each turbine location during the breeding season (April to August inclusive). These surveys will be carried out by qualified ecologists, and the searches may either be human- or dog-led. Methods to correct for biases in searcher efficiency and scavenger removal of carcasses will be included as part of these searches.

6.4.11.2Habitats

Habitat surveys in the NEAs will be undertaken once every year for the first four years post-felling of conifer plantation until heather and scrub mosaic habitats have been established and then once every five years thereafter for the lifespan of the proposed project. Surveys will

assess vegetation condition, fire risk and overall suitability for nesting hen harrier. Scoring criteria will be developed using resources available from schemes such as the Irish Hen Harrier Project (The Hen Harrier Project Ltd, 2025).

6.4.11.2.1 Compliance with Measures Set out in OBMP

Compliance checks with farm plans will be undertaken every year for the lifespan of the proposed project and would comprise of two visits a year for the first three years of monitoring by specialist surveyors (formal team inspections), and once every year thereafter with self-reporting every year and formal project team inspections every three years to verify the self-reporting. This would involve monitoring of vegetation and habitats against agreed criteria, which will be developed using resources available from schemes such as the Irish Hen Harrier Project (The Hen Harrier Project Ltd, 2025).

6.4.12 Summary of Effects

A summary of likely significant effects, proposed mitigation, residual effects and, where relevant, proposed compensation measures is provided for each IOF included in the assessment in Table 6-28, along with a summary of proposed biodiversity enhancements that are relevant to ornithology.

Table 6-28: Summary of Likely Significant Effects, Mitigation, Residual Effects & Proposed Compensation Measures for IOFs

Ecological Feature	Potential Impacts Leading to Likely Significant Effects	Proposed Mitigation (including embedded and secondary mitigation measures)	Means of Delivering Mitigation	Proposed Compensation	Means of Delivering Proposed Compensation	Residual Effects	Proposed Enhancements	Means of Delivering Proposed Enhancement
Common kestrel	• Construction nest damage / destruction	• Confirmatory pre-construction surveys and exclusion zones • Timing of works to avoid breeding season	• Implemented through CEMP • ECoW oversight • Planning condition	• None required – effects fully mitigated	• N/A	• Not significant after mitigation	• Hen harrier NEA and foraging land enhancement and as part of hen harrier compensation measures – may indirectly increase prey populations for kestrel	• Long-term management secured for 35 years via Farm Plans • Legal agreement with landowners
	• Construction habitat loss	• None	• N/A	• None	• N/A	• Not significant		
	• Construction disturbance / displacement	• Confirmatory pre-construction surveys and exclusion zones • Timing of works to avoid breeding season	• Implemented through CEMP • ECoW oversight • Planning condition	• None required – effects fully mitigated	• N/A	• Not significant after mitigation		
	• Operational barrier effect	• None	• N/A	• None	• N/A	• Not significant		
	• Operational disturbance / displacement	• None	• N/A	• None	• N/A	• Not significant		
	• Operational collision	• Precautionary common kestrel mitigation: reduction in prey habitat suitability surrounding turbines	• Ongoing monitoring delivered in Years 1, 2, 3, 5, and every 5 years thereafter as specified in the EIAR monitoring programme to be in the detailed BMP • Planning condition	• None required	• N/A	• Not significant		
Hen harrier (breeding season) and	• Construction nest damage / destruction	• Confirmatory pre-construction surveys and exclusion zones	• Implemented through CEMP • ECoW oversight • Planning condition	• None required – effects fully mitigated	• N/A	• Not significant after mitigation	• N/A	• N/A

Ecological Feature	Potential Impacts Leading to Likely Significant Effects	Proposed Mitigation (including embedded and secondary mitigation measures)	Means of Delivering Mitigation	Proposed Compensation	Means of Delivering Proposed Compensation	Residual Effects	Proposed Enhancements	Means of Delivering Proposed Enhancement
Leitrim Uplands Non-Designated Important Breeding Area for hen harrier		• Timing of works to avoid breeding season						
	• Construction habitat loss	• None	• N/A	• None	• N/A	• Not significant		
	• Construction disturbance / displacement	• Confirmatory pre-construction surveys and exclusion zones • Timing of works to avoid breeding season • 1,000 m forestry-felling buffers and 750 m buffer for non-forestry works around active hen harrier nests	• Implemented through CEMP • ECoW oversight • Planning condition	• None required – effects fully mitigated	• N/A	• Not significant after mitigation		
	• Operational barrier effect	• None	• N/A	• None	• N/A	• Not significant		
	• Operational disturbance / displacement leading to loss of up to c.140 ha of foraging habitat and risk of displacement of up to 2 breeding pairs within Leitrim Uplands Non-Designated Important Breeding Area	• 750 m turbine buffers around NEAs	• Mitigation by design	• 54.15 ha NEAs • 164.25 ha foraging enhancement areas • Total 218.4 ha managed long-term	• Long-term management secured for 35 years via Farm Plans • Delivery to be set out in detailed BMP • Monitoring over full operational period including compliance checks with Farm Plans and habitat and bird surveys	• Residual effect after mitigation and compensation is not significant		

Ecological Feature	Potential Impacts Leading to Likely Significant Effects	Proposed Mitigation (including embedded and secondary mitigation measures)	Means of Delivering Mitigation	Proposed Compensation	Means of Delivering Proposed Compensation	Residual Effects	Proposed Enhancements	Means of Delivering Proposed Enhancement
					• Monitoring reports submitted to Planning Authority and NPWS • Planning condition			
	• Operational collision	• None	• Ongoing monitoring delivered in Years 1, 2, 3, 5, and every 5 years thereafter as specified in the EIAR monitoring programme • Planning condition	• None required – effects fully mitigated	• N/A	• Not significant after mitigation		
White-tailed eagle	• Construction nest damage / destruction	• Confirmatory pre-construction surveys and exclusion zones • Timing of works to avoid breeding season	• Implemented through CEMP • ECoW oversight • Planning condition	• None required – effects fully mitigated	• N/A	• Not significant after mitigation	• None	• N/A
	• Construction habitat loss	• None	• N/A	• None	• N/A	• Not significant		
	• Construction disturbance / displacement	• Pre-construction surveys and exclusion zones • Timing of works to avoid breeding season	• Implemented through CEMP • ECoW oversight • Planning condition	• None required – effects fully mitigated	• N/A	• Not significant after mitigation		
	• Operational barrier effect	• None	• N/A	• None	• N/A	• Not significant		
	• Operational disturbance / displacement	• None	• N/A	• None	• N/A	• Not significant		

Ecological Feature	Potential Impacts Leading to Likely Significant Effects	Proposed Mitigation (including embedded and secondary mitigation measures)	Means of Delivering Mitigation	Proposed Compensation	Means of Delivering Proposed Compensation	Residual Effects	Proposed Enhancements	Means of Delivering Proposed Enhancement
	• Operational collision	• Precautionary white-tailed eagle mitigation: prompt carcass removal.	• Ongoing monitoring delivered in Years 1, 2, 3, 5, and every 5 years thereafter as specified in the EIAR monitoring programme • Planning condition)	• None required - effects fully mitigated	• N/A	• Not significant after mitigation		
Cummeen Strand SPA (TDR accommodations area 13)	• Construction temporary disturbance to wintering / migratory SCI waterbirds and waders	• Pre-works bird checks • Exclusion zones if active nests found • Standard noise, pollution and traffic controls	• Implemented through CEMP • Planning condition	• None required – effects fully mitigated	• N/A	• Not significant after mitigation	• None	• N/A
	• Construction pollution to downstream wetland habitats	• Embedded mitigation to prevent pollution and sedimentation	• Implemented through CEMP • Planning condition	None required – effects fully mitigated	• N/A	• Not significant after mitigation		
All other IOFs and designated sites (grouped) i.e. common snipe, Eurasian woodcock, European golden plover, lesser black-backed gull and whooper swan.	• Construction nest damage / destruction	• Confirmatory pre-construction surveys and exclusion zones • Timing of works to avoid breeding season	• Implemented through CEMP • ECoW oversight • Planning condition	• None required – effects fully mitigated	• N/A	• Not significant after mitigation	• Hen harrier NEAs and foraging habitat compensation measures – will enhance habitat for upland IOFs such as common snipe and European golden plover, as well as other non-IOFs	• Long-term management secured for 35-40 years via Farm Plans • Delivery to be set out in detailed BMP • Legal agreements with landowners
	• Construction habitat loss	• None	• N/A	• None	• N/A	• Not significant		
	• Construction disturbance / displacement	• Confirmatory pre-construction surveys and exclusion zones • Timing of works to avoid breeding season	• Implemented through CEMP • ECoW oversight • Planning condition	• None required – effects fully mitigated	• N/A	• Not significant after mitigation		

Ecological Feature	Potential Impacts Leading to Likely Significant Effects	Proposed Mitigation (including embedded and secondary mitigation measures)	Means of Delivering Mitigation	Proposed Compensation	Means of Delivering Proposed Compensation	Residual Effects	Proposed Enhancements	Means of Delivering Proposed Enhancement
	• Construction pollution to downstream wetland habitats	• Embedded mitigation to prevent pollution and sedimentation	• Implemented through CEMP • Planning condition	• None required – effects fully mitigated	• N/A	• Not significant after mitigation		
	• Operational barrier effect	• None	• N/A	• None	• N/A	• Not significant		
	• Operational disturbance / displacement	• None	• N/A	• None	• N/A	• Not significant		
	• Operational collision	• None.	• Ongoing monitoring delivered in Years 1, 2, 3, 5, and every 5 years thereafter as specified in the EIAR monitoring programme to be in the detailed BMP • Planning condition	• None required – effects fully mitigated	• N/A	• Not significant after mitigation		

6.5 CONCLUSION

This assessment has considered the likely significant effects of the proposed project, including the GCR and TDR, on IOFs consistent with the EU Birds Directive, the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended), the Wildlife Acts 1976–2021, and recognised best-practice guidance for Ecological Impact Assessment and wind farm ornithology.

A robust baseline dataset was established from multi-year surveys (2020–2025) supported by earlier contextual data. Following scoping and evaluation, detailed assessment focused on those IOFs with likelihood for significant effects.

With embedded mitigation and good practice measures applied including turbine siting, seasonal timing of works, confirmatory pre-construction checks, disturbance-free buffers, pollution prevention measures, precautionary mitigation to reduce collision risk, operational monitoring and a compensation package for hen harrier, the proposed project is predicted to give rise to no significant residual effects on all assessed IOFs.

A comprehensive compensation package, including the management of 54.15 ha of nesting enhancement areas and 218.4 ha of foraging habitat enhancement (including any NEAs that double-up as foraging lands), in place for the full operational life of the proposed project, has been designed to offset any potential effects relating to possible displacement of nesting hen harrier and a reduction in functional foraging habitat. This package will support hen harrier breeding productivity within the Leitrim Uplands non-designated important breeding area.

Cumulative and transboundary assessments conclude that no significant cumulative or transboundary effects are expected. A structured post-construction monitoring programme will be implemented to monitor the effectiveness of the mitigation measures.

In summary, subject to the implementation of all embedded and additional mitigation, monitoring, and the committed compensation measures, the proposed project is not predicted to result in any significant adverse residual effects on ornithological receptors at the population levels relevant to the EIAR.

6.6 REFERENCES

Anderson, C., Beadle, K., Beattie, A., Ben-Ami, J., Brecht, H. Le, Burgess, P., Callaghan, J., Casey, R., Higham, G., Hoare, D., Howard, R., Knott, S., Phillips, M., Riley, R., Sykes, R., & Walker, E. (2024). *Institute of Environmental Management and Assessment (IEMA) Impact Assessment Guidelines*.

Band, W. (2024). *Using a collision risk model to assess bird collision risks for onshore wind farms*.

Bengtsson, D., Avril, A., Gunnarsson, G., Elmberg, J., Söderquist, P., Norevik, G., Tolf, C., Safi, K., Fiedler, W., Wikelski, M., Olsen, B., & Waldenström, J. (2014). Movements, Home-Range Size and Habitat Selection of Mallards during Autumn Migration. *PLOS ONE*, *9*(6), e100764. https://doi.org/10.1371/JOURNAL.PONE.0100764

Bennun, L., van Bochove, J., Ng, C., Fletcher, C., Wilson, D., Phair, N., & Carbone, G. (2021). Mitigating biodiversity impacts associated with solar and wind energy development: guidelines for project developers. *Mitigating Biodiversity Impacts Associated with Solar and Wind Energy Development: Guidelines for Project Developers*. https://doi.org/10.2305/IUCN.CH.2021.04.EN

Beston, J. A., Diffendorfer, J. E., Loss, S. R., & Johnson, D. H. (2016). Prioritizing Avian Species for Their Risk of Population-Level Consequences from Wind Energy Development. *PLOS ONE*, *11*(3), e0150813. https://doi.org/10.1371/JOURNAL.PONE.0150813

Bibby, C. J., Burgess, N. D., Hill, D. A., & Mustoe, S. (2000). *Bird Census Techniques*. Academic Press.

BirdWatch Ireland. (2025a). *Golden Plover*. https://birdwatchireland.ie/birds/golden-plover/

BirdWatch Ireland. (2025b). *Lesser Black-backed Gul*. https://birdwatchireland.ie/birds/lesser-black-backed-gull/

BirdWatch Ireland. (2025c). *Snipe*. https://birdwatchireland.ie/birds/snipe/

BirdWatch Ireland. (2025d). *Whooper Swan*. https://birdwatchireland.ie/birds/whooper-swan/

Blakesley, D., & Buckley, G. P. (2010). Woodland edge and open space. In *Improving woodland habitat for wildlife* (4). Pisces Publications.

Bradarić, M., Kranstauber, B., Bouten, W., van Gasteren, H., & Baranes, J. S. (2024). Drivers of flight altitude during nocturnal bird migration over the North Sea and implications for offshore wind energy. *Conservation Science and Practice*, *6*(4), e13114. https://doi.org/10.1111/CSP2.13114

Braña, F., Prieto, L., & González-Quirós, P. (2010). Habitat Change and Timing of Dusk Flight in the Eurasian Woodcock: A Trade-Off between Feeding and Predator Avoidance? *Https://Doi.Org/10.5735/086.047.0305*, *47*(3), 206–214. https://doi.org/10.5735/086.047.0305

Brewin, J., Hoodless, A. N., Heward, C. J., & Hopgood, A. 2022. (2022). *Conserving Our Woodcock: Research-based measures to help the UK's resident populatoin*. www.gwct.org.uk

Brown, A. F., & Shepherd, K. B. (1993). A method for censusing upland breeding waders. *Bird Study*, *40*, 189–195.

BTO. (2025a). *BirdFacts*. Https://Www.Bto.Org/Learn/about-Birds/Birdfacts. https://www.bto.org/learn/about-birds/birdfacts

BTO. (2025b). *WeBS Reports*. https://app.bto.org/webs-reporting/principal.jsp

Burke, B., Egan, F., Norriss, D., Wilson, H. J., & Walsh, A. (2014). *A review of Greenland White-fronted Geese in Ireland 1982/83 - 2011/12*.

Calladine, J., Garner, G., Wernham, C., & Thiel, A. (2009). The influence of survey frequency on population estimates of moorland breeding birds. *Bird Study*, *56*(3), 381–388.

Caravaggi, A., Irwin, S., Lusby, J., Ruddock, M., O'Toole, L., Mee, A., Nagle, T., O'Neill, S., Tierney, D., McCarthy, A., & O'Halloran, J. (2019). Factors influencing Hen Harrier Circus cyaneus territory site selection and breeding success. *Bird Study*, *66*(3), 366–377. https://doi.org/10.1080/00063657.2019.1692778

Carrete, M., Sánchez-Zapata, J. A., Benítez, J. R., Lobón, M., Montoya, F., & Donázar, J. A. (2012). Mortality at wind-farms is positively related to large-scale distribution and aggregation in griffon vultures. *Biological Conservation*, *145*(1), 102–108. https://doi.org/10.1016/J.BIOCON.2011.10.017

Christidis, L., Rheindt, F. E., Iliff, M. J., Lepage, D., Rasmussen, P. C., Donald, P., Alström, P., Areta, J. I., Brammer, F., Chesser, T., Donsker, D., Dowsett, B., Gerbracht, J., Kirsch, M., Kuziemko, M., Lagerqvist, M., Littauer, R., Longmore, W., Norman, J., … Stervander, M. (2025). AviList v2025. In *AviList*. https://doi.org/10.2173/avilist.v2025

CIEEM. (2024). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*.

DAERA. (2025). *Natural Environment Map Viewer*. https://www.daera-ni.gov.uk/services/natural-environment-map-viewer

Department of Housing, L. G. and H. (2023). *Return flight for the Osprey as National Parks and Wildlife Service prepares to reintroduce bird to Ireland this summer*. https://www.gov.ie/en/department-of-housing-local-government-and-heritage/press-releases/return-flight-for-the-osprey-as-national-parks-and-wildlife-service-prepares-to-reintroduce-bird-to-ireland-this-summer/

Devault, T. L., Seamans, T. W., Linnell, K. E., Sparks, D. W., & Beasley, J. C. (2017). Scavenger removal of bird carcasses at simulated wind turbines: Does carcass type matter? *Ecosphere*, *8*(11), e01994. https://doi.org/10.1002/ECS2.1994

Devereux, C. L., Denny, M. J. H., & Whittingham, M. J. (2008). Minimal effects of wind turbines on the distribution of wintering farmland birds. *Journal of Applied Ecology*, *45*(6), 1689–1694. https://doi.org/10.1111/J.1365-2664.2008.01560.X

Donegal Daily. (2025, October). Three white tailed eagles killed by wind turbines in South Donegal - Donegal Daily. *Donegal Daily*. https://www.donegaldaily.com/2025/10/02/three-white-tailed-eagles-killed-by-wind-turbines-in-south-donegal-1/

Douglas, D. J. T., Bellamy, P. E., & Pearce-Higgins, J. W. (2011). Changes in the abundance and distribution of upland breeding birds at an operational wind farm. *Bird Study*, *58*(1), 37–43. https://doi.org/10.1080/00063657.2010.524914

Drewitt, A. L., & Langston, R. H. W. (2006). Assessing the impacts of wind farms on birds. *Ibis*, *148*(SUPPL. 1), 29–42. https://doi.org/10.1111/J.1474-919X.2006.00516.X

Dürr, T. (2025). *Vogelverluste an Windenergieanlagen / bird and bat fatalities at wind turbines in Europe*. https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Flfu.brandenburg.de%2Fsixcms%2Fmedia.php%2F9%2FVoegel-Uebersicht-Europa.xlsx&wdOrigin=BROWSELINK

eBird. (2026). *Common Snipe - eBird*. https://ebird.org/species/comsni

EIONET. (2025). *Article 12 web tool*. Https://Nature-Art12.Eionet.Europa.Eu/Article12/Report?Period=3&country=IE .

Engler, J. O., Bokämper, M., Hannabach, S., Merling de Chapa, M., Daum, L., Georgiev, K. B., & Thorn, S. (2025). From dusk till dawn: ecoacoustic monitoring reveals wind energy impacts on roding Eurasian woodcock Scolopax rusticola. *Wildlife Biology*, e01492. https://doi.org/10.1002/WLB3.01492

Erickson, W. P., Wolfe, M. M., Bay, K. J., Johnson, D. H., & Gehring, J. L. (2014). A Comprehensive Analysis of Small-Passerine Fatalities from Collision with Turbines at Wind Energy Facilities. *PLOS ONE*, *9*(9), e107491. https://doi.org/10.1371/JOURNAL.PONE.0107491

Eskildsen, D. P. ;, Ali, N. Y. ;, Larsen, J. C. ;, Thorup, K ;, Skelmose, K ;, Mirski, P., Wink, M., Palm Eskildsen, D., Ali, N. Y., Larsen, J. C., Thorup, Kasper, Skelmose, Kim, & Tøttrup, A. P. (2024). Survival, Nest Site Affiliation and Post-Fledging Movements of Danish White-Tailed Eagles (Haliaeetus albicilla). *Diversity 2024, Vol. 16, Page 314*, *16*(6), 314. https://doi.org/10.3390/D16060314

European Commission. (2012). *Guidance document on Article 6(4) of the "Habitats Directive" 92/43/EEC CLARIFICATION OF THE CONCEPTS OF: ALTERNATIVE SOLUTIONS, IMPERATIVE REASONS OF OVERRIDING PUBLIC INTEREST, COMPENSATORY MEASURES, OVERALL COHERENCE, OPINION OF THE COMMISSION*.

European Commission. (2021). *Official Journal C 437/2021*. https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=OJ:C:2021:437:FULL

Fernández-Bellon, D., Wilson, M. W., Irwin, S., & O'Halloran, J. (2019). Effects of development of wind energy and associated changes in land use on bird densities in upland areas. *Conservation Biology*, *33*(2), 413–422. https://doi.org/10.1111/COBI.13239

Fielding, A. H., & Haworth, P. F. (2013). *Farr windfarm: A review of displacement disturbance on golden plover arising from operational turbines 2005-2013*.

Gale, T. (2023). *The stopover behaviour of Common Snipe Gallinago gallinago migrating through North Ronaldsay, Orkney*.

Garcia, D. A., Canavero, G., Ardenghi, F., & Zambon, M. (2015). Analysis of wind farm effects on the surrounding environment: Assessing population trends of breeding passerines. *Renewable Energy*, *80*, 190–196. https://doi.org/10.1016/J.RENENE.2015.02.004

Garcia-Rosa, P. B., & Tande, J. O. G. (2023). Mitigation measures for preventing collision of birds with wind turbines. *Journal of Physics: Conference Series*, *2626*(1), 012072. https://doi.org/10.1088/1742-6596/2626/1/012072

Gilbert, G., Stanbury, A., & Lewis, L. (2021). Birds of Conservation Concern in Ireland 4: 2020 – 2026. *Irish Birds*, *43*, 1.

Gilbert, Gillian., Gibbons, D. Wingfield., & Evans, Julianne. (1998). *Bird monitoring methods : a manual of techniques for key UK species*. Pelagic Publishing.

Gillings, S., Balmer, D. E., Caffrey, B. J., Downie, I. S., Gibbons, D. W., Lack, P. C., Reid, J. B., Sharrock, J. T. R., Swann, R. L., & Fuller, R. J. (2019). Breeding and wintering bird distributions in Britain and Ireland from citizen science bird atlases. *Global Ecology and Biogeography*, *28*(7), 866–874. https://doi.org/10.1111/GEB.12906

Gittings, T. (2019). *Castlebanny Wind Farm: Woodcock Surveys, 2019*.

Gittings, T. (2022). *APPENDIX 7-6 COLLISION RISK ASSESSMENT*. https://www.ballivorwindfarmplanning.ie/wp-content/uploads/sites/38/2023/04/Appendix_7-6_Collision_Risk_Assessment.pdf

Goodship, N. M., Furness, R. W., & (MacArthur Green). (2022). *Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species*. https://www.nature.scot/doc/naturescot-research-report-1283-disturbance-distances-review-updated-literature-review-disturbance

Hardey, J., Crick, H., Wernham, C., Riley, H., & Thompson, D. (2013). *Raptors: a field guide to survey and monitoring* (3rd ed.). The Stationery Office.

Haworth, P., & Fielding, A. (2012). *A review of the impacts of terrestrial wind farms on breeding and wintering hen harriers*.

Heward, C. J., Hoodless, A. N., Conway, G. J., Fuller, R. J., Maccoll, A. D. C., & Aebischer, N. J. (2018). Habitat correlates of Eurasian Woodcock Scolopax rusticola abundance in a declining resident population. *Journal of Ornithology 2018 159:4*, *159*(4), 955–965. https://doi.org/10.1007/S10336-018-1570-Z

Holt, C., Austin, G., Calbrade, N., Mellan, H., Hearn, R., Stroud, D., Wotton, S., & Musgrove, A. (2012). *Waterbirds in the UK 2010/11 The Wetland Bird Survey*.

Hoodless, A. N., & Hirons, G. J. M. (2007). Habitat selection and foraging behaviour of breeding Eurasian Woodcock Scolopax rusticola: a comparison between contrasting landscapes. *Ibis*, *149*(SUPPL. 2), 234–249. https://doi.org/10.1111/J.1474-919X.2007.00725.X

Hoodless, A. N., Lang, D., Aebischer, N. J., Fuller, R. J., & Ewald, J. A. (2009). *Densities and population estimates of breeding Eurasian Woodcock Scolopax rusticola in Britain in 2003*. *56*, 15–25.

Hoorick, G. Van. (2014). Compensatory Measures in European Nature Conservation Law. *Utrecht Law Review*, *10*(2). http://www.utrechtlawreview.org

Hötker, H., Thomsen, K. M., & Jeromin, H. (2006). *Impacts on biodiversity of exploitation of renewable energy sources: the example of birds and bats - facts, gaps in knowledge, demands for further research, and ornithological guidelines for the development of renewable energy exploitation*. https://www.researchgate.net/publication/237771339_Impacts_on_biodiversity_of_exploitation_of_renewable_energy_sources_the_example_of_birds_and_bats

IWEA. (2012). *Best Practice Guidelines for the Irish Wind Energy*.

IWeBS. (2025). *I-WeBS National Trends Report*. https://birdwatchireland.ie/app/uploads/2023/08/iwebs_trends_00000_National.html

Jia, R., Gao, R., Ru, W., Kong, D., Ji, Z., & Zhang, G. (2021). Using satellite tracking to identify the factors affecting the spring migration timing of whooper swans (Cygnus cygnus). *Shengtai Xuebao*, *41*(15), 6075–6082. https://doi.org/10.5846/STXB202004230974

Katzner, T., Bennett, V., Miller, T., Duerr, A., Braham, M., & Hale, A. (2016). Wind energy development: methods for assessing risks to birds and bats pre-construction. *Human-Wildlife Interactions*, *10*, 42–52. https://www.jstor.org/stable/24874155?casa_token=CtqMAzTBox0AAAAA:IDPIgGbEfnj8RUILPBVL81AYh9OoXwKSAdQL1zlWPsrRxOaxYnRfLC2lJa0yg7dYmMe1zJtKc0IstvVwyYI-H2yQK0YX7xLIXCzkL5t2I8UyiT7ZckQ

Kerlinger, P., Gehring, J. L., Erickson, W. P., Curry, R., Jain, A., & Guarnaccia, J. (2010). Night Migrant Fatalities and Obstruction Lighting at Wind Turbines in North America. *The Wilson Journal of Ornithology*, *122*(4), 744–754. https://doi.org/10.1676/06-075.1

Langston, R., & Pullan, J. (2003). *Windfarms and Birds : An analysis of the effects of windfarms on birds, and guidance on environmental assessment criteria and site selection issues*. http://www.coe.int/t/dg4/cultureheritage/conventions/Bern/TPVSList_en.asp#TopOfPage.

Lonsdorf, E. V, Gerber, J. S., Ray, D., Slater, S. J., Allison, T. D., & Eric Lonsdorf, C. V. (2023). *Assessing carcass relocation for offsetting golden eagle mortality at wind energy facilities*. https://doi.org/10.1002/jwmg.22478

Mack, G. G., & Clark, R. G. (2006). Home-Range Characteristics, Age, Body Size, and Breeding Performance of Female Mallards (Anas Platyrhynchos). *The Auk*, *123*(2), 467–474. https://doi.org/10.1093/AUK/123.2.467

Mackrill, T. (2024). *The Osprey*. Poyser Monographs, Bloomsbury Publishing.

Madders, M. (2000). Habitat selection and foraging success of hen harriers circus cyaneus in west scotland. *Bird Study*, *47*(1), 32–40. https://doi.org/10.1080/00063650009461158

Masden, Elizabeth A, Haydon, Daniel T, Fox, A. D., Furness, Robert W, Bullman, R., Masden, M. D., Haydon, E. A., Fox, D. T., Bullman, R. W., Masden, E A, Haydon, D T, & Furness, R W. (2009). Barriers to movement: impacts of wind farms on migrating birds. *ICES Journal of Marine Science*, *66*(4), 746–753. https://doi.org/10.1093/ICESJMS/FSP031

McAuliffe, F., Wilson-Parr, R., O'Toole, L., Marnell, F., & Reid, N. (2024). *Prey deficit for reintroduced Golden Eagles (Aquila chrysaetos) in Ireland* (pp. 72–83). Irish Naturalists Journal Ltd. https://pure.qub.ac.uk/en/publications/prey-deficit-for-reintroduced-golden-eagles-aquila-chrysaetos-in-/

McClure, C. J. W., Rolek, B. W., Dunn, L., McCabe, J. D., Martinson, L., & Katzner, T. (2021). Eagle fatalities are reduced by automated curtailment of wind turbines. *Journal of Applied Ecology*, *58*(3), 446–452. https://doi.org/10.1111/1365-2664.13831;ISSUE:ISSUE:DOI

McClure, C. J. W., Rolek, B. W., Dunn, L., McCabe, J. D., Martinson, L., & Katzner, T. E. (2022). Confirmation that eagle fatalities can be reduced by automated curtailment of wind turbines. *Ecological Solutions and Evidence*, *3*(3), e12173. https://doi.org/10.1002/2688-8319.12173;CTYPE:STRING:JOURNAL

Mills, A. M., Thurber, B. G., MacKenzie, S. A., & Taylor, P. D. (2011). Passerines use Nocturnal Flights for Landscape-Scale Movements during Migration Stopover. *The Condor: Ornithological Applications*, *113*(3), 597–607. https://doi.org/10.1525/COND.2011.100186

Minias, P., Kaczmarek, K., Włodarczyk, R., & Janiszewski, T. (2013). Wing Shape Influences Stopover Strategies in a Migratory Shorebird, The Common Snipe. *The Condor: Ornithological Applications*, *115*(3), 535–542. https://doi.org/10.1525/COND.2013.120137

MKO. (2018a). *Breeding Bird Survey Report 2018, Lissinagroagh, Co. Leitrim* .

MKO. (2018b). *Winter Birds Survey 2017/2018 Lissinagroagh Survey Report*.

MKO. (2019). *Winter Bird Survey Report 2018/2019 Lissinagroagh, Co. Leitrim*.

MKO. (2020). *Breeding Bird Survey Report 2019, Lissinagroagh, Co. Leitrim* .

MKO. (2025). *Breeding Bird Survey Report 2020, Lissinagroagh, Co. Leitrim* .

Murray, T., Clotworthy, C., & Bleasdale, A. (2013). A Survey of Red Grouse (Lagopus lagopus scoticus) in the Owenduff/Nephin Complex Special Protection Area. Irish Wildlife Manuals. In *Irish Wildlife Manuals: No. 77* (No. 77). National Parks and Wildlife Service, Departments of Arts, Heritage and the Gaeltacht.

Næss, C. (2025). *Successful Reintroduction of White-Tailed Sea Eagles in Ireland*. https://www.nina.no/english/About-NINA/News/article/successful-reintroduction-of-white-tailed-sea-eagles-in-ireland

NatureScot. (2009). *Guidance note Guidance on Methods for Monitoring Bird Populations at Onshore Wind Farms*.

NatureScot. (2016). *Assessing Connectivity with Special Protection Areas (SPAs) Guidance*.

NatureScot. (2020). *The Effect of Aviation Obstruction Lighting on Birds at Wind Turbines, Communication Towers and Other Structures*.

NatureScot. (2024). *Guidance on using an updated collision risk model to assess bird collision risk at onshore wind farms*. https://www.nature.scot/doc/guidance-using-updated-collision-risk-model-assess-bird-collision-risk-onshore-wind-farms

NatureScot. (2025a). *Guidance - Assessing the cumulative impacts of onshore wind farms on birds*. https://www.nature.scot/doc/guidance-assessing-cumulative-impacts-onshore-wind-farms-birds

NatureScot. (2025b). *Guidance - Assessment and mitigation of impacts of power lines and guyed meteorological masts on birds*. https://www.nature.scot/doc/guidance-assessment-and-mitigation-impacts-power-lines-and-guyed-meteorological-masts-birds

NatureScot. (2025c). *Guidance note - Assessing the significance of impacts on bird populations from onshore wind farms that do not affect protected areas*. https://www.nature.scot/doc/guidance-note-assessing-significance-impacts-bird-populations-onshore-wind-farms-do-not-affect

NatureScot. (2025d). *Recommended bird survey methods to inform impact assessment of onshore windfarms*. https://www.nature.scot/doc/recommended-bird-survey-methods-inform-impact-assessment-onshore-windfarms

NatureScot. (2025e). *Wind farm impacts on birds - Use of Avoidance Rates in the NatureScot Wind Farm Collision Risk Model*. https://www.nature.scot/doc/wind-farm-impacts-birds-use-avoidance-rates-naturescot-wind-farm-collision-risk-model

NBDC. (2025). *Biodiversity Maps*. https://maps.biodiversityireland.ie/

Norman, D. (2008). *Birds in Cheshire and Wirral: a breeding and wintering atlas*. Liverpool University Press. http://www.cheshireandwirralbirdatlas.org/species/woodcock-wintering.htm

NPWS. (2024). *Hen Harrier Threat Response Plan 2024-2028*.

NPWS. (2025). *National Parks & Wildlife Service website*. https://www.npws.ie/

NPWS. (2026). *White-tailed Eagle Reintroduction (Second Phase) | National Parks & Wildlife Service*. https://www.npws.ie/research-projects/animal-species/birds/white-tailed-eagle-phase-2

O'Donoghue, B. (2019). *Irish Hen Harrier Winter Survey Guide*.

O'Donoghue, B. G. (2021). Hen Harrier Circus cyaneus ecology and conservation during the non-breeding season in Ireland. *Bird Study*, *67*(3), 344–359. https://doi.org/10.1080/00063657.2021.1874871

O'Donoghue, B. G., Casey, M. J., Malone, E., Carey, J. G. J., Clarke, D., & Conroy, K. (2020). *Recording and Addressing Persecution and Threats to Our Raptors (RAPTOR): a review of incidents 2007–2019*.

OPR. (2021). *Appropriate Assessment Screening for Development Management*.

O'Rourke, E. (2014). The reintroduction of the white-tailed sea eagle to Ireland: People and wildlife. *Land Use Policy*, *38*, 129–137. https://doi.org/10.1016/J.LANDUSEPOL.2013.10.020

Pearce-Higgins, J. W., Stephen, L., Douse, A., & Langston, R. H. W. (2012). Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. *Journal of Applied Ecology*, *49*(2), 386–394. https://doi.org/10.1111/J.1365-2664.2012.02110.X

Pearce-Higgins, J. W., Stephen, L., Langston, R. H. W., Bainbridge, I. P., & Bullman, R. (2009). The distribution of breeding birds around upland wind farms. *Journal of Applied Ecology*, *46*(6), 1323–1331. https://doi.org/10.1111/J.1365-2664.2009.01715.X

Percival, S. M. (2003). *BIRDS AND WIND FARMS IN IRELAND: A REVIEW OF POTENTIAL ISSUES AND IMPACT ASSESSMENT*.

Percival, S. M. (2005). Birds and windfarms: What are the real issues? *British Birds*, *98*, 194–204. https://www.researchgate.net/publication/287773894_Birds_and_windfarms_What_are_the_real_issues

Pescador, M., Gómez Ramírez, J. I., & Peris, S. J. (2019). Effectiveness of a mitigation measure for the lesser kestrel (Falco naumanni) in wind farms in Spain. *Journal of Environmental Management*, *231*, 919–925. https://doi.org/10.1016/j.jenvman.2018.10.094

Ruddock, M., Wilson-Parr, R., Lusby, J., Connolly, F., Bailey, J., & O'Toole, L. (2024). *The 2022 National Survey of breeding Hen Harrier in Ireland. Report prepared by Irish Raptor Study Group (IRSG), BirdWatch Ireland (BWI), Golden Eagel Trust (GET).*

Stewart, G. B., Pullin, A. S., & Coles, C. F. (2007). Poor evidence-base for assessment of windfarm impacts on birds. *Environmental Conservation*, *34*(1), 1–11. https://doi.org/10.1017/S0376892907003554

Sullivan, C., & Monaghan, F. (2023). *(2017-2023) Hen Harrier Project Final Report*. https://acresireland.ie/wp-content/uploads/2025/05/Hen-Harrier-Project-EIP-Final-Report-2017-2023-web.pdf

Thaxter, C. B., Buchanan, G. M., Carr, J., Butchart, S. H. M., Newbold, T., Green, R. E., Tobias, J. A., Foden, W. B., O'Brien, S., & Pearce-Higgins, J. W. (2017). Bird and bat species' global vulnerability to collision mortality at wind farms revealed through a trait-based assessment. *Proceedings of the Royal Society B: Biological Sciences*, *284*(1862). https://doi.org/10.1098/RSPB.2017.0829

Thaxter, C. B., Ross-Smith, V. H., Bouten, W., Clark, N. A., Conway, G. J., Masden, E. A., Clewley, G. D., Barber, L. J., & Burton, N. H. K. (2019). Avian vulnerability to wind farm collision through the year: Insights from lesser black-backed gulls (Larus fuscus) tracked from multiple breeding colonies. *Journal of Applied Ecology*, *56*(11), 2410–2422. https://doi.org/10.1111/1365-2664.13488

The Hen Harrier Project Ltd. (2025). *Hen Harrier Project*. Http://Www.Henharrierproject.Ie/. http://www.henharrierproject.ie/

Tolvanen, A., Routavaara, H., Jokikokko, M., & Rana, P. (2023). How far are birds, bats, and terrestrial mammals displaced from onshore wind power development? – A systematic review. *Biological Conservation*, *288*, 110382. https://doi.org/10.1016/J.BIOCON.2023.110382

Treinys, R., Dementavičius, D., Rumbutis, S., Švažas, S., Butkauskas, D., Sruoga, A., & Dagys, M. (2015). Settlement, habitat preference, reproduction, and genetic diversity in recovering the white-tailed eagle Haliaeetus albicilla population. *Journal of Ornithology 2015 157:1*, *157*(1), 311–323. https://doi.org/10.1007/S10336-015-1280-8

Village, Andrew. (1990). *The kestrel*. A&C Black. https://books.google.com/books/about/The_Kestrel.html?id=pkReR6cBZOIC

Watts, K., Whytock, R. C., Park, K. J., Fuentes-Montemayor, E., Macgregor, N. A., Duffield, S., & McGowan, P. J. K. (2020). Ecological time lags and the journey towards conservation success. *Nature Ecology & Evolution 2020 4:3*, *4*(3), 304–311. https://doi.org/10.1038/s41559-019-1087-8

Welcker, J., Liesenjohann, M., Blew, J., Nehls, G., & Grünkorn, T. (2017). Nocturnal migrants do not incur higher collision risk at wind turbines than diurnally active species. *Ibis*, *159*(2), 366–373. https://doi.org/10.1111/IBI.12456

Whitfield, D. P., Green, M., & Fielding, A. H. (2010). *Are Breeding Eurasian Curlew Numenius Arquata Displaced by Wind Energy Developments?* https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Whitfield%2C+D.P.%2C+M.+Green%2C+and+A.H.+Fielding.+2010.+Are+Breeding+Eurasian+Curlew+Numenius

++arquatic+Displaced+by+Wind+Energy+Developments%3F+Banchory%2C+Scotland%3A+Natural+Research++Projects+Ltd.&btnG=

Wilson, M., Gittings, T., O'Halloran, J., Kelly, T. C., & Pithon, J. (2006). *The distribution of Hen Harriers in Ireland in relation to land use cover, particularly forest cover*. https://www.researchgate.net/publication/228708749

Wilson, M. W., Fernández-Bellon, D., Irwin, S., & O'Halloran, J. (2017). Hen Harrier Circus cyaneus population trends in relation to wind farms. *Bird Study*, *64*(1), 20–29. https://doi.org/10.1080/00063657.2016.1262815;ISSUE:ISSUE:DOI

Appendix 6-1

Relevant Legislation and Policy

Appendix 6-1 Relevant Legislation and Policy

6.1.1 Habitats and Birds Directive

The Habitats Directive ensures the conservation of a wide range of rare, threatened or endemic animal and plant species. Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora was adopted in 1992 and aims to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements. It forms the cornerstone of Europe's nature conservation policy with the Birds Directive and establishes the EU wide Natura 2000 ecological network of protected areas, safeguarded against potentially damaging developments.

The Natura 2000 network of protected areas is known as Special Areas of Conservation (SAC) and Special Protection Areas (SPA). In general terms, they are considered to be of exceptional importance in terms of rare, endangered or vulnerable habitats and species within the European Community. The requirements of the Habitats Directive have been transposed into Irish law through the European Communities (Birds and Natural Habitats) Regulations 2011 [S.I. No. 477/2011]. This legislation affords protection to both Special Protection Areas and Special Areas of Conservation.

Special Areas of Conservation (SAC) are designated under the Conservation of Natural Habitats and of Wild Fauna and Flora Directive 92/43/EEC (Habitats Directive) which is transposed into Irish law by the EC (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011). Special Protection Areas (SPA) are classified under the Birds Directive (2009/147/EC on the Conservation of Wild Birds). Article 6(3) of the Habitats Directive requires an 'appropriate assessment' to be undertaken for any plan or project that is likely to have a significant effect on the conservation objectives of a Natura 2000 site. An 'appropriate assessment' is an evaluation of the potential impacts of a plan or project on the integrity of a Natura 2000 site, and the incorporation, where necessary, of measures to mitigate or avoid negative effects.

6.1.2 National Legislation

Flora and fauna in Ireland are protected at a national level by the Wildlife Acts 1976 to 2021 and the Floral (Protection) Order 2022. Natural Heritage Areas (NHA) are areas that are considered to be important for the habitats present or for the species of plants and animals supported by those habitats. Under the Wildlife Amendment Act 2000, NHAs are legally protected from damage from the date they were formally proposed for designation.

In addition, a list of proposed NHAs (pNHAs) was published in 1995 but to date these have not had their status confirmed. Prior to statutory designation, pNHAs are subject to limited protection under various agri-environment and forestry schemes and under local authority planning strategies such as County Development Plans.

6.1.3 Relevant Policy

6.1.3.1 Leitrim County Council Development Plan 2023-2029

The general policies and objectives relevant to ornithology are extracted from Volume 1, Chapter 11 of the Leitrim County Development Plan 2023-2029 and outlined below.

6.1.3.1.1 Policies

County Development Plan Policy NH 1: Natura 2000 Sites

To protect and conserve Special Areas of Conservation and Special Protection Areas.

County Development Plan Policy NH 2: Appropriate Assessment

To implement Article 6(3) and where necessary Article 6(4) of the Habitats Directive, to ensure that Appropriate Assessment is carried out in relation to works, plans and projects with the potential to impact European sites (SACs and SPAs), whether directly or indirectly or in combination with any other plan(s) or project(s). All assessments must be in compliance with the European Communities (Birds and Natural Habitats) Regulations 2011, as amended, and the Planning and Development Act 2000, as amended as relevant.

County Development Plan Policy NH 3: NHAs

To protect designated Natural Heritage Area (NHA) sites, including proposed Natural Heritage Area sites (pNHA) and seek to develop linkages between designated sites and other non-designated sites of ecological importance, where feasible and as resources permit.

County Development Plan Policy NH 4: Consultation

To consult with relevant prescribed bodies, such as the National Parks and Wildlife Service (DoHLGH), and take account of any licensing requirements when undertaking, approving and authorising development which is likely to affect plant, animal or bird species or habitats protected by law.

County Development Plan Policy NH 5: Significant Negative Impacts

To ensure that development does not have a significant negative impact on plant, animal or bird species or habitats protected by law, subject to satisfactory mitigation measures.

County Development Plan Policy WE POL 3: Wind Energy

To ensure that the assessment of wind energy development proposals will have regard to the following: the impact of the proposed development on protected bird and mammal species.

6.1.3.1.2 Objectives

County Development Plan Objective NH 1: Natura 2000 Sites

To ensure that no project or programme giving rise to significant negative, direct, indirect, secondary or cumulative impacts on the integrity of any Natura 2000 site(s), having regard to their qualifying interests and conservation objectives, arising from their size, scale, area or land take, proximity, resource requirements, emissions (disposal to land, water or air), transportation requirements,

duration of construction, operation, decommissioning or from any other effects shall be permitted on the basis of this Plan (either alone or in combination with other plans or projects)[1]

County Development Plan Objective NH 3: SPAs

To protect and conserve those sites designated as Special Protection Areas during the lifetime of this Plan. There is currently one SPA in Co. Leitrim which is contained in Table 11.2 of this Plan.

County Development Plan Objective NH 4: NHAs

To protect and conserve Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) that become designated and notified to the Local Authority during the lifetime of this Plan. The list of current NHAs and proposed NHAs are contained in Table 11.3 and 11.4 of this Plan.

County Development Plan Objective NH 7: Management of Landscape Features

To encourage appropriate management of landscape features, particularly through the development management process and using planning agreements with landowners and developers, where appropriate.

6.1.3.2 SLIGO COUNTY COUNCIL DEVELOPMENT PLAN 2024-2030

6.1.3.2.1 POLICIES

County Development Plan Policy P-BD-1

Protect, conserve, enhance and sustainably manage the natural heritage, biodiversity, geological heritage, landscape and environment of County Sligo.

County Development Plan Policy P-BD-2

Protect and, where possible, enhance the plant and animal species and their habitats that have been identified under EU Habitats Directive (92/43/EEC), the EU Birds Directive (2009/147/EC), European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477/2011) as amended, Flora (Protection) Order 2015, the Wildlife Act 1976 (as amended), and the Wildlife (Amendment) Act 2000 as amended, including all statutory instruments made under each act.

County Development Plan Policy P-BD-3

Ensure that the ecological impact of all development proposals on habitats and species are appropriately assessed by suitably qualified professionals, in accordance with best practice guidelines, taking full account of the precautionary principle where uncertainty exists.

County Development Plan Policy P-BD-4

Minimise negative impacts of proposed developments on existing habitats (whether designated or not) by including mitigation and/or compensation measures as appropriate. This shall comprise the retention and enhancement of all possible existing habitats, vegetation and breeding sites in the early design stages of the development. [PA-84]

County Development Plan Policy P-BD-5

[1] Except as provided for in Article 6(4) of the Habitats Directive which states that there must be: a) no alternative solution available, b) imperative reasons of overriding public interest for the project to proceed; and c) Adequate compensatory measures in place.

Raise public awareness of the natural heritage and biodiversity of the County and encourage increased public participation in biodiversity conservation by supporting community-led initiatives.

County Development Plan Policy P-BD-7

Require development proposals on sites of 0.5 ha and over to retain existing high-quality ecological features and demonstrate a site-specific biodiversity net gain (BNG), indicating how the approach to development will leave the natural environment in a measurably better state that it was beforehand. The same approach will be encouraged, although not required, on sites under 0.5 ha. The biodiversity net gain (BNG) shall consist of the enhancement and restoration of existing habitats or the creation of new areas for wildlife, where the biodiversity value of the site is low or non-existent (e.g. certain brownfield sites). [PA-80]

County Development Plan Policy P-DSNC-1

Protect and maintain the conservation status of all natural heritage sites designated or proposed for designation in accordance with European and national legislation and agreements. These include Special Areas of Conservation (SAC), Special Protection Areas (SPA), Natural Heritage Areas (NHA), proposed Natural Heritage Areas (pNHA), Ramsar Sites, Statutory Nature Reserves, as identified by the Minister for Culture, Heritage and the Gaeltacht, and any other sites that may be proposed for designation during the lifetime of this Plan. In addition, the Council will identify, maintain and develop non-designated areas of high nature conservation value which serve as linkages or 'stepping stones' between protected sites in accordance with Article 10 of the Habitats Directive.

County Development Plan Policy P-DSNC-2

Promote the maintenance and, as appropriate, achievement of 'favourable conservation status' of habitats and species in association with the National Parks and Wildlife Service (NPWS).

County Development Plan Policy P-DSNC-3

Carry out an appropriate level of assessment for all development plans, land-use plans and projects that the Council authorizes or proposes to undertake or adopt, to determine the potential for these plans or projects to impact on designated sites, proposed designated sites or associated ecological corridors and linkages in accordance with the Habitats Directive. All appropriate assessments shall be in compliance with the provisions of Part XAB of the Planning and Development Act 2000 (as amended).

County Development Plan Policy P-DSNC-4

Ensure that all development proposals are subject to the process of Screening for Appropriate Assessment and subsequent stages of Appropriate Assessment, as relevant, carried out to the satisfaction of the Planning Authority, in consultation with National Parks and Wildlife Service, as appropriate.

County Development Plan Policy P-PS-1

Ensure that development does not have a significant negative impact incapable of satisfactory mitigation on plant, animal or bird species protected by law.

County Development Plan Policy P-PS-2

Consult with the National Parks and Wildlife Service (DHLGH) and take account of any licensing requirements when undertaking, approving, and authorising development which is likely to affect plant, animal or bird species protected by law.

County Development Plan Policy P-PS-3

Provide guidance to developers and others in relation to species protected by law and their protection and management in the context of development.

County Development Plan Policy P-PS-4

Ensure, where appropriate, the protection and conservation of areas, sites, species and ecological networks of biodiversity value outside designated sites, and require an appropriate level of ecological assessment by suitably qualified professionals to accompany any development proposals likely to impact on such areas or species.

County Development Plan Policy NCODS-1

Minimise the impact of new development on habitats of natural value that are key features of the County's ecological network. Developments likely to have an negative effect on recognised sites of local nature conservation importance will be required to demonstrate the impacts on the ecological value of the site and will not be approved unless it can be clearly demonstrated that there are reasons for the development that outweigh the need to safeguard the nature conservation value of the site.

County Development Plan Policy NCODS-2

Ensure that development proposals, where relevant, improve the ecological coherence of the Natura 2000 network and encourage the retention and management of landscape features that are of major importance for wild fauna and flora as per Article 10 of the Habitats Directive.

County Development Plan Policy NCODS-3

Ensure that proposals for development protect and enhance biodiversity, wherever possible, by minimising negative impacts on existing habitats and by including mitigation and/or compensation measures, as appropriate, which ensure that biodiversity is enhanced.

County Development Plan Policy NCODS-4

Applications for development that is likely to have significant impact on natural habitats or species shall be accompanied by an ecological impact assessment (EcIA), to ensure that such proposed development will not affect the integrity and conservation value of important biodiversity sites. [PA-86.

County Development Plan Policy NCODS-5

Ensure that no ecological networks, or parts thereof which provide significant connectivity between areas of local biodiversity, are lost without remediation as a result of implementation of this Plan.

6.1.3.2.2 OBJECTIVES

County Development Plan Objective O-BD-1

Implement, in partnership with the Department of Housing, Local Government and Heritage, relevant stakeholders and the community, the objectives and actions of both the County Sligo Biodiversity Action Plan and the National Biodiversity Action Plan as it relates to the remit and functions of Sligo County Council.

County Development Plan Objective O-DSNC-1

Identify any areas of high nature conservation value which are of major importance for wild fauna and flora in accordance with Article 10 of the Habitats Directive, and which have not been previously identified.

County Development Plan Objective O-DSNC-1

Undertake appropriate surveys and collect data to provide an evidence-base to assist the Council in meeting its obligations under Article 6 of the Habitats Directives (92/43/EEC) as transposed into Irish Law, subject to available resources.

County Development Plan Objective O-PS-1

Undertake surveys, as appropriate, to establish the location of protected flora and fauna in the Plan area through the County Heritage Plan and the County Biodiversity Action Plan.

6.1.3.3 DONEGAL COUNTY COUNCIL DEVELOPMENT PLAN 2024-2030

6.1.3.3.1 POLICIES

County Development Plan Policy BIO-P-1

To require all developments to comply with the requirements of the EU Habitats Directive and EU Bird Directive, including ensuring that development proposals:
a. Do not negatively affect the integrity of any European/Natura 2000 site (i.e. Special Areas of Conservation and Special Protection Areas) including effects on ex-situ but functionally linked habitats, and species (e.g. Pearl Mussel) save where a plan must be carried out for imperative reasons of overriding public interest (IROPI).
b. Provide for the protection of animal and plant species listed in Annex IV of the EU Habitats Directive and the Flora Protection Order.
c. Protect and enhance features of the landscape (such as rivers, riverbanks, field boundaries, ponds and small woods) which are of major importance for wild fauna and flora and the ecological coherence of the Natura 2000 network.

County Development Plan Policy BIO-P-2

Ensure that all developments seek to conserve/protect the qualifying interests of Ramsar Sites, Nature Reserves, Natural Heritage Areas (NHA), proposed Natural Heritage Areas (pNHA), the Cró na mBroanáin Red Grouse Sanctuary and any species protected under the Wildlife Act save to the extent necessary to provide for strategic infrastructure projects including but not restricted to the TEN-T Priority Route Improvement Project, Donegal, the Bridgend to County border project scheme, the Buncrana Inner Relief Road and Greenways, subject to such projects being in accordance with all relevant statutory and regulatory provisions. Otherwise, where no statutory or regulatory provisions apply this policy will be implemented by the Council in so far as same can be practicably and reasonably achieved within the context of such projects.

County Development Plan Policy BIO-P-3

a. Protect features of local biodiversity value (e.g. hedgerows/field boundaries, trees, woodlands, wetlands, water bodies, riverbanks and peatlands) which make a significant contribution to the biodiversity, biodiversity/ecosystem services, ecological connectivity, and associated visual amenity and/or rural character of the

area.
b. Require that developments otherwise maximise the retention of and suitably integrate such features and provide new ecological corridors where appropriate. In this regard proposals for the removal of existing roadside hedgerows/field boundaries for new developments in rural areas will only be permitted in so far as is necessary to safeguard public safety and any remaining portion of those features identified above not so required shall be retained.
c. Require that development proposals provide biodiversity enhancement measures (e.g. native tree and hedgerow planting, and nature-based water management solutions).
d. Require that large-scale developments result in no net biodiversity loss and include a site-specific comprehensive Biodiversity Management Plan (BMP), as part of any planning proposal.

This policy will be implemented by the Council in so far as same can be practicably and reasonably achieved within the context of Strategic Infrastructure Projects including, but not restricted to, the TEN-T Priority Route Improvement Project, Donegal, the Bridgend to County border project scheme, the Buncrana Inner relief Road and Greenways.

County Development Plan Policy WE-P-3

To ensure that the assessment of wind energy development proposals will have regard to the following:
g. the impact of the proposed development on protected bird and mammal species;

County Development Plan Policy WE-P-8

To ensure that the assessment of Wind Energy Development Proposals have regard to the following Specific Biodiversity Related Requirement:

a. Loss of functionally linked habitat: Developers of wind energy proposals on greenfield sites shall undertake a preconstruction appraisal of habitats. Should habitats suitable for supporting Special Conservation Interest bird species be present, developers will be required to undertake pre-construction bird surveys to confirm whether the site supports a significant proportion of bird populations (typically taken to be 1% of the population of a SPA, at time of designation).

To ensure that the assessment of Wind Energy Development Proposals have regard to the following Specific Biodiversity Related Requirement:

a. Loss of functionally linked habitat: Developers of wind energy proposals on greenfield sites shall undertake a preconstruction appraisal of habitats. Should habitats suitable for supporting Special Conservation Interest bird species be present, developers will be required to undertake pre-construction bird surveys to confirm whether the site supports a significant proportion of bird populations (typically taken to be 1% of the population of a SPA, at time of designation).

6.1.3.3.2 OBJECTIVES

County Development Plan Objective BIO-0-1

To preserve and enhance the biodiversity of the County in accordance with the relevant EU policies and national legislation.

County Development Plan Objective BIO-0-2

To have regard to the objectives of any extant National Biodiversity Action Plan and National Peatlands Strategy in all aspects of the sustainable development of the county.



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Appendix 6-2

Bird Survey Report Breeding 2020

Planning and Environmental Consultants

Breeding Bird Survey Report 2020

Lissinagroagh Wind Farm, Co. Leitrim



DOCUMENT DETAILS

Client:	**FuturEnergy Ireland**
Project Title:	**Lissinagroagh Wind Farm, Co. Leitrim**
Project Number:	**200217-a**
Document Title:	**Breeding Bird Survey Report 2020**
Document File Name:	**Lissinagroagh Breeding Season 2020 Report - F - 2025.01.08 - 200217-a**
Prepared By:	**MKO** **Tuam Road** **Galway** **Ireland** **H91 VW84**

Planning and Environmental Consultants

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1. SUMMARY

Ornithological surveys have been conducted at the site of Lissinagroagh Wind Farm, Co. Leitrim since September 2017. This report outlines the findings from surveys completed during the 2020 breeding season from April 2020 to September 2020. The following surveys were undertaken:

- Vantage Point Surveys
- Breeding Walkover Surveys
- Breeding Raptor Surveys
- Breeding Woodcock Surveys

The key observations at the site involved nesting hen harrier. There were two confirmed nests located on the wind farm site. At least one chick fledged from one of the nests and while a second nest was confirmed, there was no evidence of fledged chicks from that nest.

Breeding territories were also identified for kestrel, snipe, woodcock, buzzard and sparrowhawk on, or within 500m of, the wind farm site. A possible red grouse breeding territory was identified within 500m of the site.

2. INTRODUCTION

MKO was appointed to carry out bird surveys at Lissinagroagh Wind Farm, Co. Leitrim for the breeding season 2020. This report describes the ornithological survey methods employed and survey data collected at Lissinagroagh Wind Farm, Co. Leitrim for the period from April 2020 to September 2020 inclusive.

2.1 Site Description

The site is located 3km northeast of Manerhamilton (Grid Ref: G 90949 42157). The dominant habitat onsite is conifer plantation and upland blanket bog with accompanying smaller areas of mixed conifer woodland and heath. The wider surroundings are predominantly improved agricultural grassland and wet grassland.

2.2 Details of the Proposed Development

The total area of the development is approximately 152 hectares. Figure 1 shows the wind farm site boundary.

2.3 Purpose of this Report

This report describes the ornithological survey methods employed and the survey data collected at Lissinagroagh Wind Farm for the period April 2020 to September 2020 inclusive. This report aims to provide robust baseline ornithological survey data for the breeding season. This data will be used to inform a separate ecological impact assessment and appropriate assessment for the proposed development.

2.4 Relevant Legislation

The following key legislative provisions are applicable to wild birds in Ireland: Irish Wildlife Act 1976 (revised).; the Birds Directive (EU Directive 2009/147/EC on the conservation of wild birds); the European Communities (Birds and Natural Habitats) Regulations 2011, as amended (S.I. no. 477 of 2011) and the International Convention on Wetlands of International Importance (the Ramsar Convention), 1971.

3. METHODS

3.1 Scope

3.1.1 Description of Study Area

The ornithology study area was defined as a 500m radius of the viable area for turbines (Figure 1). This boundary accounts for both detecting birds that use the wind farm site occasionally and spatial inaccuracies in observational data, as well as ancillary structures. The ornithology study area was used for vantage point surveys, following SNH (2017) guidance that flight activity surveys encompass an area extending 500m beyond the potential outermost proposed turbines. A 500m radius of the ornithology study area boundary was used for breeding walkover surveys, the methodology followed Brown and Shepard (1993) and Calladine *et al.* (2009). A 500m radius of the ornithology study area boundary was also used for breeding woodcock surveys, following Gilbert *et al.* (1998). A 5km radius of the ornithology study area boundary was used for breeding raptor surveys, based on Hardey *et al.* (2013).

3.1.2 Ecological Features Considered

Ecological features considered in the scope of the surveys were the habitats present on-site and, in the hinterland, as reviewed by aerial photography and reconnaissance visits, and the Special Protection Areas (SPA) designated under the Birds and Habitats (92/43/EEC) Directives Natura 2000 network within foraging range for Special Conservation Interest (SCI) species and/or 15km of the site. Bird species' ecological importance and nature conservation interest was also considered. Species of conservation concern included those listed on Annex I of the Birds Directive that occur in Ireland, species that are a Special Conservation Interest (SCI) of SPAs within foraging range for SCI species and/or 15km of the site, species on the Red List of Birds of Conservation Concern in Ireland (Gilbert *et al.,* 2021) and all raptor species that occur in Ireland, because these species are particularly sensitive to wind farm developments.

3.1.3 Consultation

MKO undertook a consultation exercise to inform the scope of the surveys. Table 3-1 provides a list of the organisations consulted and notes where responses have been received.

Table 3-1 Consultation Response Summary

No.	Consultee	Response to Consultation
1	Birdwatch Ireland	No response
2	National Parks & Wildlife Service	Initial response received 18/06/2018. Confirmation received 30/12/2019 from NPWS that no more recent information was available.

3.2 Desk Study

A comprehensive desk study was undertaken prior to surveys in the breeding season 2020 to search for any relevant information on species of conservation concern which potentially use the study area. The assessment included a thorough review of the available ornithological data including:

- Review of online web-mappers from the National Parks and Wildlife Service (NPWS) and National Biodiversity Data Centre (NBDC);
- Review of the Bird Atlas (Balmer *et al.,* 2013);

- Review of specially requested records from the NPWS Rare and Protected Species Database.

3.3 Field Surveys

The approach to breeding bird surveys for the proposed wind farm is based on recommendations given in Scottish Natural Heritage (SNH; now NatureScot) 2017 guidance (SNH, 2017). This guidance is recognised as standard good practice guidance throughout the UK and Ireland for surveying birds to inform impact assessment for onshore wind farms. Field surveys were undertaken from April 2020 to September 2020 inclusive. Individual survey types are described below.

3.3.1 Vantage Point Surveys

Vantage point surveys were undertaken following the guidance of SNH (2017) from four vantage point locations during the 2020 breeding season.

Vantage Point Locations and Viewshed Analysis

Vantage point locations are presented in Table 3-2. Viewshed analysis was carried out to confirm the sufficiency of the chosen vantage point locations. Viewsheds were calculated using Resoft Wind Farm ZTV (Zone of Theoretical Visibility) software in combination with MapInfo Professional (Version 10.0) using a notional layer suspended at 25m, which is representative of the minimum height considered for the Potential Collision Height (PCH) based on the turbine model at the time the vantage point locations were selected. Note that while the relevance of being able to view as much of the site to ground level is acknowledged, the SNH guidance emphasises the importance of visibility of the 'collision risk volume' when the data is to be used to estimate the risk of collision with turbines by birds. Therefore, the viewshed analysis aims to identify the most suitable locations to site vantage points such that the airspace of the turbine rotor swept area is in view using the fewest possible number of vantage points. The vantage point locations were tested for visibility coverage by creating a viewshed point 1.75m in height (to represent the height of the observer) on a map using 10m contours terrain data. The relative height of any surrounding trees and its effects on visibility is also accounted for in the analysis. Using the ZTV software, a viewshed of 360° was produced calculating an area 25m from ground level up to a 2km radius. The resulting viewshed image was then cropped to 180° to give the viewshed.

Survey Effort

A total of 36 hours of watches was undertaken at each of the vantage point locations, equating to a total of six hours per vantage point per month. The survey effort is summarised in Table 3-2 and full details are presented in Appendix 2 of this report, including dates, times, duration and weather conditions. The location of vantage points is shown in Appendix 1.

Table 3-2 Summary of Vantage Point Survey effort

	VP1 ITM [1] X 592930 Y 842236	VP2 ITM X 592615 Y 842428	VP3 ITM X 593496 Y 843692	VP4 ITM X 590407 Y 840997
Month	**Date & Hours**			
April	17/04/2020 3 hrs 20/04/2020 3 hrs	16/04/2020 6 hrs	17/04/2020 3 hrs 20/04/2020 3 hrs	21/04/2020 6 hrs
May	20/05/2020 4 hrs 21/05/2020 2 hrs	26/05/2020 6 hrs	25/05/2020 6 hrs	20/05/2020 2 hrs 21/05/2020 4 hrs

[1] Irish Transverse Mercator Co-Ordinates

	VP1 ITM [1] X 592930 Y 842236	VP2 ITM X 592615 Y 842428	VP3 ITM X 593496 Y 843692	VP4 ITM X 590407 Y 840997
Month	**Date & Hours**			
June	11/06/2020 3 hrs 15/06/2020 3 hrs	23/05/2020 3 hrs 24/06/2020 3 hrs	25/06/2020 6 hrs	10/06/2020 3 hrs 15/06/2020 3 hrs
July	08/07/2020 2 hrs 20/07/2020 4 hrs	07/07/2020 3 hrs 08/07/2020 3 hrs	29/07/2020 6 hrs	07/07/2020 3 hrs 09/07/2020 3 hrs
August	06/08/2020 3 hrs 10/08/2020 3 hrs	05/08/2020 6 hrs	11/08/2020 6 hrs	06/08/2020 3 hrs 10/08/2020 3 hrs
September	13/09/2020 3 hrs 14/09/2020 2 hrs 30/09/2020 1 hr	04/09/2020 3 hrs 13/09/2020 3 hrs	14/09/2020 4 hrs 30/09/2020 2 hrs	03/09/2020 6 hrs
Total Hours	**36:00**	**36:00**	**36:00**	**36:00**

Primary Target Species

The target species for vantage point surveys were defined by legal and/or conservation status, following SNH (2017) guidance, which states that "*in most circumstances the target species will be limited to those species which are afforded a higher level of legislative protection.*" A list of primary target species was draw from the following sources:

- Species that are SCIs of the SPAs within Special Conservation Interest (SCI) foraging range and/or 15km of the site;
- Species listed on Annex I of the Birds Directive that occur in Ireland;
- Species listed on the Red List of Birds of Conservation Concern in Ireland (Gilbert *et al.*, 2021) with the exception of Red List passerines, as these are generally not significantly impacted by wind energy developments.

Secondary Target Species

SNH (2017) also states that "*local circumstances may indicate that survey information should also be acquired on other species, especially those of regional conservation concern*". A list of secondary target species comprised:

- All other waterbirds that occur in Ireland that not included as primary target species;
- All raptors that occur in Ireland that are not included as primary target species.

Data Collection

Data on bird observations and flight activity was collected by the surveyor by scanning the arc of 180° and a 2km radius from the fixed location. Surveys were scheduled to provide a spread over the full daylight period including at dawn and dusk (starting or ending an hour before dawn or an hour after dusk on alternate months during April, May and September) to coincide with the highest peaks of bird activity and to record any wildfowl migration or crepuscular species. Breaks of at least 30 minutes were taken every 3 hours to minimise observer fatigue. A 10-minute settling in period was allowed for at the start of each vantage point to allow the surveyor to get into place, and to minimise the impact of surveyor disturbance on flight activity. For each primary target species observation, the following details were recorded:

- Date, time, and location of observation;
- Number of species recorded;
- Total duration of flightline observation;

- Duration at each of flightline at each height band;
- Species age and sex (where determinable);
- Habitat(s);
- Behaviour.

Recording height bands were determined based on the likely turbine specifications under consideration at the time of the survey (upper tip height 175m and lower tip height 25m). Flight heights were attributed to four distinct height bands as follows:

- Band 1 = 0 - 10m (below the likely rotor swept area);
- Band 2 = 10 - 25m (potentially within the likely rotor swept area, at least in part);
- Band 3 = 25 - 175m (within the likely rotor swept area, PCH);
- Band 4 = >175m (above the likely rotor swept area).

Although recording of secondary species is subsidiary to the recording of primary target species, secondary target species were also recorded to provide an index of flight activity for secondary target species within the site.

3.3.2 Breeding Walkover Surveys

Breeding walkover surveys were undertaken to determine the presence of bird species of conservation concern and identify areas of possible, probable or confirmed breeding territories. The survey methodology Brown and Shepherd (1993) and Calladine *et al.* (2009). Transect routes were devised to ensure coverage of different habitat complexes between vantage point locations within the study area and to survey all areas of suitable breeding habitat to within 100m, where access allowed. Surveys were carried out during daylight hours during the core breeding season months of April, May, June, and July 2020, with the site being visited four days per month on each occasion. Following all survey visits, the field maps were analysed to determine the number and location of breeding territories. All non-breeding individuals and species encountered were also recorded. Survey effort is provided in Appendix 2 of this report, including dates, times, duration and weather conditions. A map of the breeding walkover survey area is provided in Appendix 1.

3.3.3 Breeding Raptor Surveys

Breeding raptor surveys (i.e. birds of prey) were undertaken to identify occupied raptor territories and ascertain whether breeding was successful. Methodology followed Hardey *et al.* (2013). Surveys involved a combination of raptor vantage point watches of 3 hours and transects in areas deemed most likely to hold breeding raptors based on habitat and observed movements of raptor species in the study area. Breeding raptor surveys were undertaken out to a 5km survey radius. Once breeding activity was observed, vantage point and transect locations were adjusted to pinpoint breeding locations. Each breeding raptor survey location was visited four times to complete a full round of breeding season surveys. The purpose of the four visits is (1) to establish occupancy, (2) to establish active nests, (3) to check for chicks and (4) to check for fledglings. Timing of these visits vary by species as set out in Hardey *et al.* (2013). Survey effort is provided in Appendix 2 of this report, including dates, times, duration and weather conditions. A map of the breeding raptor survey area is presented in Appendix 1.

3.3.4 Breeding Woodcock Surveys

Breeding season surveys for woodcock were undertaken to record the presence of roding (displaying) male woodcock and thereby establish the distribution and abundance of the species in the study area. Methodology followed Gilbert *et al.* (1998). Transects were carried out in areas of suitable habitat, i.e. woodland (particularly broadleaf) and dense bracken in upland areas by a surveyor walking slowly (~2km/hr). The same transect routes were followed on successive surveys. When a woodcock was detected, the following details are recorded for each observation: location, time, transect number, number

of birds, breeding activity/behaviour and primary habitat used (and secondary and tertiary habitat if applicable).

Transect surveys were undertaken in May and June 2020. Surveys commenced one hour before sunset and continued for an hour after sunset or until it was too dark to see. Survey effort is provided in Appendix 2 of this report, including dates, times, duration and weather conditions. A map of the survey area is presented in Appendix 1.

3.4 Project Team

This report has been prepared by Zak O'Connor (B.Sc.), Ornithologist of MKO, and reviewed by Thalie Konstantinidis (B.Sc.), Ornithologist, Patrick Manley (B.Sc.), Senior Ornithologist of MKO and Padraig Cregg (B.Sc. M.Sc.), Principal Ornithologist of MKO. All are suitably qualified ornithologists with experience in completing avifaunal assessments and competent experts for the purposes of the preparation of this report, following SNH (2017) and CIEEM (2017) ecological reporting guidelines.

3.4.1 Field Team

Field surveys were undertaken by Andrew O'Donoghue (B.Sc.). Andrew is a suitably qualified competent expert in field ornithology.

3.5 Survey Limitations

A comprehensive suite of bird surveys was undertaken at the site between April 2020 and September 2020. Results from the breeding season 2020 are derived from a continuous 6 months of surveying undertaken in accordance with best practice guidance, SNH (2017).

There were no issues relating to study area access/weather/time of year/Coillte forestry operations. However, one round of the breeding walkover surveys was not conducted in April 2020 due to the movement restrictions mandated by the Government of Ireland during the COVID-19 pandemic. Nonetheless, surveys were conducted during the core breeding season in May, June and July.

4. RESULTS

4.1 Desk Review

4.1.1 Sites Designated for Nature Conservation

Using GIS software, sites designated for nature conservation within the potential zone of influence of the proposed wind farm development were identified. In the absence of any specific European or Irish guidance, SNH (2016) was consulted. This document provides guidance in relation to the identification of connectivity between proposed development proposals and SPAs. It takes into consideration the distances some species may travel beyond the boundary of their SPAs and outlines information on the dispersal and foraging ranges of certain bird species. In addition, taking a precautionary approach, sites within Special Conservation Interest (SCI) foraging range and/or a 15km radius of the proposed wind farm were identified. Sites designated for birds are listed below in Table 4-1.

Table 4-1 Special Protection Areas within 15 kilometres of site

Designated site and code	Special Conservation Interest Species[2]	Distance from wind farm site (km)
Sligo/Leitrim Uplands (004187)	› Peregrine › Chough	9.2km

4.1.2 Previous Survey Data

4.1.2.1 Breeding/Wintering Bird Atlas Records

Bird Atlas 2007-11: The breeding and wintering birds of Britain and Ireland' (Balmer *et al.,* 2013) is the most recent comprehensive work on wintering/breeding birds in Ireland. It provides information on species and their wintering/breeding status in 10km hectads. The site lies within hectad G94. Table 4-2 presents a list of nine species of conservation interest recorded within this hectad.

Table 4-2 Bird atlas data for relevant hectads

Species Name	Bird Atlas 2007-2011		Conservation Status
	G94 Breeding	G94 Winter	
Golden Plover	-	Present	BD, RL
Peregrine	Prob	-	BD, SCI
Hen Harrier	Conf	Present	BD
Greenland White-fronted Goose	-	Present	BD
Merlin	Poss	-	BD
Woodcock	-	Present	RL
Red Grouse	Prob	Present	RL
Kestrel	Prob	Present	RL
Meadow Pipit	Conf	Present	RL

BD=Birds Directive; RL = BoCCI Red List; Poss = possible breeding; Prob = probable breeding; Conf= confirmed breeding; Seen = present without evidence of breeding.

[2] *It is noted that a determination will be made on whether there is connectivity between the SPAs and the wind farm site at the appropriate assessment stage*

4.1.2.2 Rare and Protected Species Dataset

An information request was sent to the NPWS requesting records from the Rare and Protected Species Database. The sections below provide records obtained from the NPWS of the rare and protected breeding bird species:

Hen Harrier

Table 4-3 below presents the NPWS records for hen harrier nest sites to defined radii (km) of the development site.

Table 4-3 NPWS Hen Harrier Nest Site Records

Year	Within Site Boundary	0-1km from site boundary	1-3km from site boundary	3-5km from site boundary
2015	No Records	1 confirmed breeding site	No Records	1 confirmed breeding site
2010	No Records	3 confirmed breeding sites	1 sighting	1 confirmed breeding site, 1 additional sighting
2005	No Records	3 sightings	No records	No records
1998-2004	No Records	No Records	No Records	No records

Peregrine

The NPWS identified one confirmed peregrine nest site within 3-5km of the site. The observation was recorded during a survey in 2002.

Red Grouse

The NPWS hold records of red grouse in the area. Between 2000 and 2011 this species was recorded on nine occasions. One observation was recorded on site. There were two records located approximately 500m from the site, one just south of Dough Mountain and the other just north of Kilea. The remainder of the observations were recorded over 3km from the proposed development area. Three of these observations were recorded in the vicinity of Thur Mountain, to the south-east of the proposed development area.

4.2 Field Surveys

4.2.1 Flight Activity Survey

Observations during vantage point surveys, breeding walkover surveys, breeding raptor surveys, breeding woodcock surveys and incidental observations are provided below. Summaries include individual species accounts of primary and secondary target species.

4.2.2 Vantage Point Surveys

4.2.2.1 Primary Target Species

Golden Plover

There were three observations of golden plover during vantage point surveys. All observations were recorded during the migratory period for this species during April and September. Observations were of between 6 and 17 birds. Two observations were within 500m of the site and the other was within 600m of the site. A total of 40 seconds (s) was spent at potential collision height (PCH). Observations are shown in Appendix 1 Figure 1.2.

Hen Harrier

There were 44 observations of hen harrier during vantage point surveys. Observations were mostly of individual birds with a maximum of three birds observed simultaneously. All observations were on, or within 500m of the site and likely relate to the two breeding territories identified during the survey period. Observations in these areas include birds displaying, showing agitated behaviour, and food provisioning flights. There was one observation at the nest west of Boleyboy in July of a ringtail (possible juvenile) flying up from forestry. The remaining observations of hen harrier were of birds commuting or hunting. A total of 1,330s was spent at PCH. Observations are shown in Appendix 3 Figure 1.1.

Peregrine

There were three observations of peregrine during vantage point surveys. All observations were of individual birds commuting and occurred on site. A total of 200s was recorded at PCH. Observations are shown in Appendix 1 Figure 1.3.

Whooper Swan

There was one observation of whooper swan during vantage point surveys. This observation was of a flock of 28 birds commuting within the PCH for 50s in April.

Kestrel

There were 11 observations of kestrel during vantage point surveys. All observations were on, or within 500m of the site. Observations were of between one and two birds mostly hunting or commuting. There were multiple observations of juvenile birds in the same area north of Boleyboy in August and September, confirming breeding in this area. Eight observations were recorded at PCH for a combined time of 303s. Observations are shown in Appendix 1 Figure 1.4.

Red Grouse

There were 12 observations of red grouse during vantage point surveys. All observations were of birds calling and ranged between one and two birds. All observations occurred within 500m of the site from suitable breeding west of Killea. Observations are shown in Appendix 1 Figure 1.5.

Snipe

There were nine observations of snipe during vantage point surveys. Observations were of between one and two birds and occurred within 500m of the site. Most observations were recorded around Killea. A

total of 100s were observed at PCH. Birds were observed displaying (drumming), flying and calling. This behaviour indicates probable breeding for this species. Observations shown in Appendix 1 Figure 1.6.

Woodcock

There were three observations of woodcock during vantage point surveys. Observations were of between one and two birds. Birds were observed displaying (roding) and occurred within 500m of the site. There were no observations at PCH. Observations are shown in Appendix 1 Figure 1.7.

4.2.2.2 Secondary Target Species

Buzzard

There were 26 observations of buzzard during vantage point surveys. One breeding territory was identified on site at Boleyboy and juvenile birds were heard calling/begging from this area on several occasions in August. The remainder of observations during these surveys were of birds commuting on, or within 500m of the site. A total of 870s was recorded at PCH. Observations are shown in Appendix 1 Figure 1.8.

Sparrowhawk

There were 13 observations of sparrowhawk during vantage point surveys. One breeding territory was identified at Tawnyfeacle during these surveys. Juvenile birds were heard begging in this area in August, and in September three juvenile birds were observed here. The remainder of the observations were of birds hunting and commuting. Seven observations occurred at PCH for a combined time of 745s. Observations are shown in Appendix 1 Figure 1.9.

Grey Heron

There were two observations of grey heron during vantage point surveys. Both observations were of individual birds commuting and a total of 45s was spent at PCH.

Lesser Black-backed Gull

There were 13 observations of lesser black-backed gulls during vantage point surveys. All observations were of birds commuting and ranged between 1 and 360 birds. A total of 822s was recorded at PCH.

Mallard

There were two observations of mallard during vantage point surveys. Both observations were of individual birds commuting and neither occurred at PCH.

4.2.3 Breeding Walkover Surveys

Hen Harrier

There were 11 observations of hen harrier during breeding walkover surveys. All observations were on, or within 500m of the site and are likely related to the two breeding territories identified during this survey period. There was one food pass observed at the nest to the southeast of Saddle Hill in May, and two

separate food passes observed at the nest west of Boleyboy in May and June. Other observations were of birds displaying and commuting. Observations are shown in Appendix 3 Figure 2.1.

Kestrel

There was one observation of kestrel during breeding walkover surveys. In July, a juvenile bird was observed perching on site. This observation was within the breeding kestrel territory identified north of Boleyboy, so it is thought to be related to this nest. Observations are shown in Appendix 1 Figure 2.2.

Red Grouse

There were five observations of red grouse during breeding walkover surveys. Observations were on, or within 500m of the site. All observations were of individual birds calling or flying within suitable breeding habitat, west of Killea. Observations are shown in Appendix 1 Figure 2.3.

Grey wagtail

There were eight observations of grey wagtail during breeding walkover surveys. Observations were between one and three birds.

Meadow pipit

There were 120 observations of meadow pipit during breeding walkover surveys. These observations were recorded across the site and flock sizes varied between two and ten birds with some observations having only one bird.

Snipe

There was one observation of snipe during breeding walkover surveys. An individual bird was flushed by the surveyor within 500m of the site. Observations are shown in Appendix 1 Figure 2.4.

Buzzard

There were 12 observations of buzzard during breeding walkover surveys. Observations were between one and two birds with all on, or within 500m of the site. Most observations were of birds commuting or hunting. There were two observations related to a nest on site, in both instances, adult birds displayed agitated behaviour at the nest site in the presence of the surveyor. Observations are shown in Appendix 1 Figure 2.5.

Lesser Black-backed Gull

There were nine observations of lesser black-backed gull during breeding walkover surveys. Most observations were of birds flying over and within 500m of the site.

Sparrowhawk

There were nine observations of sparrowhawk during breeding walkover surveys. Observations were on, or within 500m of the site. Two nests were identified during these surveys, in addition to the one identified during the vantage point surveys. Both nests are located at the northern section of the site with one located on the site and the other located 350m from the site. Most observations were of birds hunting. At both nests, juvenile birds were heard begging during these surveys. Observations are shown in Appendix 1 Figure 2.6.

4.2.4 Breeding Raptor Surveys

Hen Harrier

There were 26 observations of hen harrier during breeding raptor surveys. All but one of the observations were on, or within 500m of the site. All observations are likely related to the two breeding territories identified during the survey period. Observations included birds displaying, showing agitated behaviour, and food provisioning flights. There was one fledgling observed flying low between trees at the nest site west of [redacted] in July. Observations are shown in Appendix 3 Figure 3.1.

Kestrel

There was one observation of a kestrel during breeding raptor surveys. This observation was of a juvenile bird over 3km from the site. Observations are shown in Appendix 1 Figure 3.2.

Buzzard

There were 28 observations of buzzard during breeding raptor surveys. Most observations occurred on, or within 500m of the site. A breeding territory was identified within the site at Boleyboy in July. During these surveys, at least two chicks were determined to be fledged from this nest. Other observations during these surveys included birds commuting, perching and calling. Observations are shown in Appendix 1 Figure 3.3.

Sparrowhawk

There were 13 observations of sparrowhawk during breeding raptor surveys. All observations were on, or within 500m of the site. Two breeding territories were identified during these surveys which were also monitored during the breeding walkover surveys. Observations included birds showing agitated behaviour and a juvenile bird was heard begging from the nest on site in July. Observations are shown in Appendix 1 Figure 3.4.

4.2.5 Breeding Woodcock Survey

There were 18 observations of individual birds during breeding woodcock surveys. All observations were of birds displaying (roding). There were two breeding territories recorded given the presence of roding birds. One territory was identified between Saddle Hill and Killea in the northern section of the site and the other was recorded in the southern section of the site, north of Tawnyfeacle. Observations are shown in Appendix 1 Figure 4.1.

4.2.6 Incidental Observations

Golden Plover

There was one incidental observation of golden plover during a breeding raptor survey in April. This observation was of a flock of 86 birds being flushed within 500m of the site and then landing again 1km from the site near Dough Mountain. Observations are shown in Appendix 1 Figure 5.1.

Red Grouse

There were six incidental observations of red grouse during breeding raptor surveys. Observations were of individual birds calling or flying between 550m to 4km from the site. Observations are shown in Appendix 1 Figure 5.2.

Snipe

There were 13 incidental observations of snipe during vantage point and breeding raptor surveys up to 5km from the site. Observations were of between one and two birds who were observed displaying (drumming), commuting and calling. Observations are shown in Appendix 1 Figure 5.3.

Common Gull

There was one incidental observation of three common gull commuting during a breeding raptor survey in May, up to 5km from the site.

Grey Heron

There was one incidental observation of a grey heron commuting during a breeding raptor survey in June, up to 5km from the site.

Lesser Black-backed Gull

There were 13 incidental observations of lesser black-backed gull during breeding raptor surveys, up to 5km from the site. Observations ranged from one to six birds. All observations were of birds commuting.

5. DISCUSSION

Ornithological surveys were conducted at the Lissinagroagh wind farm site from April 2020 to September 2020. The key observations during surveys are outlined below.

Two breeding territories were identified for hen harrier on the wind farm site. The nest west of [redacted] fledged at least one chick however, while a second nest was confirmed there was no evidence of fledged chicks at the nest southeast of [redacted]. One breeding territory was identified for kestrel on the wind farm site with several observations of juvenile birds in an area north of [redacted] from July onwards. Additionally, there was one buzzard nest identified on the wind farm site at Boleyboy, this nest fledged at least two chicks. Three sparrowhawk nests were identified on, or within 500m of the site. One nest was located north of Tawnyfeacle, which is thought to have fledged three chicks. The other two sparrowhawk nests were between Saddle Hill and Killea at the northern section of the site. Juvenile birds were heard calling/begging from both of these nests, but it could not be determined how many chicks were present. Breeding was also confirmed for snipe and woodcock.

There is a resident population of red grouse within 500m of the wind farm site. Given the level of activity and the suitable breeding habitat in which they were observed, it is possible that breeding took place within 500m of the site. Golden plover, peregrine and whooper swan were recorded infrequently and in low numbers at the wind farm site.

REFERENCES

Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. & Fuller, R.J. (2013) *Bird Atlas 2007-11: The breeding and wintering birds of Britain and Ireland*. BTO Books, Thetford.

Brown, A. F., & Shepherd, K. B. (1993). A method for censusing upland breeding waders. Bird study, 40(3), 189-195. https://doi.org/10.1080/00063659309477182

Calladine, J., Garner, G., Wernham, C., & Thiel, A. (2009). The influence of survey frequency on population estimates of moorland breeding birds. Bird Study, 56(3), 381-388. https://doi.org/10.1080/00063650902984604

Council Directive 92/43/EEC 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31992L0043

Council Directive 2009/147/EC 30 November 2009 on the conservation of wild birds. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32009L0147

Gilbert, G., Gibbons, D.W. and Evans, J. (1998) *Bird Monitoring Methods.* Bedfordshire, England: Pelagic Publishing, Royal Society for the protection of Birds.

Gilbert, G., Stanbury, A. and Lewis, A. (2021). Birds of Conservation Concern in Ireland 4: 2020-2026. *Irish Birds,* 43:1-22. Available at: https://birdwatchireland.ie/birds-of-conservation-concern-in-ireland/

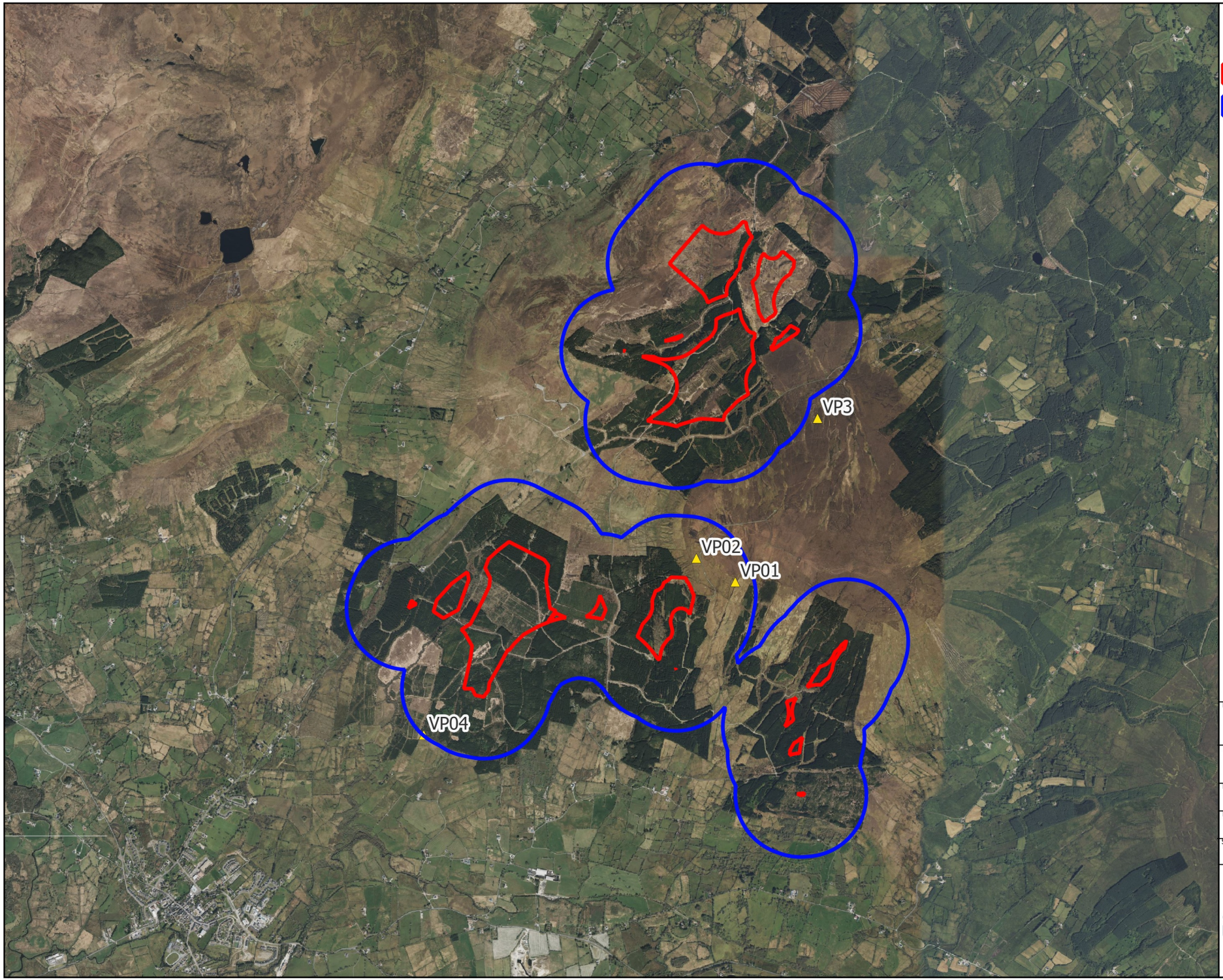
Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. and Thompson, D. (2013) *Raptors. A field Guide for Surveys and Monitoring.* The Stationary Office, Edinburgh.

SNH (2016). Assessing connectivity with Special Protection Areas (SPAs). Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2018-08/Assessing%20connectivity%20with%20special%20protection%20areas.pdf

SNH (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms. Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2018-06/Guidance%20Note%20-%20Recommended%20bird%20survey%20methods%20to%20inform%20impact%20assessment%20of%20onshore%20windfarms.pdf

APPENDIX 1

FIGURES



Map Legend

- Wind farm Site
- 500m Survey Radius
- Vantage Point Locations

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Drawing Title

Vantage Point Survey Locations

Project Title

Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 1
Scale	Date
1:40,000	10.09.2024

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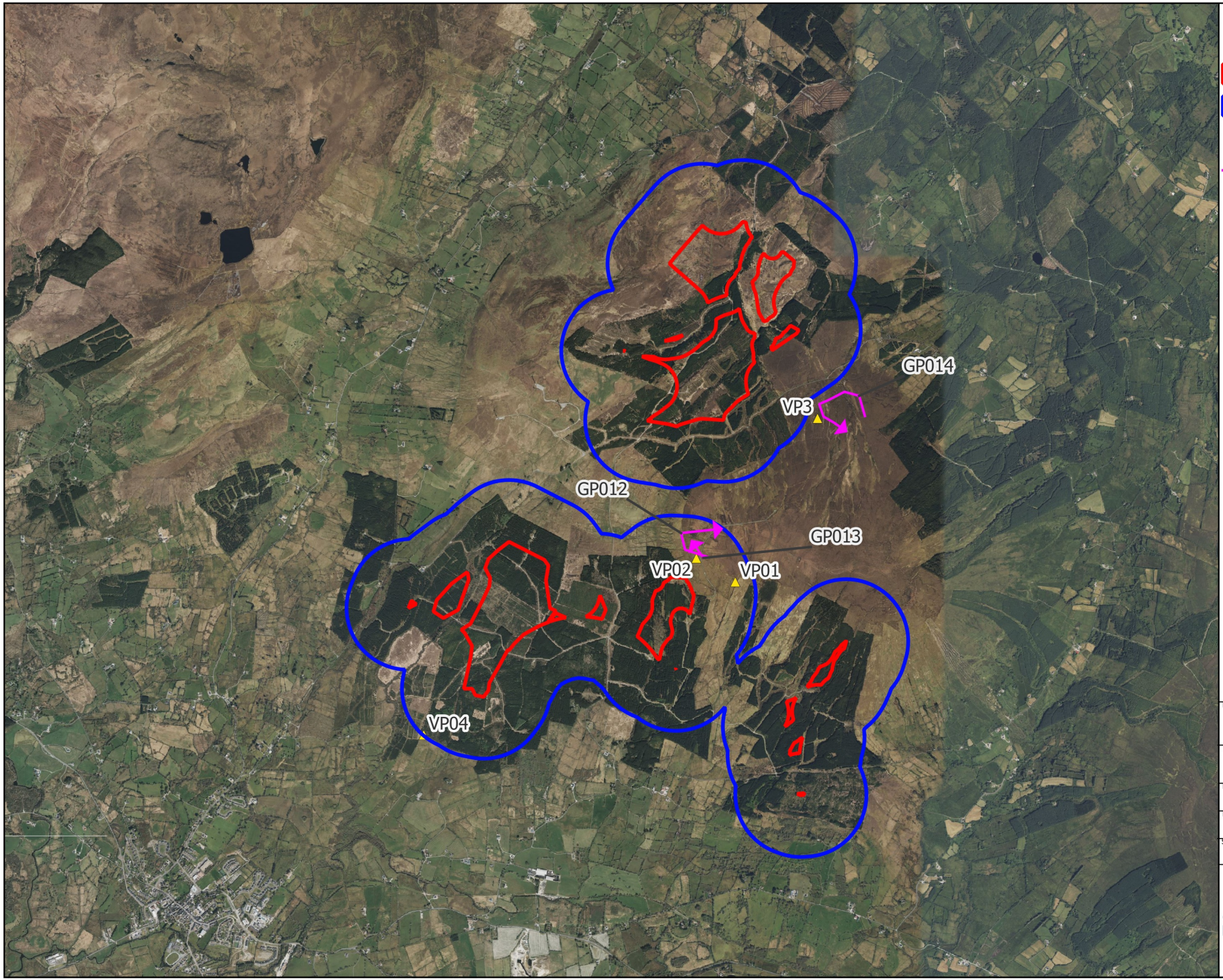

Map Legend

- Site Boundary
- 500M Survey Radius
- Vantage Point Locations
- Flightline

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Drawing Title
Vantage Point Survey Golden Plover Observations

Project Title
Lissinagroagh Wind Farm

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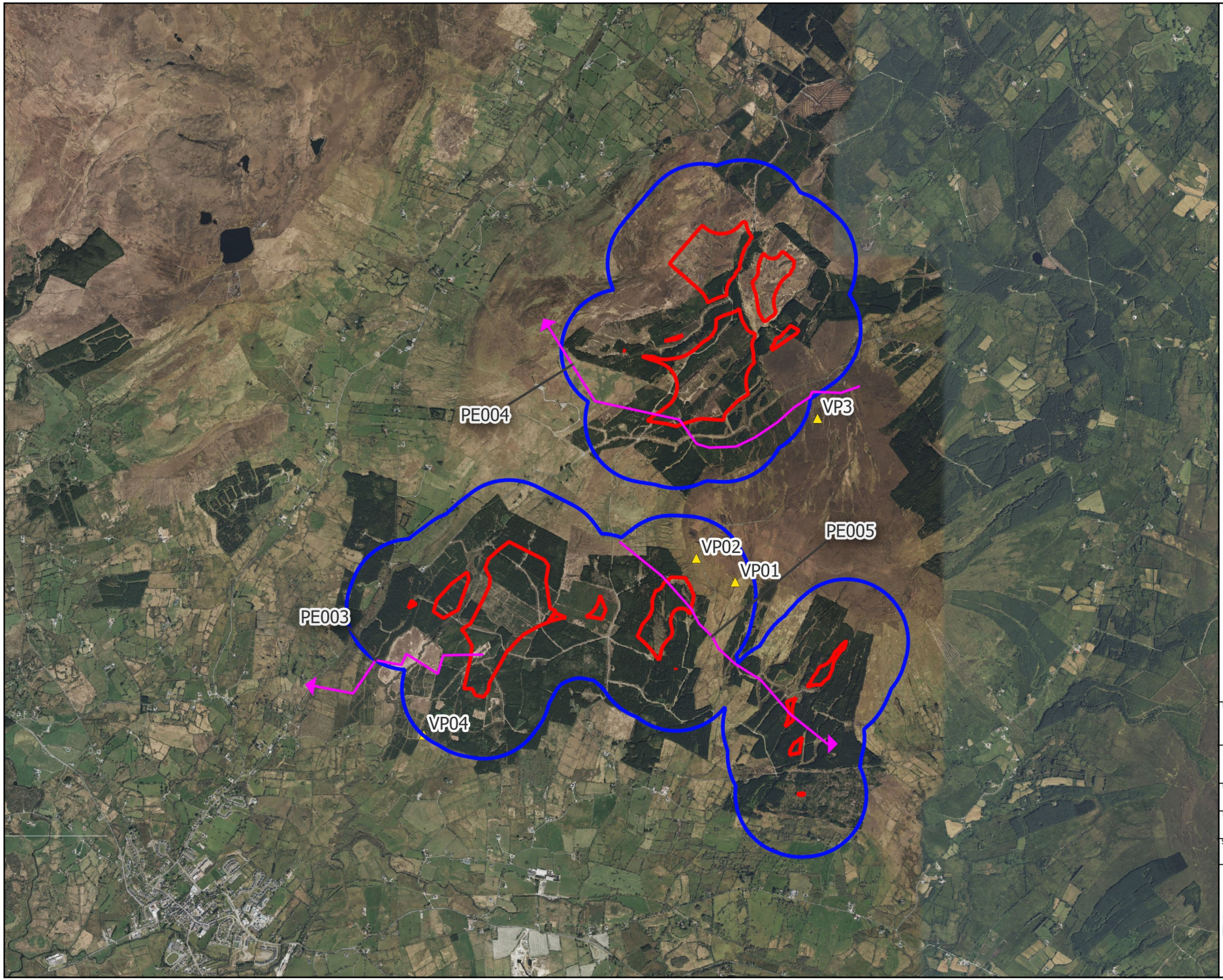

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Vantage Point Location
- Flightline

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Drawing Title
Vantage Point Survey
Peregrine Observations

Project Title
Lissinagroagh Wind Farm

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200217-a	Fig 1.3
Scale	Date
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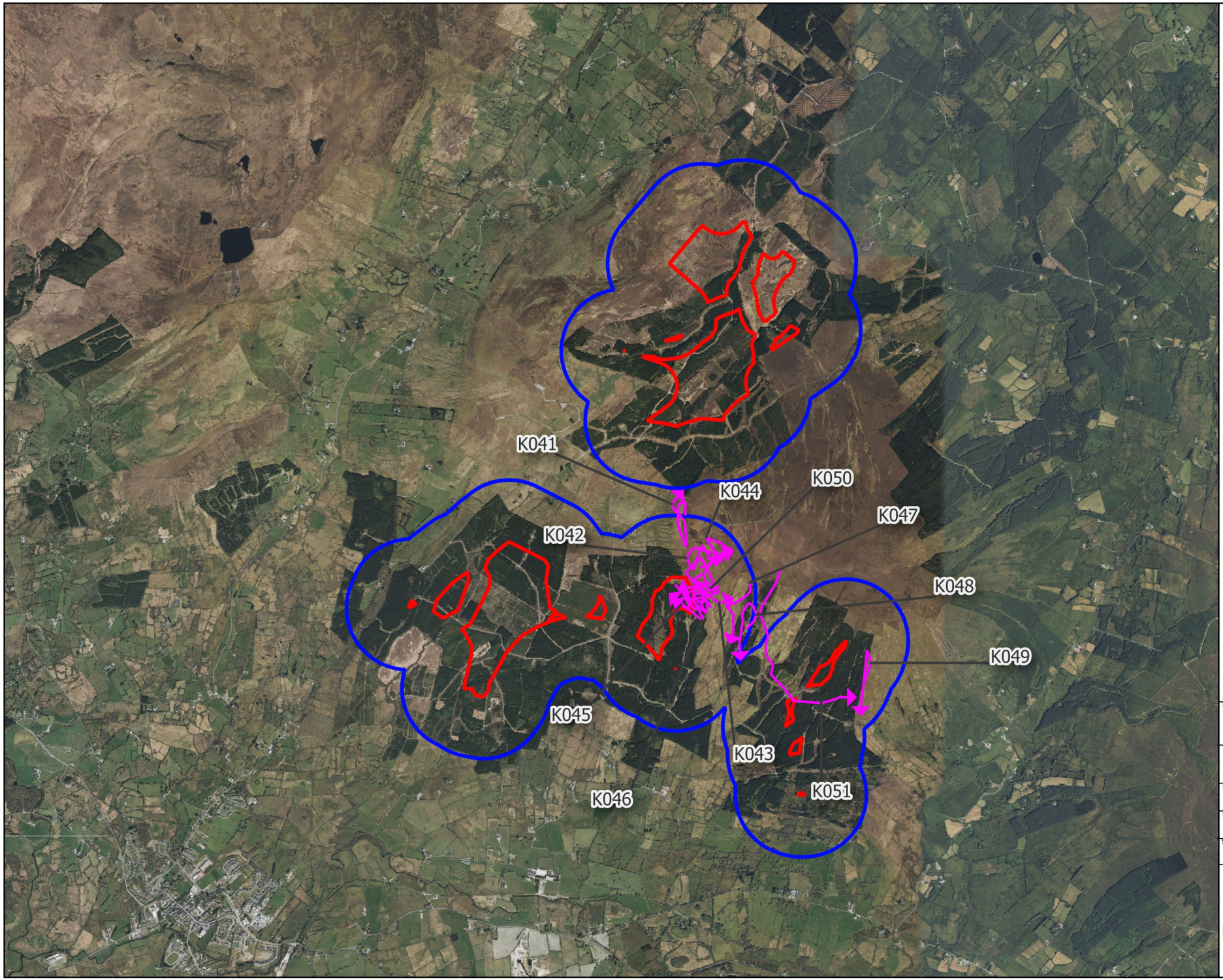

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Vantage Point Location
- Flightline

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Drawing Title
Vantage Point Survey
Kestrel Observations

Project Title
Lissinagroagh Wind Farm

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200217-a	Fig 1.4
Scale	Date
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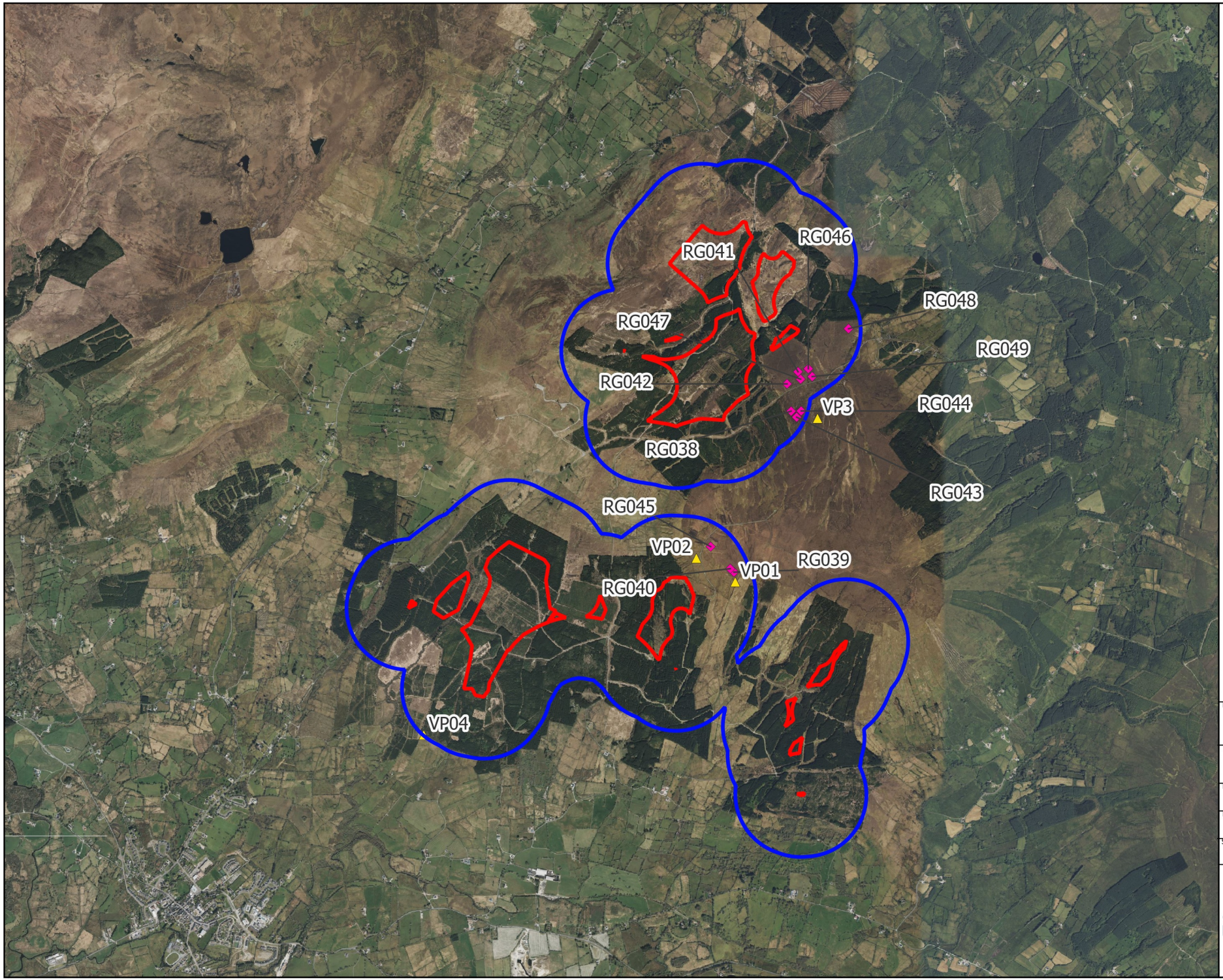

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Vantage Point Locations
- Observation

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Drawing Title
Vantage Point Survey
Red Grouse Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
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Project No.	Drawing No.
200217-a	Fig 1.5
Scale	Date
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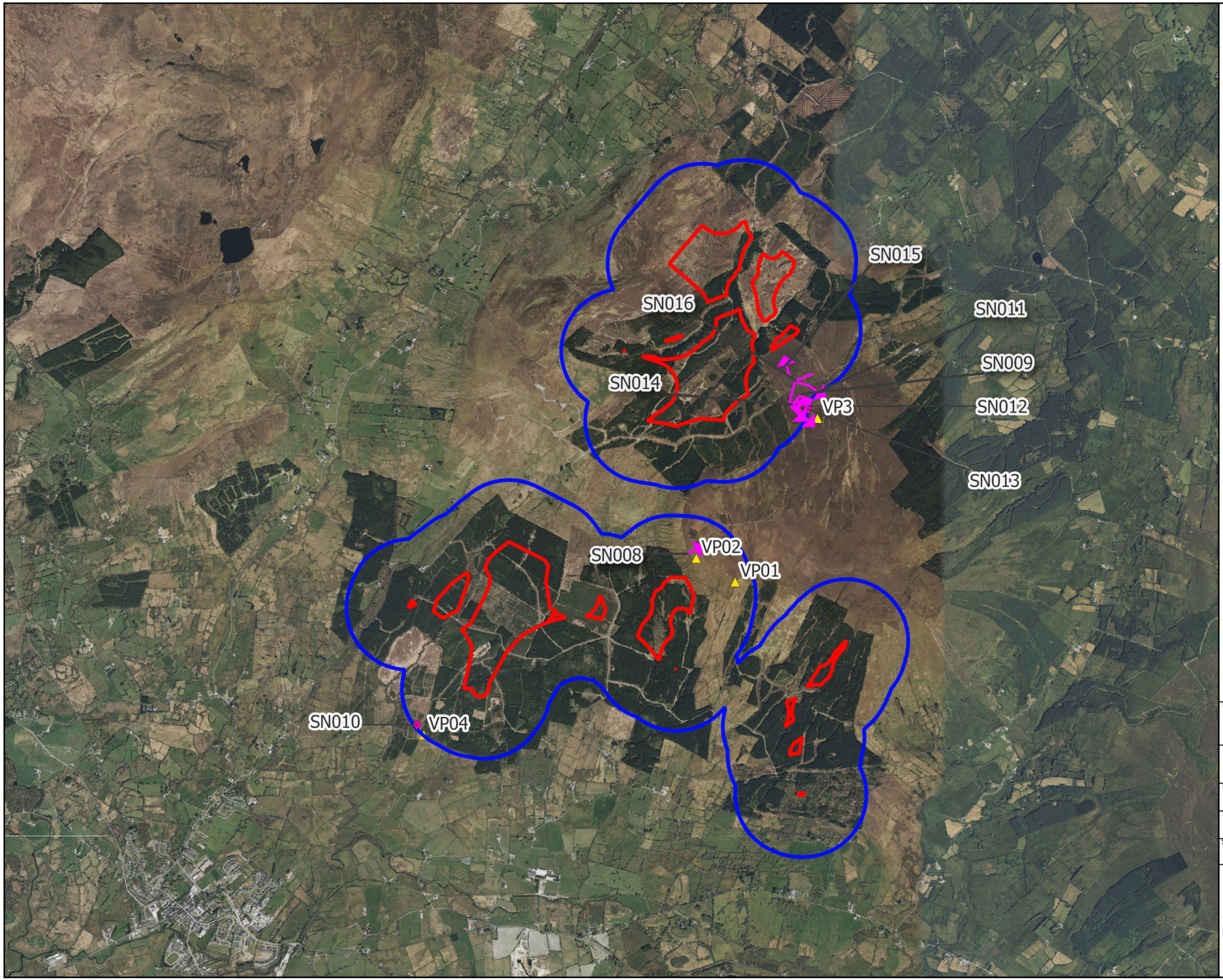

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Vantage Point Locations
- Flightline
- Observation

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Drawing Title
Vantage Point Survey
Snipe Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
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Project No.	Drawing No.
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Scale	Date
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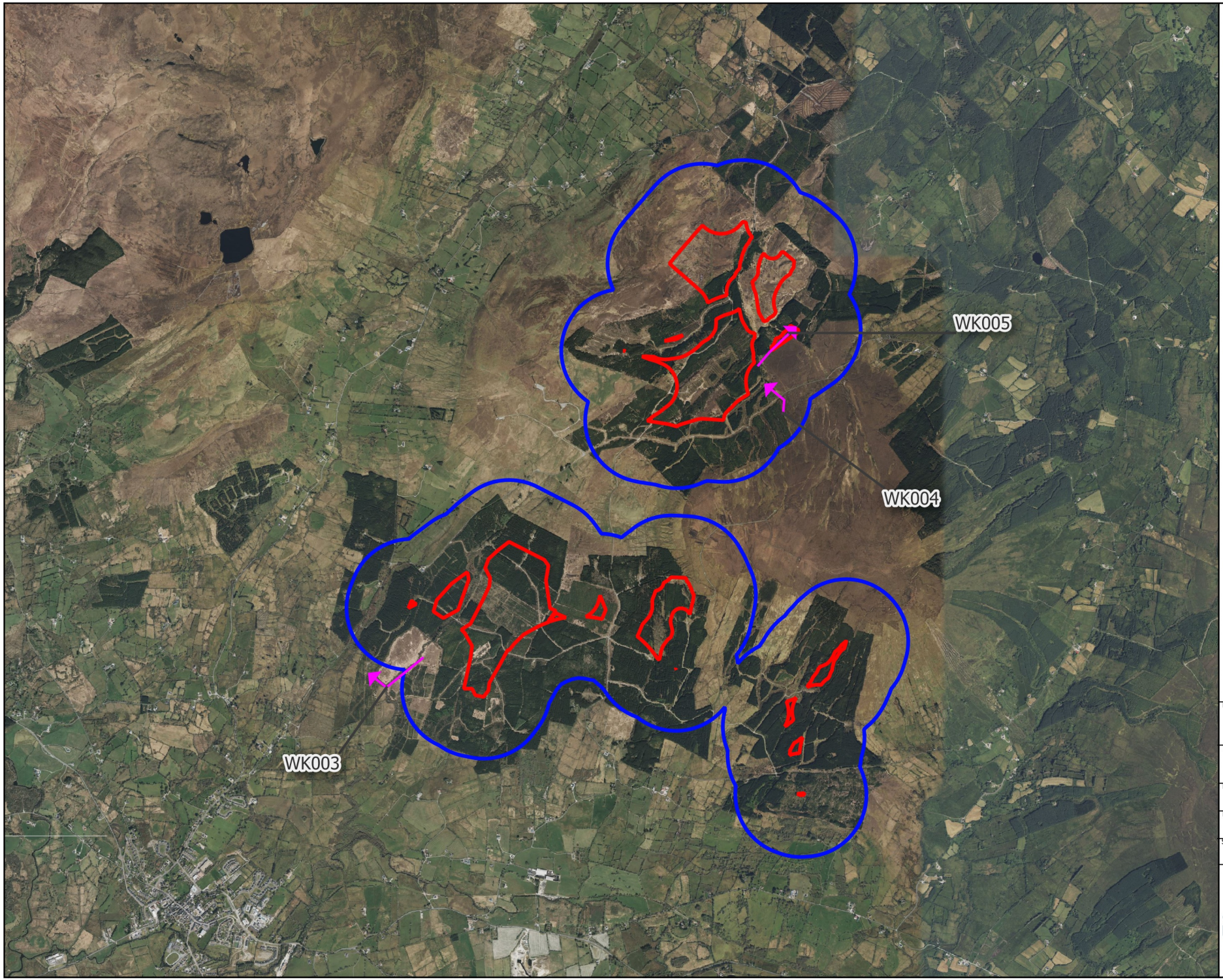

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Vantage Point Location
- Flightline

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Drawing Title
Vantage Point Survey
Woodcock Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
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Project No.	Drawing No.
200217-a	Fig 1.7
Scale	Date
1:40,000	10.09.2024

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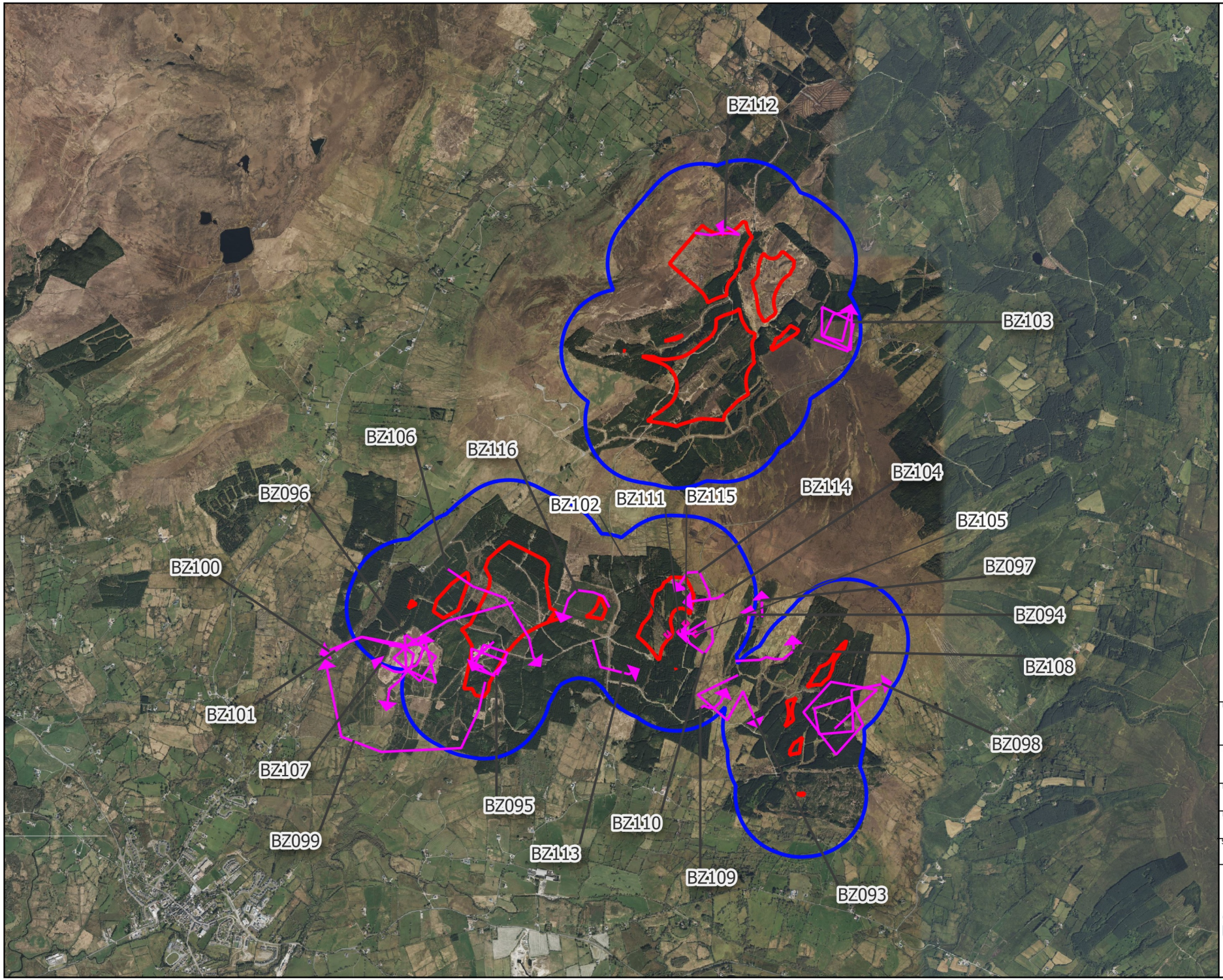

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Vantage Point Locations
- Flightline
- Observation

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N

Drawing Title
Vantage Point Survey
Buzzard Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 1.8
Scale	Date
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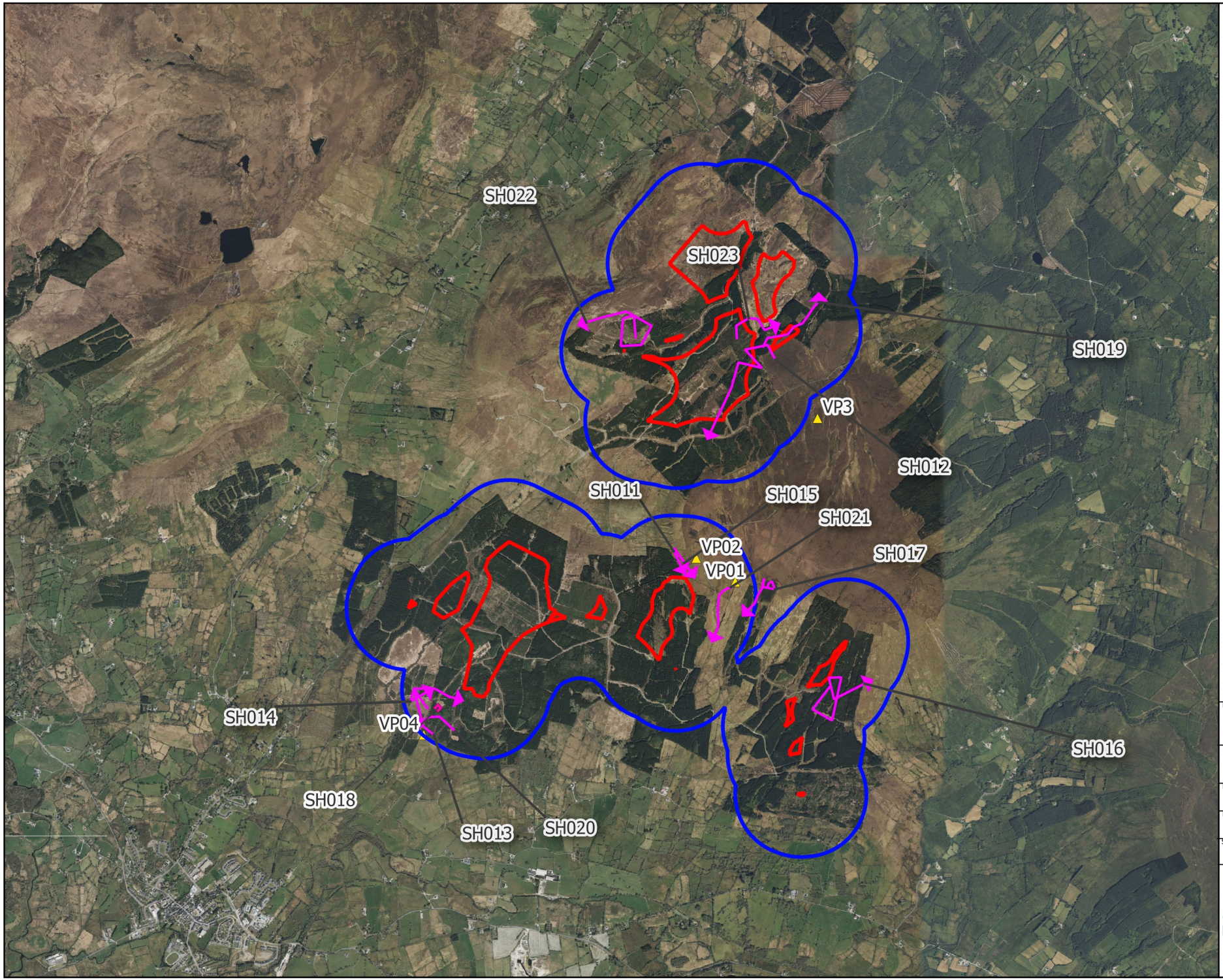

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Vantage Point Locations
- Flightline
- Observation

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Drawing Title

Vantage Point Survey
Sparrowhawk Observations

Project Title

Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 1.9
Scale	Date
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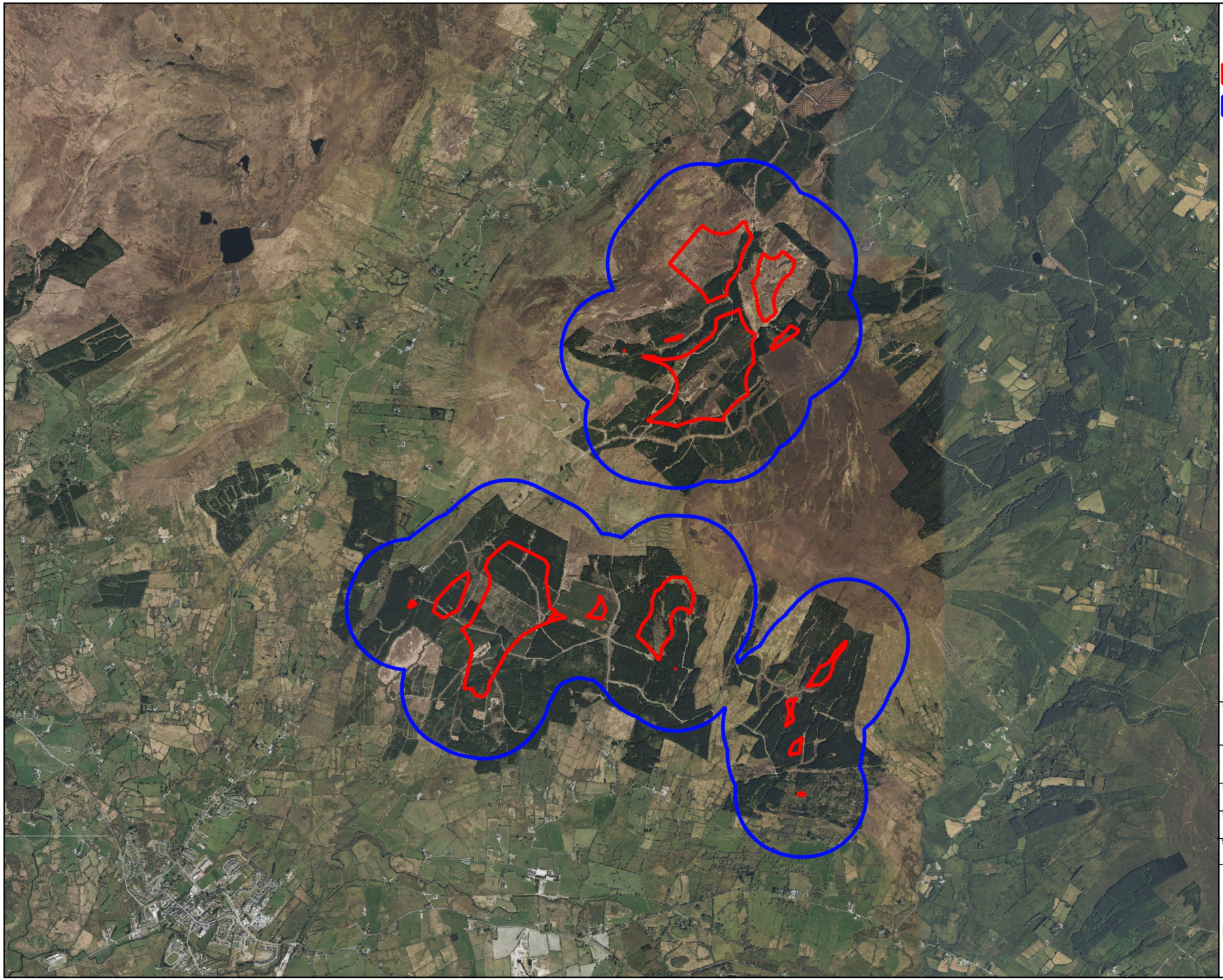

Map Legend

- Wind farm Site
- 500m Survey Radius

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Drawing Title
Breeding Walkover Survey Area

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 2
Scale	Date
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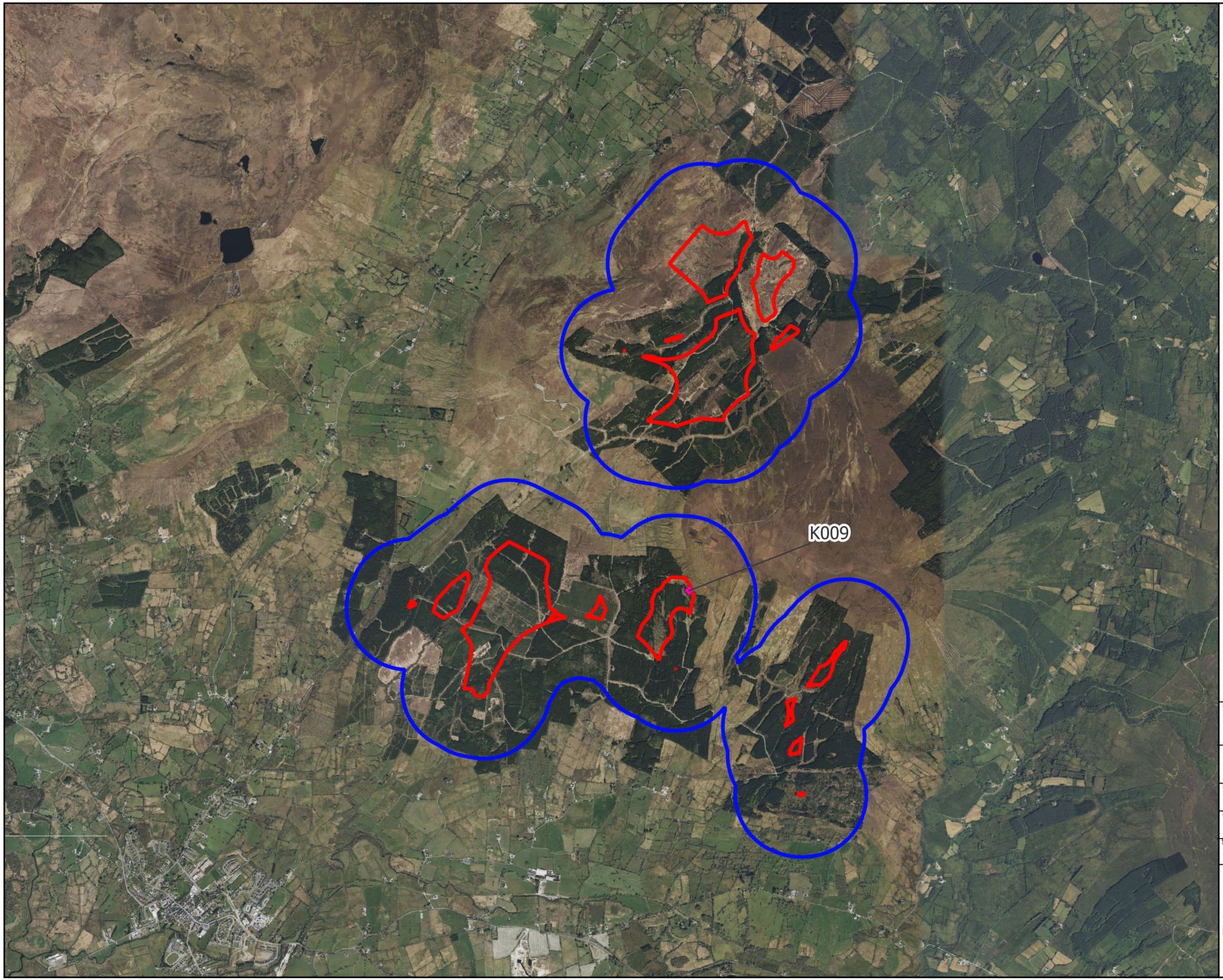

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Observation

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Drawing Title
Breeding Walkover Survey
Kestrel Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 2.2
Scale	Date
1:40,000	10.09.2024

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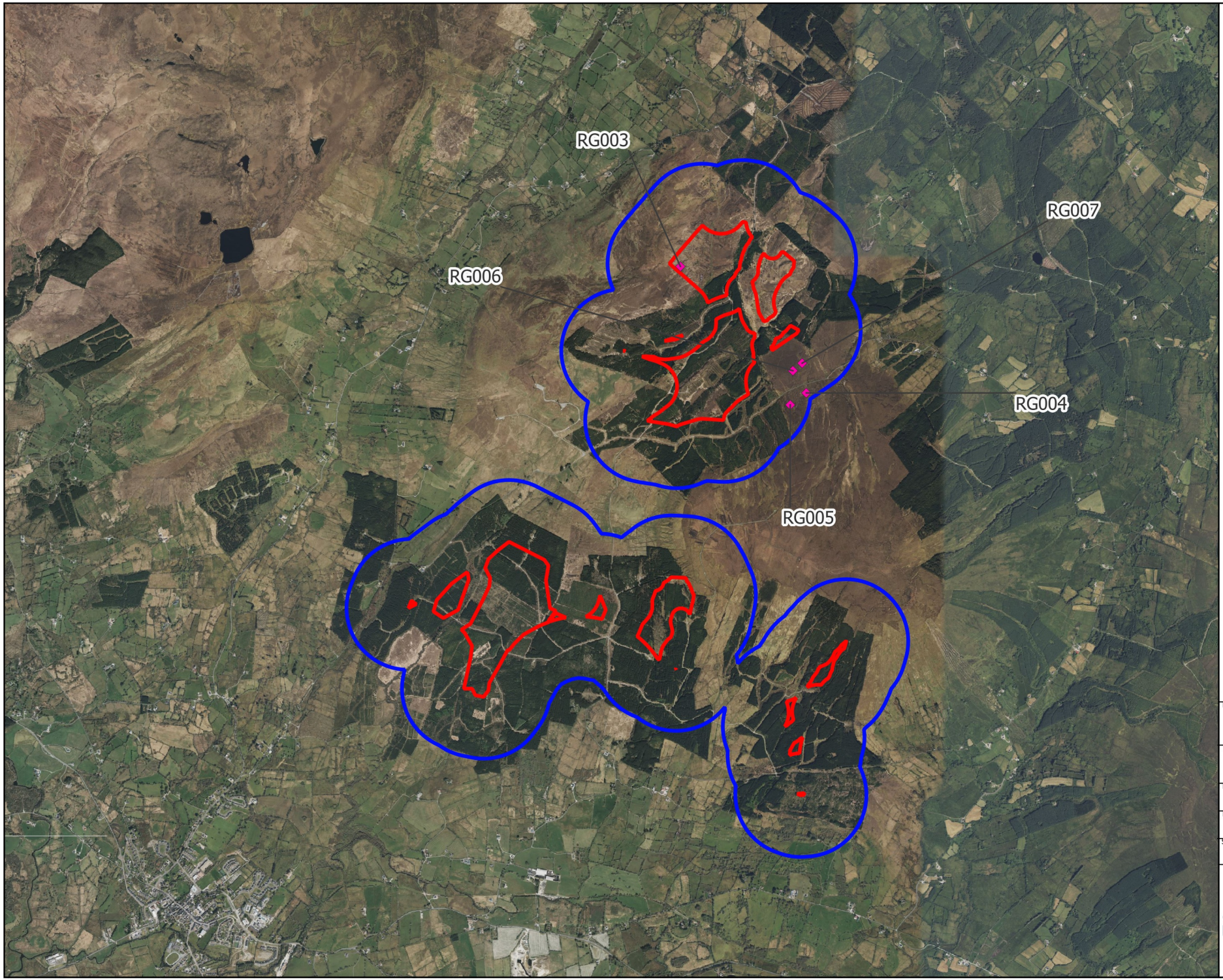

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Observation

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Drawing Title
Breeding Walkover Survey
Red Grouse Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 2.3
Scale	Date
1:40,000	10.09.2024

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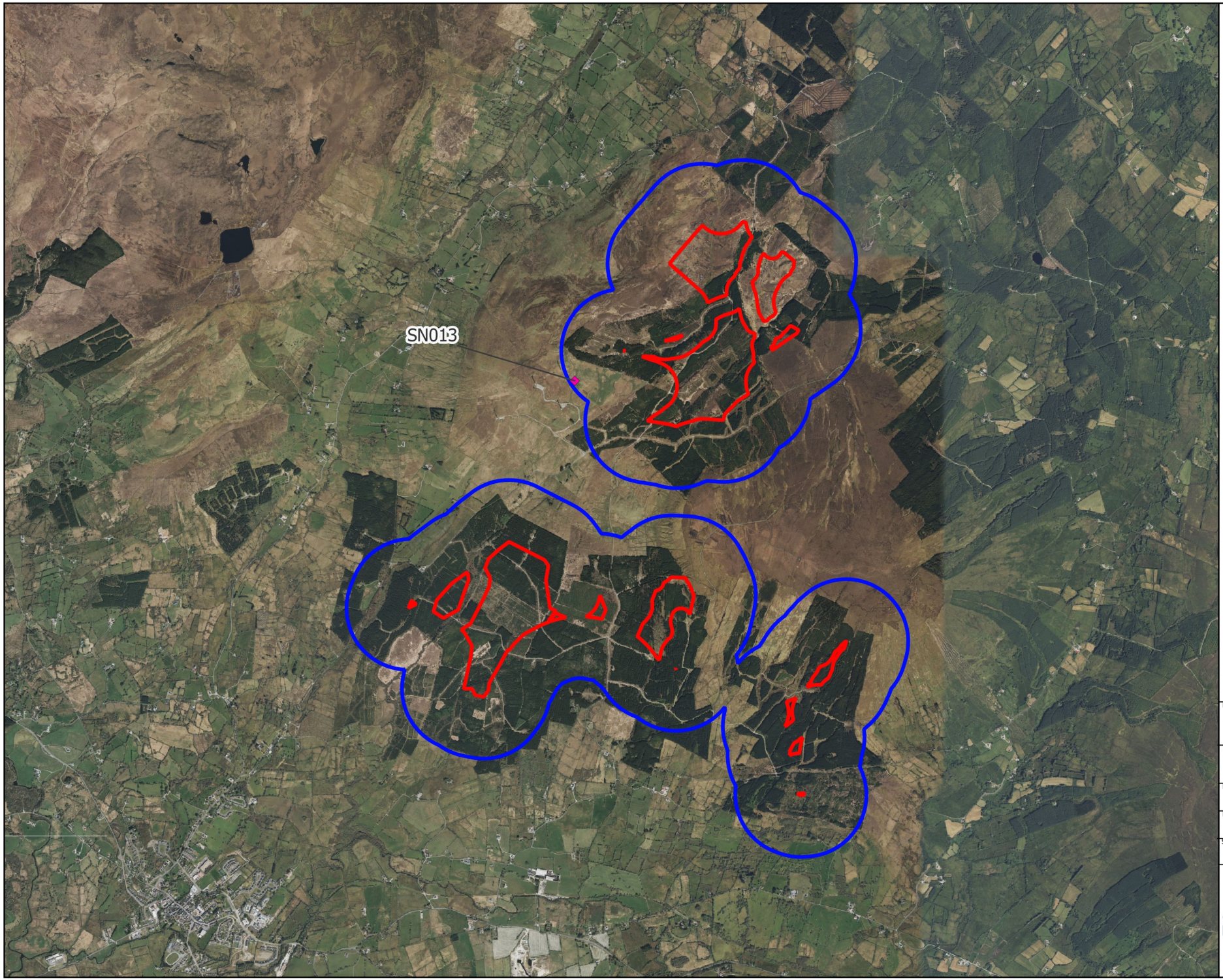

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Observation

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Drawing Title
Breeding Walkover Survey
Snipe Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 2.4
Scale	Date
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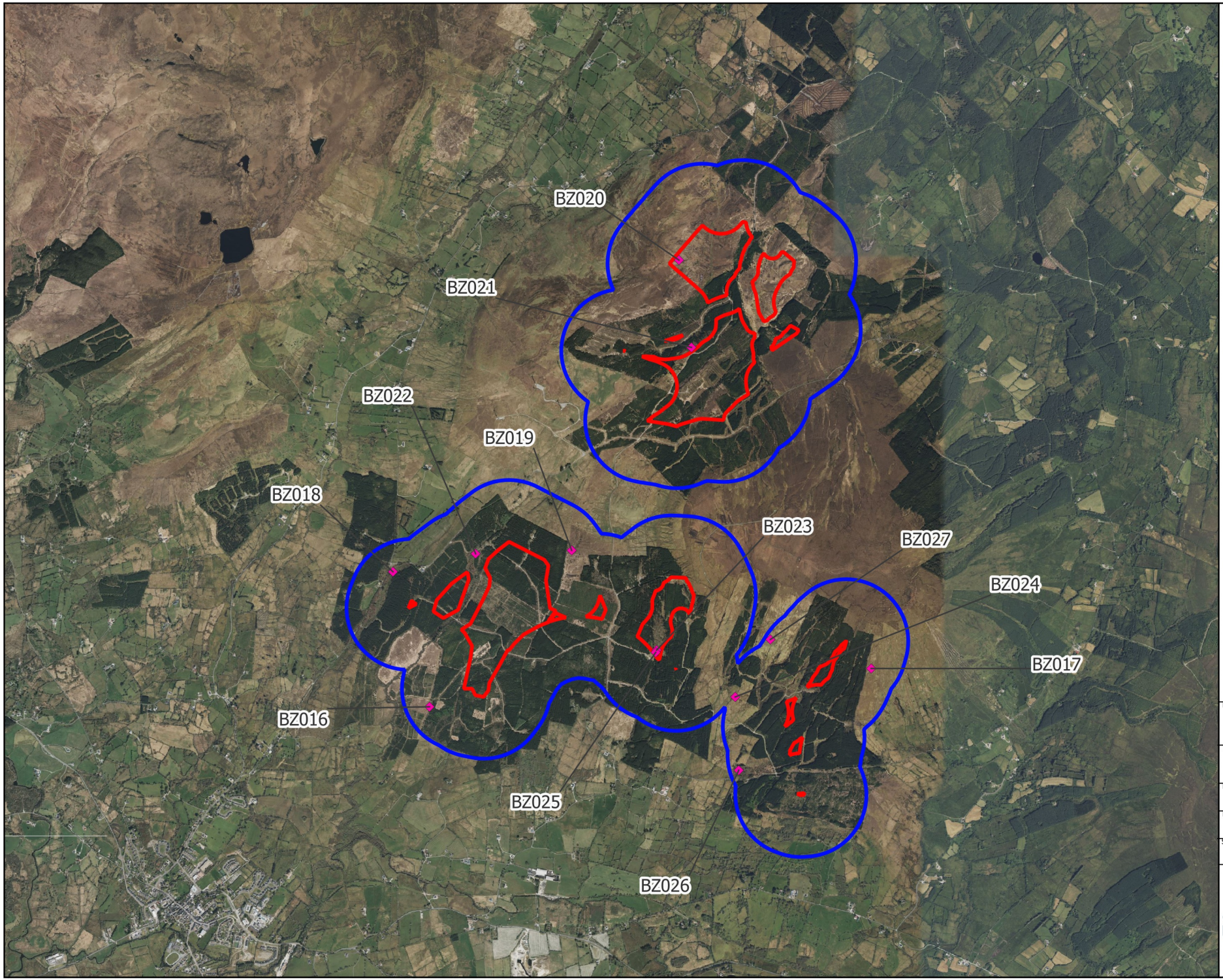

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Observation

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Drawing Title
Breeding Walkover Survey
Buzzard Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 2.5
Scale	Date
1:40,000	10.09.2024

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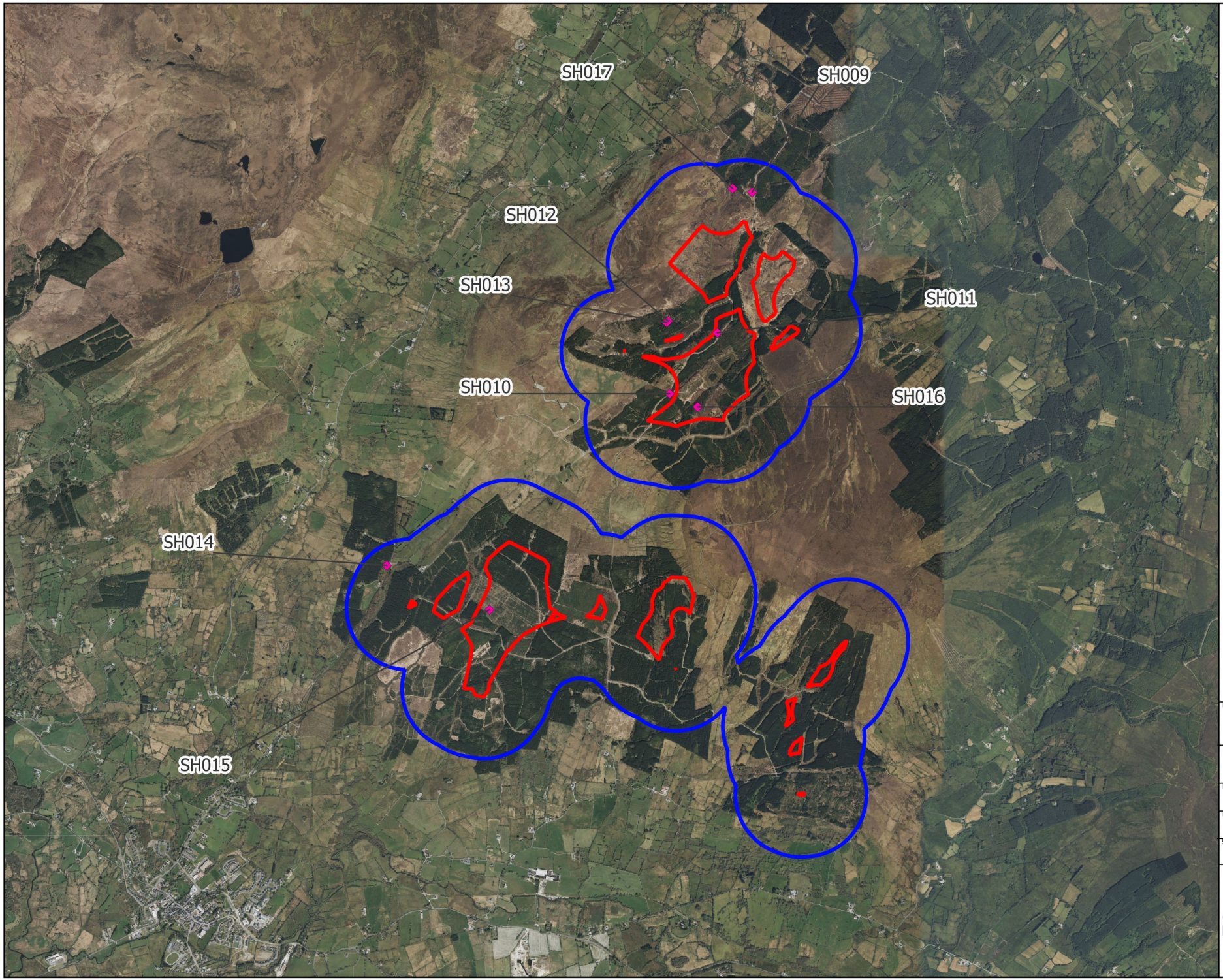

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Observation

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Drawing Title
Breeding Walkover Survey
Sparrowhawk Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 2.6
Scale	Date
1:40,000	10.09.2024

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Map Legend

- Wind Farm Site
- 500m Survey Radius
- 5km Survey Radius

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Drawing Title

Breeding Raptor Survey Area

Project Title

Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 3
Scale	Date
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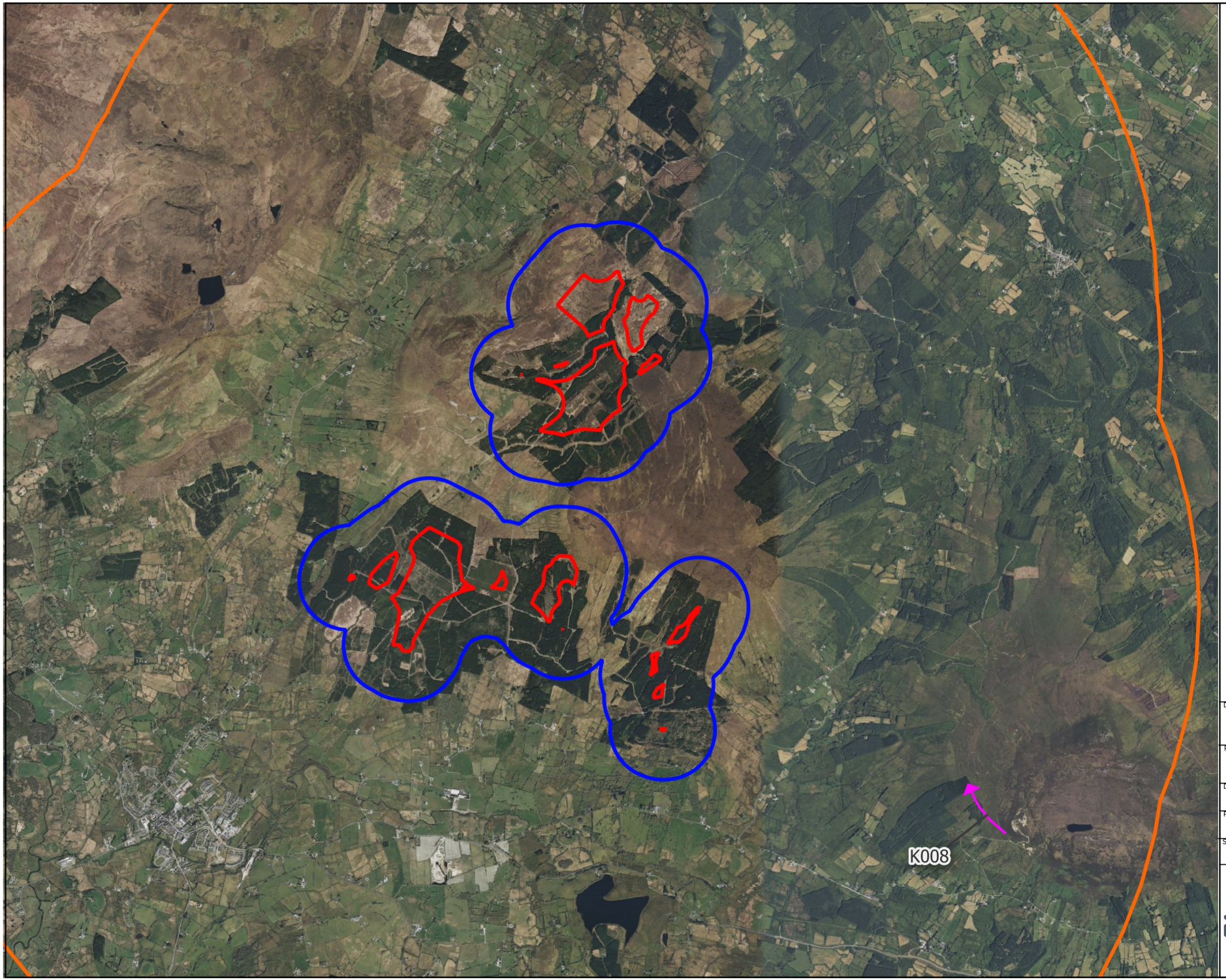

Map Legend

- Wind Farm Site
- 500m Survey Radius
- 5km Survey Radius
- Flightline

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Drawing Title
Breeding Raptor Survey
Kestrel Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 3.2
Scale	Date
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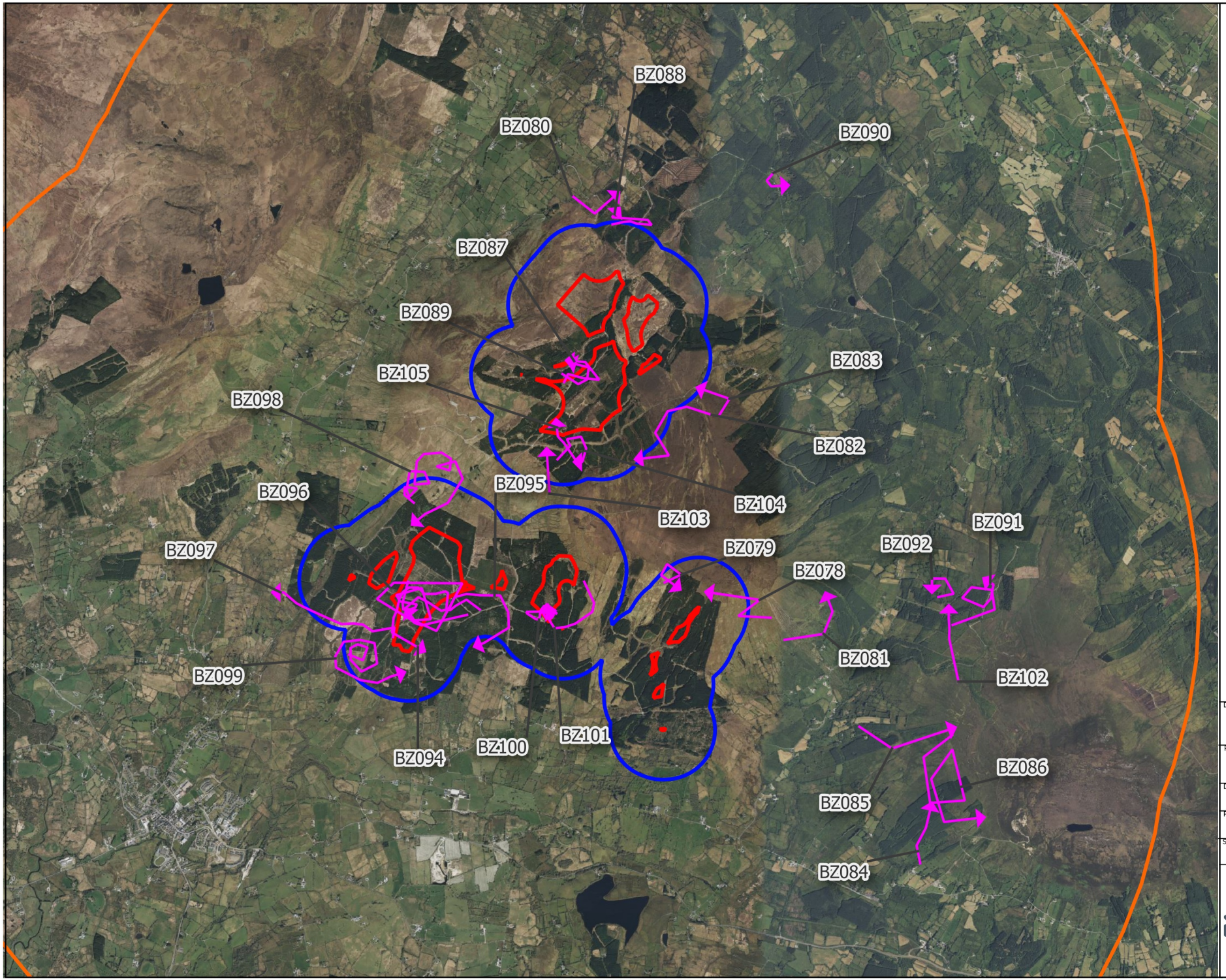

Map Legend

- Wind Farm Site
- 500m Survey Radius
- 5km Survey Radius
- Flightline

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Drawing Title

Breeding Raptor Survey
Buzzard Observations

Project Title

Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 3.3
Scale	Date
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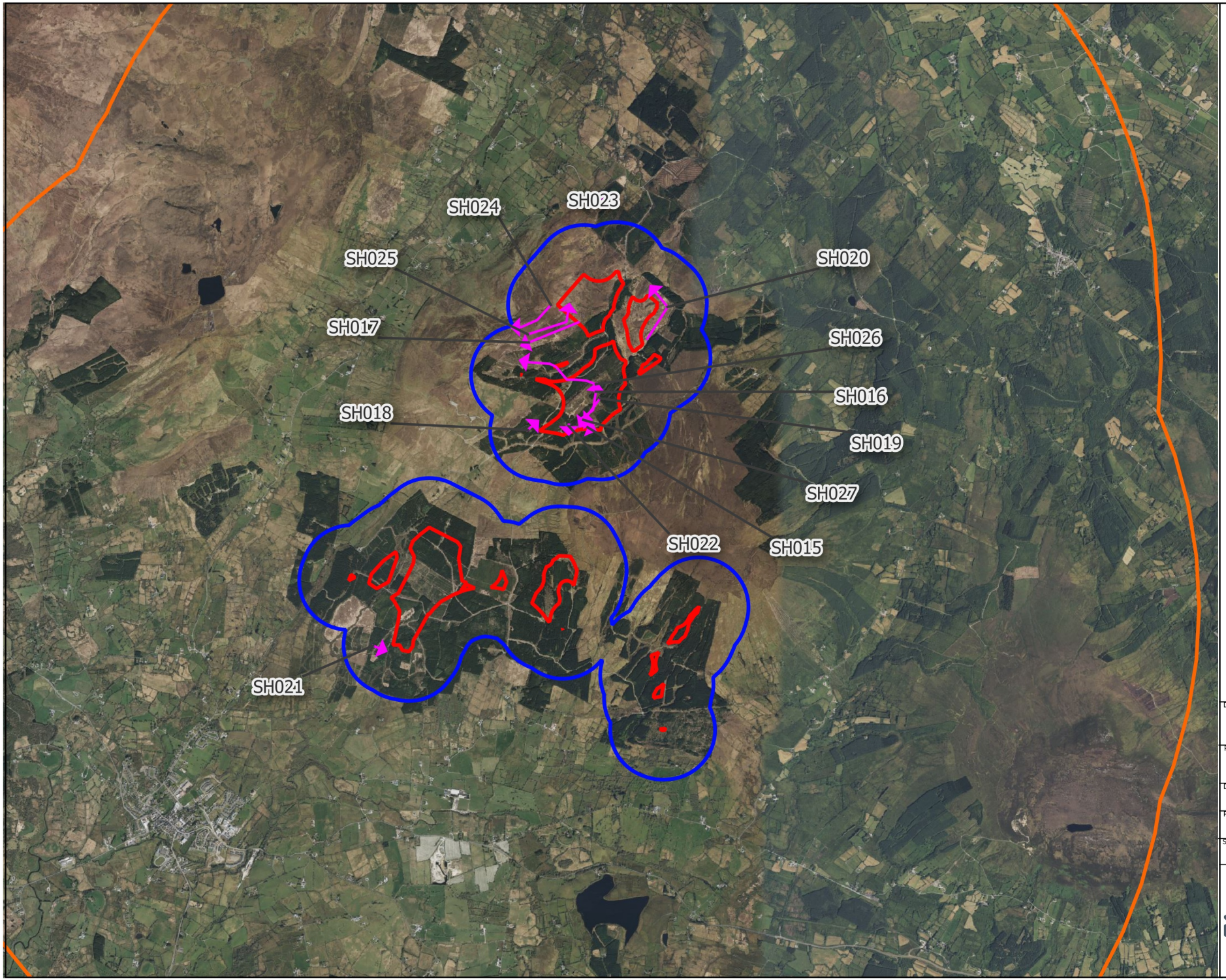

Map Legend

- Wind Farm Site
- 500m Survey Radius
- 5km Survey Radius
- Flightline

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Drawing Title
Breeding Raptor Survey
Sparrowhawk Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 3.4
Scale	Date
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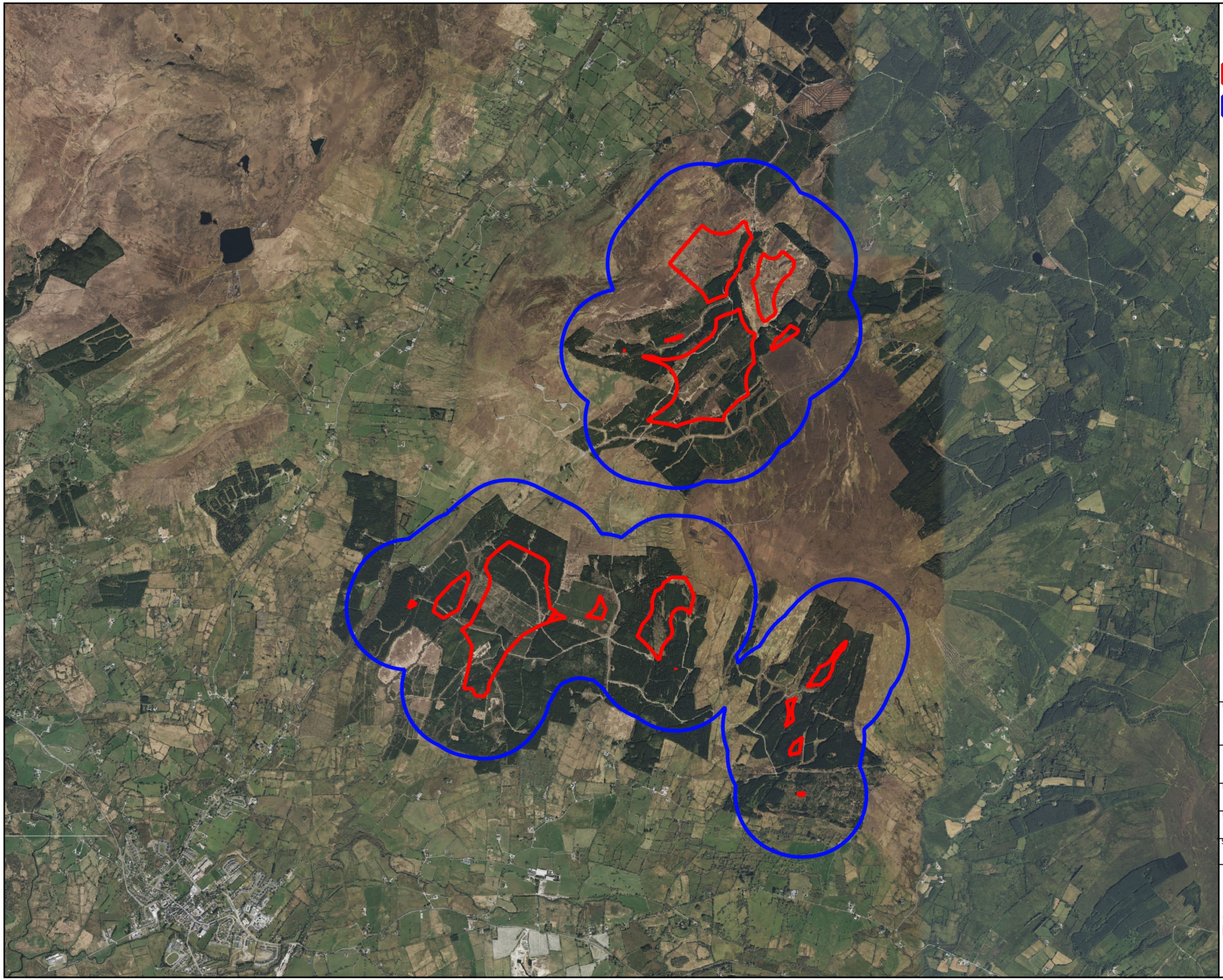

Map Legend

- Wind farm Site
- 500m Survey Radius

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Drawing Title
Breeding Woodcock Survey Area

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 4
Scale	Date
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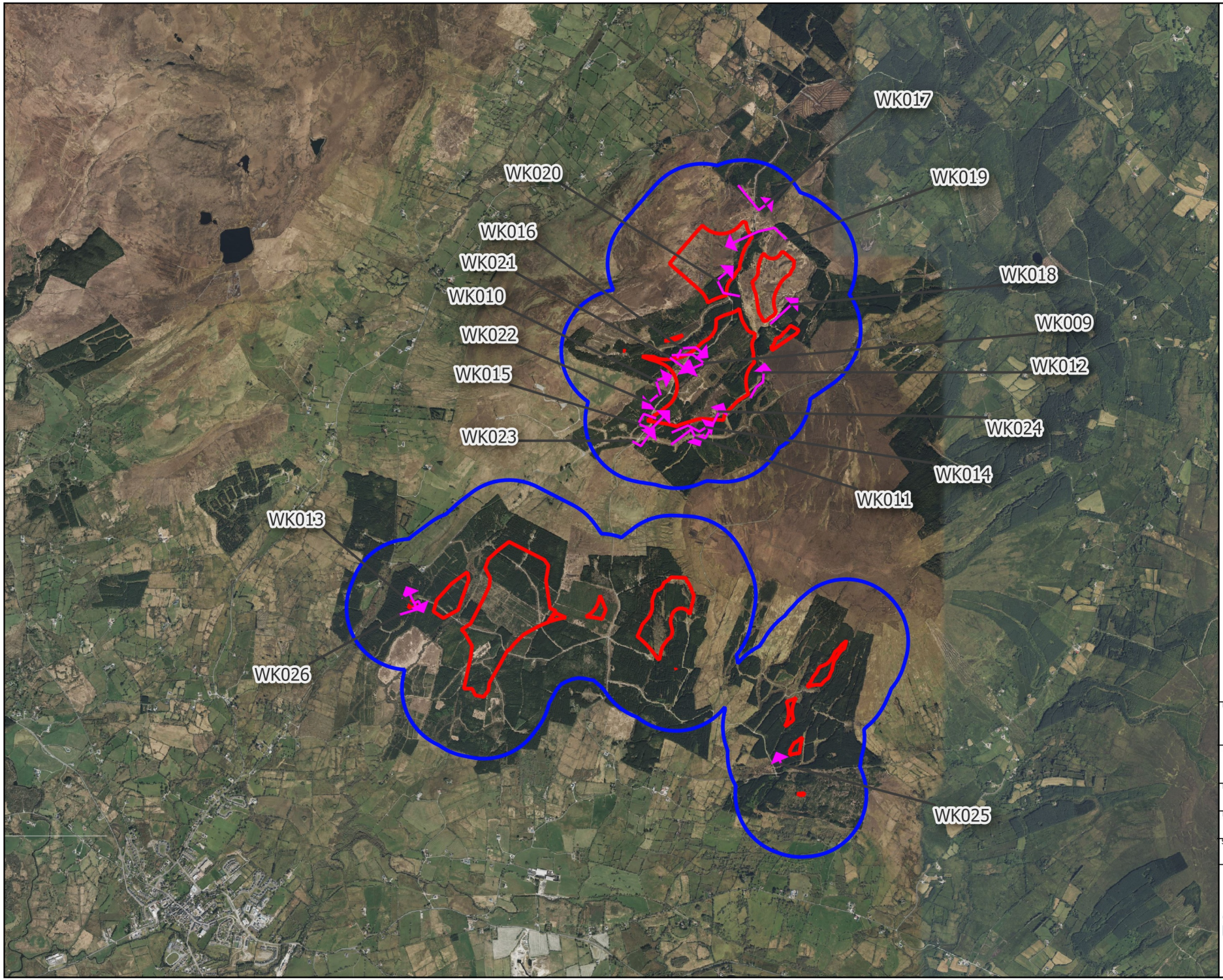

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Flightline

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Drawing Title
Breeding Woodcock Survey Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 4.1
Scale	Date
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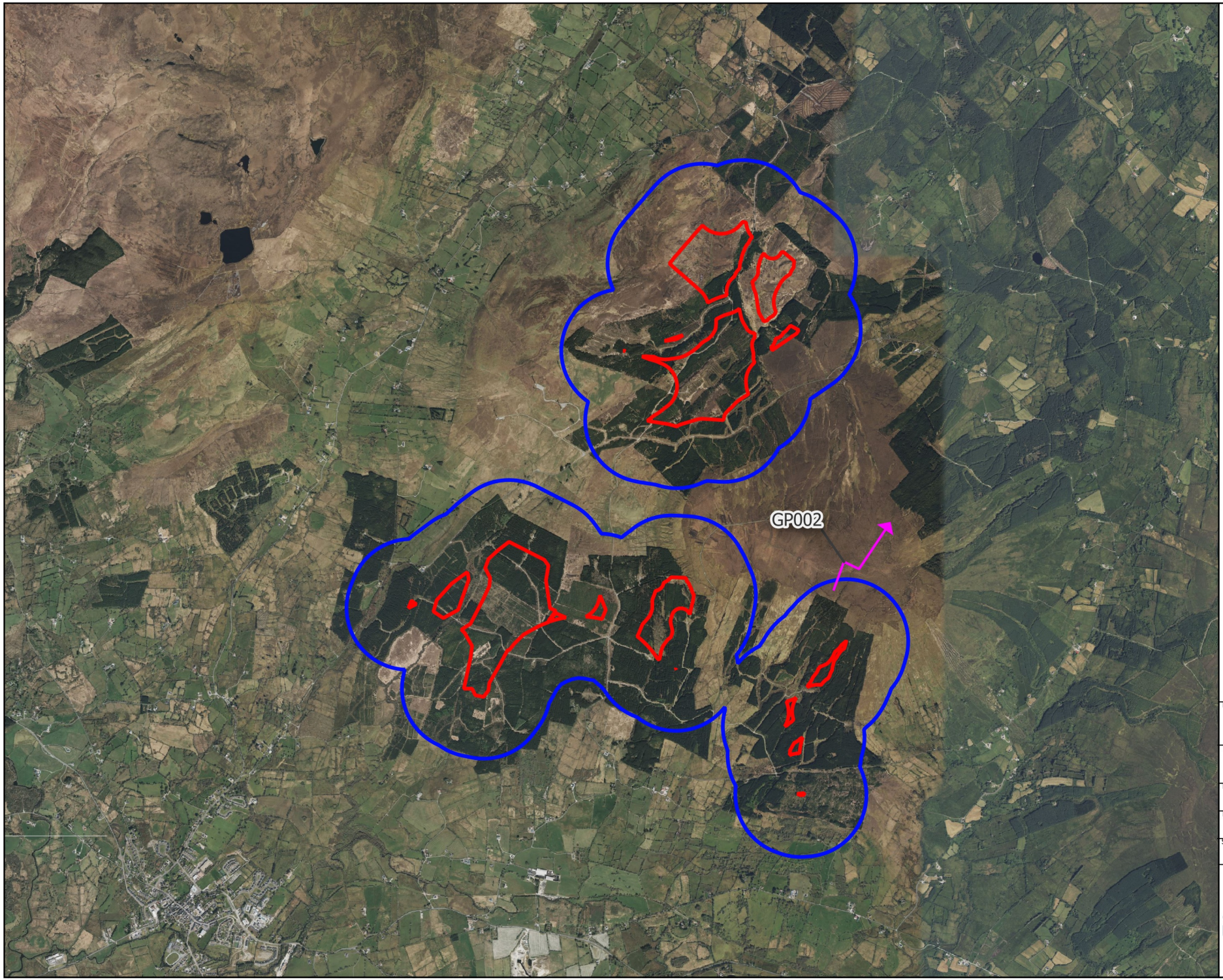

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Flightline

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Drawing Title
Incidental Golden Plover Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
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Project No.	Drawing No.
200217-a	Fig 5.1
Scale	Date
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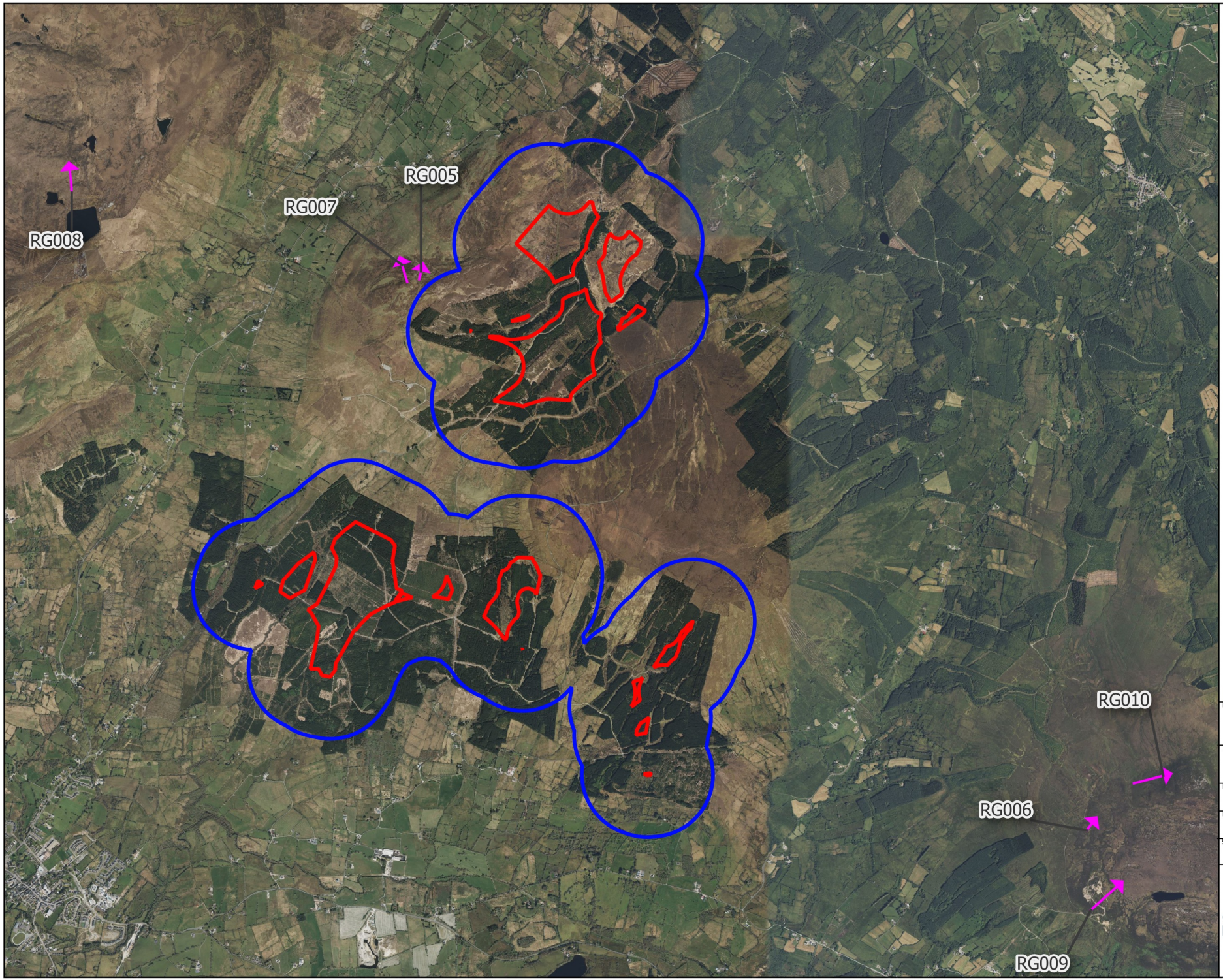

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Flightline

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Drawing Title
Incidental Red Grouse Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 5.2
Scale	Date
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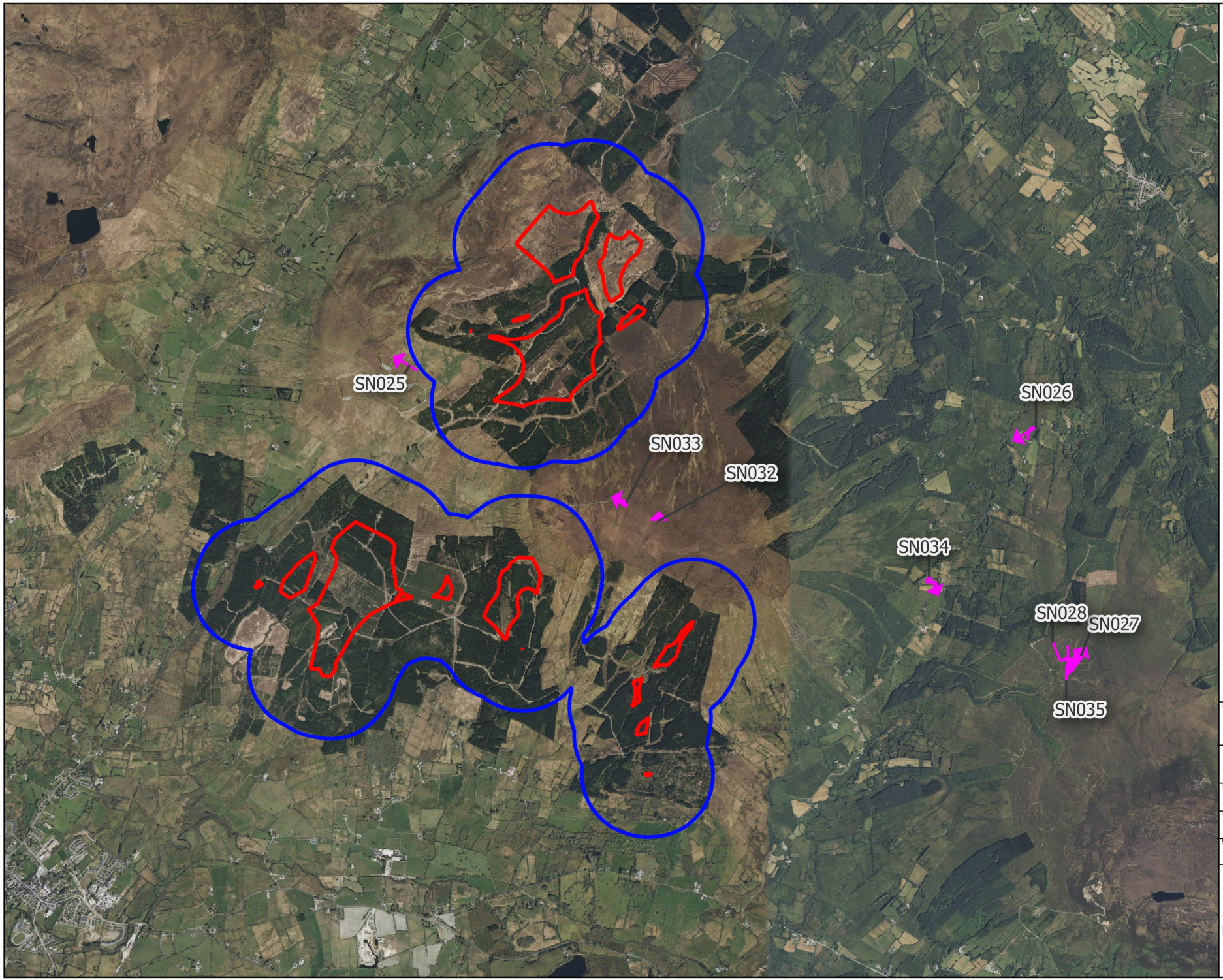

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Flightline

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Drawing Title: Incidental Snipe Observations

Project Title: Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 5.3
Scale	Date
1:40,000	10.09.2024

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APPENDIX 2

SURVEY DATA

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Table 1 Vantage Point Survey Effort

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
16/04/2020	Vantage Point Survey	2	1:00 starting at 15:00	Visibility: good; Wind speed and direction: moderate breeze NE; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
16/04/2020	Vantage Point Survey	2	1:00 starting at 16:00	Visibility: good; Wind speed and direction: moderate breeze NE; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
16/04/2020	Vantage Point Survey	2	1:00 starting at 17:00	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
16/04/2020	Vantage Point Survey	2	1:00 starting at 18:30	Visibility: moderate; Wind speed and direction: moderate breeze NE; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
16/04/2020	Vantage Point Survey	2	1:00 starting at 19:30	Visibility: moderate; Wind speed and direction: moderate breeze NE; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
16/04/2020	Vantage Point Survey	2	1:00 starting at 20:30	Visibility: moderate; Wind speed and direction: moderate breeze NE; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
17/04/2020	Vantage Point Survey	1	1:00 starting at 15:00	Visibility: good; Wind speed and direction: fresh breeze NE; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
17/04/2020	Vantage Point Survey	1	1:00 starting at 16:00	Visibility: good; Wind speed and direction: fresh breeze NE; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
17/04/2020	Vantage Point Survey	1	1:00 starting at 17:00	Visibility: good; Wind speed and direction: fresh breeze NE; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
17/04/2020	Vantage Point Survey	3	1:00 starting at 18:30	Visibility: good; Wind speed and direction: fresh breeze N ; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
17/04/2020	Vantage Point Survey	3	1:00 starting at 19:30	Visibility: good; Wind speed and direction: fresh breeze N; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
17/04/2020	Vantage Point Survey	3	1:00 starting at 20:30	Visibility: good; Wind speed and direction: moderate breeze N; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
20/04/2020	Vantage Point Survey	3	1:00 starting at 15:10	Visibility: good; Wind speed and direction: fresh breeze NW; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
20/04/2020	Vantage Point Survey	3	1:00 starting at 16:10	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
20/04/2020	Vantage Point Survey	3	1:00 starting at 17:10	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
20/04/2020	Vantage Point Survey	1	1:00 starting at 18:40	Visibility: good; Wind speed and direction: fresh breeze N ; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
20/04/2020	Vantage Point Survey	1	1:00 starting at 19:40	Visibility: good; Wind speed and direction: fresh breeze N; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
20/04/2020	Vantage Point Survey	1	1:00 starting at 20:40	Visibility: good; Wind speed and direction: fresh breeze N; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
21/04/2020	Vantage Point Survey	4	1:00 starting at 15:10	Visibility: good; Wind speed and direction: strong breeze E; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
21/04/2020	Vantage Point Survey	4	1:00 starting at 16:10	Visibility: good; Wind speed and direction: strong breeze E; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
21/04/2020	Vantage Point Survey	4	1:00 starting at 17:10	Visibility: good; Wind speed and direction: strong breeze E; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
21/04/2020	Vantage Point Survey	4	1:00 starting at 18:40	Visibility: good; Wind speed and direction: fresh breeze E; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
21/04/2020	Vantage Point Survey	4	1:00 starting at 19:40	Visibility: good; Wind speed and direction: gentle breeze E; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
21/04/2020	Vantage Point Survey	4	1:00 starting at 20:40	Visibility: good; Wind speed and direction: light air E; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
20/05/2020	Vantage Point Survey	1	1:00 starting at 04:30	Visibility: moderate; Wind speed and direction: light breeze S; Cloud cover and height: <150m% <150m; Rain: none; Frost: none; Snow: none		AOD
20/05/2020	Vantage Point Survey	1	1:00 starting at 05:30	Visibility: poor; Wind speed and direction: light breeze S; Cloud cover and height: <150m% <150m; Rain: none; Frost: none; Snow: none		AOD
20/05/2020	Vantage Point Survey	1	1:00 starting at 06:30	Visibility: poor; Wind speed and direction: gentle breeze S; Cloud cover and height: <150m% <150m; Rain: none; Frost: none; Snow: none		AOD
20/05/2020	Vantage Point Survey	1	1:00 starting at 08:00	Visibility: poor; Wind speed and direction: gentle breeze S; Cloud cover and height: <150m% <150m; Rain: none; Frost: none; Snow: none		AOD
20/05/2020	Vantage Point Survey	4	1:00 starting at 09:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: <150m% <150m; Rain: none; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
20/05/2020	Vantage Point Survey	4	1:00 starting at 10:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: <150m% <150m; Rain: none; Frost: none; Snow: none		AOD
21/05/2020	Vantage Point Survey	4	1:00 starting at 04:20	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: <150m% <150m; Rain: none; Frost: none; Snow: none		AOD
21/05/2020	Vantage Point Survey	4	1:00 starting at 05:20	Visibility: moderate; Wind speed and direction: light breeze S; Cloud cover and height: <150m% <150m; Rain: none; Frost: none; Snow: none		AOD
21/05/2020	Vantage Point Survey	4	1:00 starting at 06:20	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
21/05/2020	Vantage Point Survey	4	1:00 starting at 07:50	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
21/05/2020	Vantage Point Survey	1	1:00 starting at 09:00	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
21/05/2020	Vantage Point Survey	1	1:00 starting at 10:00	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
25/05/2020	Vantage Point Survey	3	1:00 starting at 04:15	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
25/05/2020	Vantage Point Survey	3	1:00 starting at 05:15	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
25/05/2020	Vantage Point Survey	3	1:00 starting at 06:15	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
25/05/2020	Vantage Point Survey	3	1:00 starting at 07:45	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
25/05/2020	Vantage Point Survey	3	1:00 starting at 08:45	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
25/05/2020	Vantage Point Survey	3	1:00 starting at 09:45	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
26/05/2020	Vantage Point Survey	2	1:00 starting at 04:15	Visibility: limited; Wind speed and direction: light air W; Cloud cover and height: <150m% <150m; Rain: none; Frost: none; Snow: none		AOD
26/05/2020	Vantage Point Survey	2	1:00 starting at 05:15	Visibility: limited; Wind speed and direction: light air W; Cloud cover and height: <150m% <150m; Rain: none; Frost: none; Snow: none		AOD
26/05/2020	Vantage Point Survey	2	1:00 starting at 06:15	Visibility: limited; Wind speed and direction: light breeze W; Cloud cover and height: <150m% <150m; Rain: none; Frost: none; Snow: none		AOD
26/05/2020	Vantage Point Survey	2	1:00 starting at 07:45	Visibility: poor; Wind speed and direction: gentle breeze W; Cloud cover and height: <150m% <150m; Rain: none; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
26/05/2020	Vantage Point Survey	2	1:00 starting at 08:45	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
26/05/2020	Vantage Point Survey	2	1:00 starting at 09:45	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
10/06/2020	Vantage Point Survey	4	1:00 starting at 18:10	Visibility: moderate; Wind speed and direction: moderate breeze N ; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
10/06/2020	Vantage Point Survey	4	1:00 starting at 19:10	Visibility: moderate; Wind speed and direction: gentle breeze N; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
10/06/2020	Vantage Point Survey	4	1:00 starting at 20:10	Visibility: good; Wind speed and direction: moderate breeze N; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
11/06/2020	Vantage Point Survey	1	1:00 starting at 18:00	Visibility: good; Wind speed and direction: fresh breeze N; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
11/06/2020	Vantage Point Survey	1	1:00 starting at 19:00	Visibility: good; Wind speed and direction: moderate breeze N; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
11/06/2020	Vantage Point Survey	1	1:00 starting at 20:00	Visibility: good; Wind speed and direction: fresh breeze N; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
15/06/2020	Vantage Point Survey	1	1:00 starting at 10:30	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
15/06/2020	Vantage Point Survey	1	1:00 starting at 11:30	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
15/06/2020	Vantage Point Survey	1	1:00 starting at 12:30	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
15/06/2020	Vantage Point Survey	4	1:00 starting at 14:00	Visibility: good; Wind speed and direction: light air E; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
15/06/2020	Vantage Point Survey	4	1:00 starting at 15:00	Visibility: good; Wind speed and direction: light breeze E; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
15/06/2020	Vantage Point Survey	4	1:00 starting at 16:00	Visibility: good; Wind speed and direction: light air E; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
23/06/2020	Vantage Point Survey	2	1:00 starting at 17:00	Visibility: limited; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
23/06/2020	Vantage Point Survey	2	1:00 starting at 18:00	Visibility: limited; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none		AOD
23/06/2020	Vantage Point Survey	2	1:00 starting at 19:00	Visibility: limited; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none		AOD
24/06/2020	Vantage Point Survey	2	1:00 starting at 17:30	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
24/06/2020	Vantage Point Survey	2	1:00 starting at 18:30	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
24/06/2020	Vantage Point Survey	2	1:00 starting at 19:30	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
25/06/2020	Vantage Point Survey	3	1:00 starting at 14:30	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
25/06/2020	Vantage Point Survey	3	1:00 starting at 15:30	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
25/06/2020	Vantage Point Survey	3	1:00 starting at 16:30	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
25/06/2020	Vantage Point Survey	3	1:00 starting at 18:00	Visibility: good; Wind speed and direction: light breeze N; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
25/06/2020	Vantage Point Survey	3	1:00 starting at 19:00	Visibility: good; Wind speed and direction: light breeze N; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
25/06/2020	Vantage Point Survey	3	1:00 starting at 20:00	Visibility: good; Wind speed and direction: light air N; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		AOD
07/07/2020	Vantage Point Survey	2	1:00 starting at 11:45	Visibility: poor; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
07/07/2020	Vantage Point Survey	2	1:00 starting at 12:45	Visibility: moderate; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
07/07/2020	Vantage Point Survey	2	1:00 starting at 13:45	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
07/07/2020	Vantage Point Survey	4	1:00 starting at 15:15	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
07/07/2020	Vantage Point Survey	4	1:00 starting at 16:15	Visibility: moderate; Wind speed and direction: light breeze SE; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
07/07/2020	Vantage Point Survey	4	1:00 starting at 17:15	Visibility: good; Wind speed and direction: light breeze SE; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
08/07/2020	Vantage Point Survey	2	1:00 starting at 12:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
08/07/2020	Vantage Point Survey	2	1:00 starting at 13:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
08/07/2020	Vantage Point Survey	2	1:00 starting at 14:00	Visibility: poor; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
08/07/2020	Vantage Point Survey	1	1:00 starting at 16:10	Visibility: poor; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
08/07/2020	Vantage Point Survey	1	1:00 starting at 17:10	Visibility: limited; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none		AOD
09/07/2020	Vantage Point Survey	4	1:00 starting at 11:00	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
09/07/2020	Vantage Point Survey	4	1:00 starting at 12:00	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
09/07/2020	Vantage Point Survey	4	1:00 starting at 13:00	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
20/07/2020	Vantage Point Survey	1	1:00 starting at 14:30	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
20/07/2020	Vantage Point Survey	1	1:00 starting at 16:00	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
20/07/2020	Vantage Point Survey	1	1:00 starting at 17:00	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
20/07/2020	Vantage Point Survey	1	1:00 starting at 18:00	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
29/07/2020	Vantage Point Survey	3	1:00 starting at 10:45	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
29/07/2020	Vantage Point Survey	3	1:00 starting at 11:45	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
29/07/2020	Vantage Point Survey	3	1:00 starting at 12:45	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
29/07/2020	Vantage Point Survey	3	1:00 starting at 14:15	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
29/07/2020	Vantage Point Survey	3	1:00 starting at 15:15	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none		AOD
29/07/2020	Vantage Point Survey	3	1:00 starting at 16:15	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none		AOD
05/08/2020	Vantage Point Survey	2	1:00 starting at 16:00	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
05/08/2020	Vantage Point Survey	2	1:00 starting at 17:00	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
05/08/2020	Vantage Point Survey	2	1:00 starting at 18:00	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
05/08/2020	Vantage Point Survey	2	1:00 starting at 19:30	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
05/08/2020	Vantage Point Survey	2	1:00 starting at 20:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
05/08/2020	Vantage Point Survey	2	1:00 starting at 21:30	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
06/08/2020	Vantage Point Survey	4	1:00 starting at 15:50	Visibility: good; Wind speed and direction: fresh breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
06/08/2020	Vantage Point Survey	4	1:00 starting at 16:50	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
06/08/2020	Vantage Point Survey	4	1:00 starting at 17:50	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
06/08/2020	Vantage Point Survey	1	1:00 starting at 19:20	Visibility: good; Wind speed and direction: fresh breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
06/08/2020	Vantage Point Survey	1	1:00 starting at 20:20	Visibility: good; Wind speed and direction: fresh breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
06/08/2020	Vantage Point Survey	1	1:00 starting at 21:20	Visibility: good; Wind speed and direction: fresh breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
10/08/2020	Vantage Point Survey	1	1:00 starting at 15:45	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
10/08/2020	Vantage Point Survey	1	1:00 starting at 16:45	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
10/08/2020	Vantage Point Survey	1	1:00 starting at 17:45	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
10/08/2020	Vantage Point Survey	4	1:00 starting at 19:15	Visibility: moderate; Wind speed and direction: moderate breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
10/08/2020	Vantage Point Survey	4	1:00 starting at 20:15	Visibility: poor; Wind speed and direction: moderate breeze NW; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
10/08/2020	Vantage Point Survey	4	1:00 starting at 21:15	Visibility: moderate; Wind speed and direction: moderate breeze NW; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
11/08/2020	Vantage Point Survey	3	1:00 starting at 15:45	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
11/08/2020	Vantage Point Survey	3	1:00 starting at 16:45	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
11/08/2020	Vantage Point Survey	3	1:00 starting at 17:45	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
11/08/2020	Vantage Point Survey	3	1:00 starting at 19:15	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		AOD
11/08/2020	Vantage Point Survey	3	1:00 starting at 20:15	Visibility: good; Wind speed and direction: light air W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
11/08/2020	Vantage Point Survey	3	1:00 starting at 21:15	Visibility: good; Wind speed and direction: light air W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
03/09/2020	Vantage Point Survey	4	1:00 starting at 05:50	Visibility: moderate; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
03/09/2020	Vantage Point Survey	4	1:00 starting at 06:50	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD
03/09/2020	Vantage Point Survey	4	1:00 starting at 07:50	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
03/09/2020	Vantage Point Survey	4	1:00 starting at 09:20	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
03/09/2020	Vantage Point Survey	4	1:00 starting at 10:20	Visibility: good; Wind speed and direction: fresh breeze S; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		AOD
03/09/2020	Vantage Point Survey	4	1:00 starting at 11:20	Visibility: good; Wind speed and direction: fresh breeze S; Cloud cover and height: 66-100% >500m; Rain: heavy showers; Frost: none; Snow: none		AOD
04/09/2020	Vantage Point Survey	2	1:00 starting at 05:50	Visibility: poor; Wind speed and direction: fresh breeze SE; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD
04/09/2020	Vantage Point Survey	2	1:00 starting at 06:50	Visibility: poor; Wind speed and direction: strong breeze SE; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		AOD
04/09/2020	Vantage Point Survey	2	1:00 starting at 07:50	Visibility: limited; Wind speed and direction: strong breeze SE; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		AOD
13/09/2020	Vantage Point Survey	2	1:00 starting at 11:30	Visibility: good; Wind speed and direction: near gale SE; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
13/09/2020	Vantage Point Survey	2	1:00 starting at 12:30	Visibility: moderate; Wind speed and direction: near gale SE; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
13/09/2020	Vantage Point Survey	2	1:00 starting at 13:30	Visibility: moderate; Wind speed and direction: near gale SE; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
13/09/2020	Vantage Point Survey	1	1:00 starting at 15:00	Visibility: good; Wind speed and direction: near gale S; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
13/09/2020	Vantage Point Survey	1	1:00 starting at 16:00	Visibility: good; Wind speed and direction: near gale S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
13/09/2020	Vantage Point Survey	1	1:00 starting at 17:00	Visibility: good; Wind speed and direction: strong breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
14/09/2020	Vantage Point Survey	1	1:00 starting at 06:10	Visibility: moderate; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		AOD
14/09/2020	Vantage Point Survey	1	1:00 starting at 07:10	Visibility: limited; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		AOD
14/09/2020	Vantage Point Survey	3	1:00 starting at 08:15	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		AOD
14/09/2020	Vantage Point Survey	3	1:00 starting at 09:45	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		AOD
14/09/2020	Vantage Point Survey	3	1:00 starting at 10:45	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		AOD
14/09/2020	Vantage Point Survey	3	1:00 starting at 11:45	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		AOD
30/09/2020	Vantage Point Survey	3	1:00 starting at 06:35	Visibility: poor; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
30/09/2020	Vantage Point Survey	3	1:00 starting at 07:35	Visibility: poor; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
30/09/2020	Vantage Point Survey	1	1:00 starting at 08:45	Visibility: poor; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD

Table 2 Breeding Walkover Survey Effort

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
06/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 11:40	Visibility: good; Wind speed and direction: fresh breeze NE; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
06/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 12:40	Visibility: good; Wind speed and direction: fresh breeze NE; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
06/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 13:40	Visibility: good; Wind speed and direction: fresh breeze NE; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
06/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 14:40	Visibility: good; Wind speed and direction: fresh breeze NE; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
06/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 15:40	Visibility: good; Wind speed and direction: moderate breeze NE; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
06/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 16:40	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
07/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 12:30	Visibility: good; Wind speed and direction: fresh breeze NE; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
07/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 13:30	Visibility: good; Wind speed and direction: fresh breeze NE; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
07/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 14:30	Visibility: good; Wind speed and direction: moderate breeze NE; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
07/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 15:30	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
07/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 16:30	Visibility: good; Wind speed and direction: light breeze NE; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
07/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 17:30	Visibility: good; Wind speed and direction: light breeze NE; Cloud cover and height: 150-500m% 150-500m; Rain: heavy showers; Frost: none; Snow: none		AOD
08/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 12:30	Visibility: good; Wind speed and direction: light breeze N ; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
08/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 13:30	Visibility: good; Wind speed and direction: light air N; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
08/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 14:30	Visibility: good; Wind speed and direction: light air N; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
08/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 15:30	Visibility: good; Wind speed and direction: light air N; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
08/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 16:30	Visibility: good; Wind speed and direction: light air N; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
08/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 17:30	Visibility: good; Wind speed and direction: light air N; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
11/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 12:30	Visibility: good; Wind speed and direction: gentle breeze N; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
11/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 13:30	Visibility: good; Wind speed and direction: moderate breeze N; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
11/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 14:30	Visibility: good; Wind speed and direction: fresh breeze N; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
11/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 15:30	Visibility: good; Wind speed and direction: fresh breeze NW; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
11/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 16:30	Visibility: good; Wind speed and direction: strong breeze NW; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
11/05/2020	Breeding Walkover Survey	500m Buffer	1:00 starting at 17:30	Visibility: good; Wind speed and direction: strong breeze NW; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
16/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 10:20	Visibility: moderate; Wind speed and direction: light air E; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow:		AOD
16/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 11:20	Visibility: moderate; Wind speed and direction: light air E; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		AOD
16/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 12:20	Visibility: good; Wind speed and direction: light air E; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		AOD
16/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 13:50	Visibility: good; Wind speed and direction: light air E; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		AOD
16/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 14:50	Visibility: good; Wind speed and direction: light air E; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		AOD
16/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 15:50	Visibility: good; Wind speed and direction: light air E; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
17/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 11:00	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
17/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 12:00	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
17/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 13:00	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
17/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 14:00	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
17/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 15:00	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
17/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 16:00	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
19/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 11:30	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
19/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 12:30	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
19/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 13:30	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
19/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 15:00	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none		AOD
19/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 16:00	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none		AOD
19/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 17:00	Visibility: poor; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% 150-500m; Rain: persistent; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
22/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 12:00	Visibility: good; Wind speed and direction: fresh breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
22/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 13:00	Visibility: good; Wind speed and direction: fresh breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
22/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 14:00	Visibility: good; Wind speed and direction: fresh breeze SE; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD
22/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 15:30	Visibility: good; Wind speed and direction: fresh breeze SE; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD
22/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 16:30	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
22/06/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 17:30	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
13/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 12:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
13/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 13:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
13/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 14:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		AOD
13/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 15:30	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		AOD
13/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 16:30	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		AOD
13/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 17:30	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		AOD
14/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 07:45	Visibility: poor; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
14/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 08:45	Visibility: poor; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
14/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 09:45	Visibility: poor; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none		AOD
14/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 10:45	Visibility: poor; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none		AOD
14/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 11:45	Visibility: limited; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none		AOD
14/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 12:45	Visibility: limited; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none		AOD
15/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 11:45	Visibility: limited; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
15/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 12:45	Visibility: limited; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
15/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 13:45	Visibility: poor; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
15/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 14:45	Visibility: poor; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
15/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 15:45	Visibility: poor; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
15/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 16:45	Visibility: poor; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
16/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 11:00	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
16/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 12:00	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
16/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 13:00	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
16/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 14:00	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
16/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 15:00	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
16/07/2020	Breeding Walkover Survey	500m buffer	1:00 starting at 16:00	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD

Table 3 Breeding Raptor Survey Effort

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
22/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 12:00	Visibility: good; Wind speed and direction: moderate breeze NE; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
22/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 13:00	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
22/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 14:00	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
22/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 15:30	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
22/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 16:30	Visibility: good; Wind speed and direction: light breeze NE; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
22/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 17:30	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
23/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 12:20	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
23/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 13:20	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
23/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 14:20	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
23/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 15:50	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
23/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 16:50	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
23/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 17:50	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
24/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 12:00	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
24/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 13:00	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
24/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 14:00	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
24/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 15:00	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
24/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 16:30	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
24/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 17:30	Visibility: good; Wind speed and direction: light air W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
27/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 12:00	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
27/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 13:00	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 150-500m% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
27/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 14:00	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 150-500m% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
27/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 15:00	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 150-500m% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
27/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 16:00	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 150-500m% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
27/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 17:00	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 150-500m% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
28/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 11:20	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
28/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 12:20	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: >500m% >500m; Rain: light showers; Frost: none; Snow: none		AOD
28/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 13:20	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
28/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 14:20	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
28/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 15:20	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
28/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 16:20	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
29/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 11:30	Visibility: poor; Wind speed and direction: light breeze W; Cloud cover and height: <150m% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
29/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 12:30	Visibility: poor; Wind speed and direction: gentle breeze W; Cloud cover and height: <150m% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
29/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 13:30	Visibility: poor; Wind speed and direction: light breeze W; Cloud cover and height: <150m% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
29/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 15:00	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 150-500m% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
29/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 16:00	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
29/04/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 17:00	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
12/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 11:30	Visibility: good; Wind speed and direction: strong breeze SW; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
12/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 12:30	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: 150-500m% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
12/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 13:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 150-500m% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
12/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 15:00	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 150-500m% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
12/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 16:00	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 150-500m% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
12/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 17:00	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 150-500m% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
13/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 12:00	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 150-500m% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
13/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 13:00	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
13/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 14:00	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
13/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 15:00	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
13/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 16:00	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
13/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 17:00	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
14/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 12:00	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
14/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 13:00	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
14/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 14:00	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
14/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 15:00	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
14/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 16:00	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
14/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 17:00	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
15/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 11:00	Visibility: good; Wind speed and direction: moderate breeze S ; Cloud cover and height: >500m% >500m; Rain: drizzle; Frost: none; Snow: none		AOD
15/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 12:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
15/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 13:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
15/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 14:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
15/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 15:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
15/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 16:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
18/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 12:00	Visibility: moderate; Wind speed and direction: light breeze W; Cloud cover and height: <150m% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
18/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 13:00	Visibility: moderate; Wind speed and direction: gentle breeze W; Cloud cover and height: <150m% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
18/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 14:00	Visibility: moderate; Wind speed and direction: moderate breeze W; Cloud cover and height: <150m% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
18/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 15:00	Visibility: moderate; Wind speed and direction: moderate breeze S; Cloud cover and height: <150m% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
18/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 16:00	Visibility: moderate; Wind speed and direction: moderate breeze S; Cloud cover and height: <150m% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
18/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 17:00	Visibility: moderate; Wind speed and direction: moderate breeze S; Cloud cover and height: <150m% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
19/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 11:00	Visibility: poor; Wind speed and direction: gentle breeze SW; Cloud cover and height: <150m% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
19/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 12:00	Visibility: poor; Wind speed and direction: moderate breeze SW; Cloud cover and height: <150m% <150m; Rain: drizzle; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
19/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 13:00	Visibility: poor; Wind speed and direction: gentle breeze SW; Cloud cover and height: <150m% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
19/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 14:00	Visibility: moderate; Wind speed and direction: light breeze SW; Cloud cover and height: 150-500m% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
19/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 15:30	Visibility: moderate; Wind speed and direction: light breeze SW; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
19/05/2020	Breeding Raptor Survey	500m Buffer	1:00 starting at 16:30	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		AOD
02/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 12:30	Visibility: good; Wind speed and direction: light breeze E; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
02/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 13:30	Visibility: good; Wind speed and direction: gentle breeze E; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
02/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 14:30	Visibility: good; Wind speed and direction: gentle breeze E; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
02/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 15:30	Visibility: good; Wind speed and direction: gentle breeze E; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
02/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 16:30	Visibility: good; Wind speed and direction: gentle breeze E; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
02/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 17:30	Visibility: moderate; Wind speed and direction: moderate breeze E; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		AOD
03/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 12:30	Visibility: good; Wind speed and direction: strong breeze NW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
03/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 13:30	Visibility: good; Wind speed and direction: fresh breeze NW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
03/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 14:30	Visibility: good; Wind speed and direction: fresh breeze NW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
03/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 16:00	Visibility: good; Wind speed and direction: fresh breeze NW; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
03/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 17:00	Visibility: good; Wind speed and direction: fresh breeze NW; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		AOD
03/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 18:00	Visibility: good; Wind speed and direction: fresh breeze NW; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		AOD
04/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 13:00	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
04/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 14:00	Visibility: good; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		AOD
04/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 15:00	Visibility: good; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
04/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 16:00	Visibility: good; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
04/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 17:00	Visibility: good; Wind speed and direction: strong breeze W; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
04/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 18:00	Visibility: good; Wind speed and direction: strong breeze W; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
08/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 12:30	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
08/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 13:30	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
08/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 14:30	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
08/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 16:00	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
08/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 17:00	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
08/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 18:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
09/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 11:30	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
09/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 12:30	Visibility: good; Wind speed and direction: fresh breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
09/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 13:30	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
09/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 15:00	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
09/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 16:00	Visibility: good; Wind speed and direction: light breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
09/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 17:00	Visibility: good; Wind speed and direction: light breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
12/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 12:45	Visibility: moderate; Wind speed and direction: strong breeze NE; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
12/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 13:45	Visibility: good; Wind speed and direction: strong breeze NE; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD
12/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 14:45	Visibility: good; Wind speed and direction: strong breeze NE; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD
12/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 16:15	Visibility: good; Wind speed and direction: strong breeze NE; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD
12/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 17:15	Visibility: good; Wind speed and direction: strong breeze NE; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD
12/06/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 18:15	Visibility: good; Wind speed and direction: strong breeze NE; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD
02/07/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 11:15	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
02/07/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 12:15	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
02/07/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 13:15	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
02/07/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 14:45	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
02/07/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 15:45	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
02/07/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 16:45	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
06/07/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 12:30	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
06/07/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 13:30	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
06/07/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 14:30	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
06/07/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 15:30	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
06/07/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 16:30	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
06/07/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 17:30	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
09/07/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 14:15	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
09/07/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 15:15	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
09/07/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 16:15	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
10/07/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 10:30	Visibility: good; Wind speed and direction: fresh breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
10/07/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 11:30	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
10/07/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 12:30	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
10/07/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 13:30	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
10/07/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 14:30	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
10/07/2020	Breeding Raptor Survey	5km buffer	1:00 starting at 15:30	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD

Table 4 Breeding Woodcock Survey Effort

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
28/05/2020	Breeding Woodcock Survey	500m Buffer	1:00 starting at 21:10	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
28/05/2020	Breeding Woodcock Survey	500m Buffer	1:00 starting at 22:10	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
29/05/2020	Breeding Woodcock Survey	500m Buffer	1:00 starting at 21:15	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
29/05/2020	Breeding Woodcock Survey	500m Buffer	1:00 starting at 22:15	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: >500m% >500m; Rain: none; Frost: none; Snow: none		AOD
10/06/2020	Breeding Woodcock Survey	500m buffer	1:00 starting at 21:20	Visibility: good; Wind speed and direction: gentle breeze N; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		AOD
10/06/2020	Breeding Woodcock Survey	500m buffer	1:00 starting at 22:20	Visibility: moderate; Wind speed and direction: light breeze N; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
11/06/2020	Breeding Woodcock Survey	500m buffer	1:00 starting at 21:15	Visibility: good; Wind speed and direction: strong breeze NW; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		AOD
11/06/2020	Breeding Woodcock Survey	500m buffer	1:00 starting at 22:15	Visibility: good; Wind speed and direction: strong breeze NW; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		AOD
24/06/2020	Breeding Woodcock Survey	500m buffer	1:00 starting at 21:20	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
24/06/2020	Breeding Woodcock Survey	500m buffer	1:00 starting at 22:20	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
25/06/2020	Breeding Woodcock Survey	500m buffer	1:00 starting at 21:20	Visibility: good; Wind speed and direction: light air N; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		AOD
25/06/2020	Breeding Woodcock Survey	500m buffer	1:00 starting at 22:20	Visibility: good; Wind speed and direction: light air N; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		AOD

Table 5 Vantage Point Survey Data

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
SH011	2	16/04/2020	19:08	Sparrowhawk	1	5	5	0	0	0	montane heath and wet grassland; female flying low. foraging	AOD
LB006	2	16/04/2020	19:56	Lesser Black-backed Gull	1	12	0	0	12	0	conifer plantation and montane heath; adult travelling	AOD
LB007	2	16/04/2020	19:59	Lesser Black-backed Gull	1	50	0	0	40	0	conifer plantation; adult travelling	AOD
GP012	2	16/04/2020	20:43	Golden Plover	17	20	0	0	20	0	montane heath; flock over hilltop	AOD
GP013	2	16/04/2020	21:24	Golden Plover	6	4	4	0	0	0	montane heath; flock	AOD
SN008	2	16/04/2020	21:30	Snipe	1	5	0	5	0	0	montane heath; chipping	AOD
BZ091	3	17/04/2020	13:20	Buzzard	1	20	20	0	0	0	improved agricultural grassland; flew low	AOD
BZ092	3	17/04/2020	15:42	Buzzard	1	10	10	0	0	0	improved agricultural grassland; adult	AOD
H002	3	17/04/2020	16:37	Grey Heron	1	45	0	0	45	0	improved agricultural grassland and mixed broadleaved/conifer woodland; travelling	AOD
WS003	3	17/04/2020	16:46	Whooper Swan	28	50	0	0	50	0	improved agricultural grassland, conifer plantation and mixed broadleaved/conifer woodland; flock travelling ne	AOD
BZ093	1	17/04/2020	16:13	Buzzard	1	200	100	100	0	0	conifer plantation and improved agricultural grassland; soaring low	AOD
SN009	3	17/04/2020	21:25	Snipe	1	10	10	0	0	0	montane heath; flying, chipping	AOD
SH012	3	20/04/2020	16:29	Sparrowhawk	1	500	0	200	300	0	conifer plantation; adult female soaring high over site	AOD
LB008	3	20/04/2020	16:30	Lesser Black-backed Gull	10	360	0	60	300	0	conifer plantation; loose flock moving south juvenile and adults	AOD
MA001	3	20/04/2020	17:57	Mallard	1	20	10	10	0	0	conifer plantation and montane heath; adult female calling flew from heather. possible nesting near VP	AOD
RG038	3	20/04/2020	18:04	Red Grouse	1	0	0	0	0	0	montane heath; calling unseen	AOD
BZ094	1	20/04/2020	20:00	Buzzard	1	3	3	0	0	0	conifer plantation; flew low into wd4	AOD
BZ095	4	21/04/2020	15:21	Buzzard	1	60	0	0	60	0	conifer plantation; soaring.	AOD
BZ096	4	21/04/2020	16:00	Buzzard	1	180	0	60	120	0	conifer plantation and montane heath; soaring	AOD
SH013	4	21/04/2020	16:47	Sparrowhawk	1	7	2	5	0	0	conifer plantation; adult male flew out of wd4	AOD

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
SH014	4	21/04/2020	16:45	Sparrowhawk	1	90	0	0	90	0	montane heath; male soaring	AOD
LB009	4	21/04/2020	17:19	Lesser Black-backed Gull	2	70	0	10	60	0	conifer plantation; adult pair flew east	AOD
LB010	4	21/04/2020	17:29	Lesser Black-backed Gull	1	60	0	0	60	0	conifer plantation; juv. travelling	AOD
PE003	4	20/05/2020	09:15	Peregrine Falcon	1	80	0	0	80	0	conifer plantation and montane heath; adult flying over slowly	AOD
LB011	4	20/05/2020	10:43	Lesser Black-backed Gull	3	240	0		240	0	conifer plantation and improved agricultural grassland; adults flying over	AOD
RG039	1	20/05/2020	05:09	Red Grouse	1	-	-	-	-	-	montane heath; call	AOD
RG040	1	20/05/2020	05:12	Red Grouse	1	-	-	-	-	-	montane heath; call	AOD
WK003	4	21/05/2020	04:36	Woodcock	1	15	0	15	0	0	mixed broadleaved/conifer woodland and conifer plantation; roding	AOD
MA002	4	21/05/2020	08:24	Mallard	1	20	0	20	0	0	montane heath; adult male flew se	AOD
BZ097	1	21/05/2020	09:22	Buzzard	1	10	10	0	0	0	conifer plantation; low uphill. flying over.	AOD
SN010	4	21/05/2020	04:35	Snipe	2	-	-	-	-	-	conifer plantation and montane heath; drumming	AOD
WK004	3	25/05/2020	04:25	Woodcock	1	10	0	10	0	0	conifer plantation; roding	AOD
WK005	3	25/05/2020	04:29	Woodcock	2	7	0	7	0	0	conifer plantation and montane heath; 2 roding birds flying close together	AOD
SN011	3	25/05/2020	06:10	Snipe	1	20	0	20	0	0	montane heath; drumming	AOD
LB012	3	25/05/2020	07:25	Lesser Black-backed Gull	1	50	0	30	20	0	conifer plantation; adult flying over	AOD
LB013	3	25/05/2020	09:02	Lesser Black-backed Gull	1	60	0	60	0	0	conifer plantation; juvenile flying over	AOD
RG041	3	25/05/2020	04:19	Red Grouse	2	-	-	-	-	-	montane heath; calling	AOD
RG042	3	25/05/2020	04:25	Red Grouse	1	-	-	-	-	-	montane heath; call	AOD
RG043	3	25/05/2020	04:31	Red Grouse	1	-	-	-	-	-	montane heath; call	AOD
RG044	3	25/05/2020	04:54	Red Grouse	2	-	-	-	-	-	montane heath; call	AOD
SN012	3	25/05/2020	06:23	Snipe	1	-	-	-	-	-	montane heath; chipping	AOD
SN013	3	25/05/2020	08:28	Snipe	1	-	-	-	-	-	montane heath; chipping	AOD
SH015	2	26/05/2020	05:22	Sparrowhawk	1	4	4	0	0	0	montane heath; female hunting	AOD

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
LB014	2	26/05/2020	06:38	Lesser Black-backed Gull	1	30	10	20	0	0	wet grassland; juvenile into field	AOD
LB015	2	26/05/2020	09:24	Lesser Black-backed Gull	1	40	0	20	20	0	conifer plantation; adult flying over	AOD
RG045	2	26/05/2020	04:44	Red Grouse	1	-	-	-	-	-	montane heath; call	AOD
BZ098	1	11/06/2020	16:26	Buzzard	1	180	0	120	60	0	conifer plantation; soaring over wd4	AOD
SH016	1	15/06/2020	10:47	Sparrowhawk	1	100	0	0	100	0	conifer plantation; soaring bird.no age/sex	AOD
BZ099	4	15/06/2020	15:27	Buzzard	1	160	0	0	160	0	conifer plantation, montane heath and wet grassland; soaring from site off towards west	AOD
BZ100	4	15/06/2020	15:29	Buzzard	1	50	0	0	50	0	conifer plantation; different bird flew to same area off site. possible nest area.	AOD
BZ101	4	15/06/2020	16:55	Buzzard	2	40	0	20	20	0	conifer plantation and mixed broadleaved/conifer woodland; same pair flew back together lost in valley.	AOD
BZ102	1	15/06/2020	11:10	Buzzard	1	-	-	-	-	-	conifer plantation; calling	AOD
BZ103	3	25/06/2020	14:55	Buzzard	1	120	0	0	120	0	conifer plantation; soaring	AOD
SN014	3	25/06/2020	19:13	Snipe	1	600	200	300	100	0	montane heath; drumming	AOD
LB016	2	07/07/2020	13:30	Lesser Black-backed Gull	1	40	0	0	40	0	conifer plantation; adult flying over	AOD
LB017	4	07/07/2020	17:43	Lesser Black-backed Gull	1	30	0	0	30	0	conifer plantation; adult flying over	AOD
SN015	3	29/07/2020	11:54	Snipe	1	4	4	0	0	0	montane heath; flushed by sheep short flight	AOD
K041	2	05/08/2020	16:23	Kestrel	1	70	10	60	0	0	montane heath;	AOD
K042	2	05/08/2020	16:33	Kestrel	1	20	0	20	0	0	montane heath;	AOD
K043	2	05/08/2020	16:38	Kestrel	1	50	0	20	30	0	conifer plantation; juvenile same bird again	AOD
K044	2	05/08/2020	16:45	Kestrel	1	30	0	20	10	0	montane heath;	AOD
BZ104	2	05/08/2020	16:56	Buzzard	1	40	0	40	0	0	conifer plantation; mobbing k.	AOD
K045	2	05/08/2020	17:00	Kestrel	2	180	100	80	0	0	conifer plantation; 2 juv. soaring over trees	AOD
K046	2	05/08/2020	17:14	Kestrel	2	600	200	340	60	0	conifer plantation; pair of juvenile foraging	AOD
BZ105	2	05/08/2020	17:01	Buzzard	1	-	-	-	-	-	conifer plantation; juvenile begging call	AOD
BZ106	4	06/08/2020	17:05	Buzzard	1	30	0	0	30	0	conifer plantation; travelling	AOD

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
BZ107	4	06/08/2020	17:07	Buzzard	1	35	0	35	0	0	present	AOD
K047	1	06/08/2020	19:31	Kestrel	1	15	0	0	15	0	conifer plantation; juvenile mobbing raven	AOD
BZ108	1	06/08/2020	19:36	Buzzard	2	50	0	20	30	0	conifer plantation; juvenile begging from adult both then mobbed by raven	AOD
SH017	1	06/08/2020	19:40	Sparrowhawk	1	195	0	195	0	0	conifer plantation and montane heath; male soaring then mobbed by raven	AOD
K048	1	06/08/2020	19:43	Kestrel	1	120	0	90	30	0	conifer plantation; juvenile foraging	AOD
K049	1	06/08/2020	19:44	Kestrel	1	18	0	0	18	0	conifer plantation and montane heath; foraging no age/sex	AOD
BZ109	1	06/08/2020	19:58	Buzzard	1	10	10	0	0	0	wet grassland and conifer plantation; low over fields	AOD
BZ110	1	06/08/2020	20:02	Buzzard	1	20	0	0	20	0	conifer plantation; soaring	AOD
SH018	4	06/08/2020	18:45	Sparrowhawk	1	-	-	-	-	-	conifer plantation; begging call juvenile	AOD
BZ111	4	06/08/2020	20:02	Buzzard	1	-	-	-	-	-	conifer plantation; begging call	AOD
LB018	1	10/08/2020	16:22	Lesser Black-backed Gull	11	70	0	0	0	70	conifer plantation; mixed age flock flying over	AOD
BZ112	3	11/08/2020	17:00	Buzzard	1	30	30	0	0	0	montane heath; mobbed by hooded crow	AOD
SH019	3	11/08/2020	18:44	Sparrowhawk	1	180	0	0	180	0	conifer plantation; soaring	AOD
PE004	3	11/08/2020	19:30	Peregrine Falcon	1	80	0	0	80	0	conifer plantation and montane heath; travelling high no age/sex	AOD
RG046	3	11/08/2020	21:44	Red Grouse	1	-	-	-	-	-	montane heath; call	AOD
BZ113	4	03/09/2020	06:39	Buzzard	1	12	0	12	0	0	conifer plantation; near nest	AOD
SH020	4	03/09/2020	10:16	Sparrowhawk	3	80	20	20	40	0	conifer plantation; 3 juvenile birds flying. likely fledged in area. would be 3rd sparrowhawk nest	AOD
BZ114	2	04/09/2020	06:45	Buzzard	2	15	0	15	0	0	conifer plantation; two flying in fog	AOD
BZ115	2	04/09/2020	06:00	Buzzard	1	-	-	-	-	-	conifer plantation; call, unseen	AOD
PE005	2	13/09/2020	12:48	Peregrine Falcon	1	60	0	0	40	20	conifer plantation; travelling east.no age/sex	AOD
K050	2	13/09/2020	13:04	Kestrel	1	190	0	160	30	0	conifer plantation; juvenile hovering foraging	AOD
BZ116	2	13/09/2020	13:36	Buzzard	1	300	0	100	200	0	conifer plantation; hanging on wind foraging	AOD
SH021	1	13/09/2020	15:09	Sparrowhawk	1	28	28	0	0	0	montane heath; male low downhill hunting	AOD

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
K051	1	13/09/2020	16:16	Kestrel	1	170	0	60	110	0	conifer plantation; juvenile hovering foraging	AOD
H.001	3	14/09/2020	08:46	Grey Heron	1	70	0	70	0	0	conifer plantation; travelling	AOD
GP014	3	14/09/2020	12:22	Golden Plover	6	20	0	0	20	0	montane heath; flock on hill. non breeders back for winter.	AOD
SH022	3	14/09/2020	12:24	Sparrowhawk	1	50	0	25	25	0	conifer plantation; soaring no age/sex	AOD
SH023	3	14/09/2020	12:35	Sparrowhawk	1	40	0	30	10	0	conifer plantation; chasing swallow. gave up and soared. no age/sex	AOD
SN016	3	30/09/2020	06:49	Snipe	1	30	10	20	0	0	montane heath; calling in flight	AOD
RG047	3	30/09/2020	06:42	Red Grouse	1	-	-	-	-	-	montane heath; call, unseen	AOD
RG048	3	30/09/2020	06:46	Red Grouse	1	-	-	-	-	-	montane heath; call, unseen.2nd red grouse from distant from 1st.	AOD
RG049	3	30/09/2020	06:59	Red Grouse	2	-	-	-	-	-	montane heath; call, max 2 calling all morning	AOD

Table 6 Breeding Walkover Survey Data

Ref.	Date	Time	Transect	Species	Number	Habitat and activity	Surveyor
MP003	06/05/2020	13:01		Meadow Pipit	2	wet grassland;	AOD
MP004	06/05/2020	13:03		Meadow Pipit	1	wet grassland;	AOD
MP005	06/05/2020	14:36		Meadow Pipit	2	conifer plantation;	AOD
LB001	06/05/2020	15:41		Lesser Black-backed Gull	1	conifer plantation; flying, adult flying over	AOD
MP006	07/05/2020	13:45		Meadow Pipit	4	montane heath;	AOD
MP007	07/05/2020	13:45		Meadow Pipit	3	montane heath;	AOD
MP008	07/05/2020	13:45		Meadow Pipit	2	montane heath;	AOD
MP009	07/05/2020	13:49		Meadow Pipit	4	montane heath;	AOD
MP010	07/05/2020	13:49		Meadow Pipit	2	montane heath;	AOD
MP011	07/05/2020	13:57		Meadow Pipit	1	montane heath;	AOD
MP012	07/05/2020	14:23		Meadow Pipit	2	montane heath;	AOD
MP013	07/05/2020	14:23		Meadow Pipit	2	montane heath;	AOD
RG003	07/05/2020	14:24		Red Grouse	1	montane heath; call, unseen quick call	AOD
SH009	07/05/2020	15:05		Sparrowhawk	1	conifer plantation; foraging, female	AOD
MP014	07/05/2020	15:18		Meadow Pipit	1	montane heath;	AOD
MP015	07/05/2020	15:54		Meadow Pipit	4	montane heath;	AOD
MP016	07/05/2020	15:54		Meadow Pipit	8	montane heath;	AOD
MP017	07/05/2020	15:54		Meadow Pipit	1	montane heath;	AOD
MP018	07/05/2020	16:21		Meadow Pipit	4	montane heath;	AOD
MP019	07/05/2020	16:45		Meadow Pipit	3	montane heath;	AOD
MP020	07/05/2020	16:45		Meadow Pipit	1	montane heath;	AOD
RG004	07/05/2020	16:45		Red Grouse	1	montane heath; flushed, male	AOD
MP021	07/05/2020	16:46		Meadow Pipit	3	montane heath;	AOD
MP022	07/05/2020	16:46		Meadow Pipit	1	montane heath;	AOD
RG005	07/05/2020	17:02		Red Grouse	1	montane heath; call, unseen calling	AOD
MP023	07/05/2020	17:03		Meadow Pipit	2	montane heath;	AOD
MP024	07/05/2020	17:03		Meadow Pipit	1	montane heath;	AOD
MP025	07/05/2020	17:03		Meadow Pipit	1	montane heath;	AOD

Ref.	Date	Time	Transect	Species	Number	Habitat and activity	Surveyor
LB002	08/05/2020	14:46		Lesser Black-backed Gull	2	conifer plantation; adults flying over	AOD
MP026	08/05/2020	15:24		Meadow Pipit	3	montane heath;	AOD
BZ016	08/05/2020	15:24		Buzzard	2	conifer plantation and montane heath; soaring, pair soaring PCH 4mins.	AOD
MP027	08/05/2020	16:52		Meadow Pipit	3	montane heath;	AOD
MP028	08/05/2020	16:52		Meadow Pipit	4	montane heath;	AOD
MP029	08/05/2020	16:52		Meadow Pipit	1	montane heath;	AOD
MP030	08/05/2020	17:01		Meadow Pipit	1	montane heath;	AOD
MP031	08/05/2020	17:04		Meadow Pipit	4	montane heath; flying, mobbing ck	AOD
LB003	08/05/2020	17:33		Lesser Black-backed Gull	2	montane heath and conifer plantation; flying over, adults PCH. flew south	AOD
MP032	08/05/2020	17:34		Meadow Pipit	4	montane heath;	AOD
MP033	08/05/2020	17:34		Meadow Pipit	2	montane heath;	AOD
MP034	11/05/2020	14:08		Meadow Pipit	2	wet grassland;	AOD
MP035	11/05/2020	14:08		Meadow Pipit	1	wet grassland;	AOD
MP036	11/05/2020	15:16		Meadow Pipit	4	wet grassland;	AOD
MP037	11/05/2020	15:16		Meadow Pipit	2	wet grassland;	AOD
MP038	11/05/2020	15:17		Meadow Pipit	1	wet grassland;	AOD
GL001	11/05/2020	15:31		Grey Wagtail	2	wet grassland; flying, pair calling	AOD
GL002	11/05/2020	15:31		Grey Wagtail	1	conifer plantation; alarm	AOD
BZ017	11/05/2020	15:38		Buzzard	2	conifer plantation and wet grassland; flying, pair soaring	AOD
MP039	11/05/2020	16:40		Meadow Pipit	2	conifer plantation;	AOD
MP040	11/05/2020	17:43		Meadow Pipit	3	montane heath;	AOD
MP041	11/05/2020	17:43		Meadow Pipit	3	montane heath;	AOD
MP042	11/05/2020	17:44		Meadow Pipit	2	montane heath;	AOD
BZ018	16/06/2020	10:41		Buzzard	1	conifer plantation and wet grassland; hunting, caught squirrel? flew with prey ne into wd4	AOD
BZ019	16/06/2020	10:20		Buzzard	1	mixed broadleaved/conifer woodland; soaring, soaring/calling over woods	AOD
MP043	16/06/2020	11:28		Meadow Pipit	3	wet grassland;	AOD
MP044	16/06/2020	11:29		Meadow Pipit	6	wet grassland;	AOD
MP045	16/06/2020	11:29		Meadow Pipit	2	wet grassland;	AOD

Ref.	Date	Time	Transect	Species	Number	Habitat and activity	Surveyor
SH010	16/06/2020	11:43		Sparrowhawk	1	conifer plantation; foraging, male low near probable nest area	AOD
MP046	16/06/2020	16:02		Meadow Pipit	2	montane heath;	AOD
MP047	16/06/2020	16:03		Meadow Pipit	1	montane heath; displaying	AOD
MP048	16/06/2020	16:03		Meadow Pipit	6	montane heath;	AOD
MP049	16/06/2020	16:03		Meadow Pipit	2	montane heath;	AOD
MP050	16/06/2020	16:03		Meadow Pipit	1	montane heath;	AOD
MP051	16/06/2020	15:24		Meadow Pipit	2	conifer plantation;	AOD
MP052	16/06/2020	16:32		Meadow Pipit	5	montane heath;	AOD
MP053	16/06/2020	16:32		Meadow Pipit	1	montane heath; displaying	AOD
GL003	16/06/2020	16:33		Grey Wagtail	1	montane heath;	AOD
SH011	16/06/2020	16:46		Sparrowhawk	1	conifer plantation; hunting, female flushed off ground track.	AOD
BZ020	17/06/2020	11:42		Buzzard	1	montane heath; flying, adult with prey flying west	AOD
MP054	17/06/2020	11:43		Meadow Pipit	2	montane heath;	AOD
MP055	17/06/2020	11:43		Meadow Pipit	1	montane heath;	AOD
MP056	17/06/2020	11:52		Meadow Pipit	1	montane heath;	AOD
MP057	17/06/2020	11:53		Meadow Pipit	2	montane heath;	AOD
MP058	17/06/2020	13:45		Meadow Pipit	3	montane heath;	AOD
MP059	17/06/2020	13:45		Meadow Pipit	2	montane heath;	AOD
SH012	17/06/2020	13:46		Sparrowhawk	2	conifer plantation; begging juvenile, found nest and plucking perch	AOD
SH013	17/06/2020	13:47		Sparrowhawk	1	conifer plantation; alarming, adult alarm call flew near nest	AOD
MP060	17/06/2020	13:00		Meadow Pipit	2	montane heath;	AOD
BZ021	17/06/2020	14:03		Buzzard	1	conifer plantation; flying, flew into forestry	AOD
MP061	17/06/2020	15:21		Meadow Pipit	2	montane heath;	AOD
MP062	17/06/2020	15:22		Meadow Pipit	10	montane heath;	AOD
MP063	17/06/2020	15:22		Meadow Pipit	4	montane heath;	AOD
MP064	17/06/2020	15:22		Meadow Pipit	3	montane heath;	AOD
MP065	17/06/2020	15:22		Meadow Pipit	4	montane heath;	AOD
RG006	17/06/2020	15:31		Red Grouse	1	montane heath; flew 5s low east	AOD
MP066	19/06/2020	13:03		Meadow Pipit	2	montane heath;	AOD

Ref.	Date	Time	Transect	Species	Number	Habitat and activity	Surveyor
LB004	19/06/2020	12:46		Lesser Black-backed Gull	2	conifer plantation; flying, 1adult 1 juvenile over site	AOD
BZ022	19/06/2020	16:04		Buzzard	1	conifer plantation; flying, adult flew from tree.	AOD
GL004	19/06/2020	16:05		Grey Wagtail	2	conifer plantation; alarming, 2 adults alarming	AOD
GL005	19/06/2020	16:33		Grey Wagtail	1	wet grassland;	AOD
MP067	19/06/2020	16:33		Meadow Pipit	6	wet grassland;	AOD
MP068	19/06/2020	17:00		Meadow Pipit	3	wet grassland;	AOD
MP069	22/06/2020	12:29		Meadow Pipit	4	wet grassland;	AOD
SH014	22/06/2020	13:01		Sparrowhawk	1	mixed broadleaved/conifer woodland; foraging, female hunting low between trees	AOD
MP070	22/06/2020	13:02		Meadow Pipit	6	wet grassland;	AOD
MP071	22/06/2020	13:02		Meadow Pipit	1	wet grassland;	AOD
MP072	22/06/2020	13:46		Meadow Pipit	3	montane heath and wet grassland;	AOD
MP073	22/06/2020	13:46		Meadow Pipit	2	montane heath;	AOD
MP074	22/06/2020	13:46		Meadow Pipit	2	wet grassland;	AOD
LB005	22/06/2020	14:28		Lesser Black-backed Gull	1	conifer plantation; flying, adult flying over. flew east	AOD
SM002	22/06/2020	14:34		Sand Martin	12	wet grassland; flying nesting, colony	AOD
BZ023	22/06/2020	15:19		Buzzard	2	conifer plantation; alarming at nest, nest found. adults diving at surveyor	AOD
MP075	22/06/2020	16:15		Meadow Pipit	5	wet grassland;	AOD
MP076	22/06/2020	16:16		Meadow Pipit	2	wet grassland;	AOD
MP077	22/06/2020	17:28		Meadow Pipit	2	wet grassland;	AOD
BZ024	22/06/2020	17:29		Buzzard	1	conifer plantation; flying, soaring	AOD
GL006	22/06/2020	17:45		Grey Wagtail	2	wet grassland;	AOD
MP078	22/06/2020	18:41		Meadow Pipit	3	wet grassland;	AOD
LB006	13/07/2020	12:31		Lesser Black-backed Gull	1	conifer plantation; flying, adult flying over PCH	AOD
SH015	13/07/2020	13:35		Sparrowhawk	1	conifer plantation; flying, male flying over PCH	AOD
LB007	13/07/2020	17:41		Lesser Black-backed Gull	1	conifer plantation; flying, immature flying over	AOD
BZ025	13/07/2020	18:12		Buzzard	1	present	AOD
MP079	14/07/2020	07:55		Meadow Pipit	3	wet grassland;	AOD
LB008	14/07/2020	07:56		Lesser Black-backed Gull	1	conifer plantation; flying, immature flying over	AOD
LB009	14/07/2020	07:58		Lesser Black-backed Gull	1	wet grassland and conifer plantation; flying, adult flying over	AOD

Ref.	Date	Time	Transect	Species	Number	Habitat and activity	Surveyor
GL007	14/07/2020	08:20		Grey Wagtail	3	wet grassland; flying, juvenile and adult	AOD
MP080	14/07/2020	08:20		Meadow Pipit	1	wet grassland;	AOD
MP081	14/07/2020	08:32		Meadow Pipit	2	wet grassland;	AOD
MP082	14/07/2020	08:34		Meadow Pipit	1	wet grassland;	AOD
MP083	14/07/2020	08:34		Meadow Pipit	2	wet grassland;	AOD
MP084	14/07/2020	08:52		Meadow Pipit	2	wet grassland;	AOD
BZ026	13/07/2020	17:35		Buzzard	2	conifer plantation; alarming flying, pair at nest attacking surveyor	AOD
MP085	14/07/2020	11:58		Meadow Pipit	2	wet grassland;	AOD
GL008	14/07/2020	11:58		Grey Wagtail	1	wet grassland;	AOD
MP086	14/07/2020	11:59		Meadow Pipit	2	wet grassland;	AOD
BZ027	14/07/2020	12:15		Buzzard	1	wet grassland; perched, perched long term in heavy rain	AOD
MP087	14/07/2020	12:16		Meadow Pipit	1	wet grassland;	AOD
MP088	14/07/2020	12:16		Meadow Pipit	5	wet grassland;	AOD
K009	14/07/2020	12:49		Kestrel	1	conifer plantation; perched, recently fledged kestrel. First k observed for season. Perched in heavy rain flushed uphill	AOD
MP089	14/07/2020	12:58		Meadow Pipit	1	wet grassland;	AOD
MP090	14/07/2020	12:58		Meadow Pipit	8	wet grassland;	AOD
MP091	14/07/2020	13:00		Meadow Pipit	4	wet grassland;	AOD
MP092	14/07/2020	13:02		Meadow Pipit	3	wet grassland and upland blanket bog;	AOD
MP093	14/07/2020	13:18		Meadow Pipit	3	wet grassland and upland blanket bog;	AOD
MP094	14/07/2020	13:23		Meadow Pipit	2	montane heath;	AOD
MP095	14/07/2020	13:23		Meadow Pipit	1	montane heath;	AOD
MP096	14/07/2020	13:24		Meadow Pipit	6	montane heath;	AOD
MP097	14/07/2020	13:24		Meadow Pipit	1	montane heath;	AOD
MP098	14/07/2020	13:25		Meadow Pipit	1	montane heath;	AOD
MP099	15/07/2020	12:15		Meadow Pipit	3	wet grassland;	AOD
MP100	15/07/2020	12:15		Meadow Pipit	4	wet grassland and montane heath;	AOD
SN013	15/07/2020	12:28		Snipe	1	wet grassland and montane heath; flying, flushed	AOD
SH016	15/07/2020	14:14		Sparrowhawk	1	conifer plantation; begging call, call from nest area. unseen. plucking perch still in use.	AOD

Ref.	Date	Time	Transect	Species	Number	Habitat and activity	Surveyor
MP101	15/07/2020	14:15		Meadow Pipit	2	conifer plantation;	AOD
MP102	15/07/2020	14:16		Meadow Pipit	1	montane heath;	AOD
MP103	15/07/2020	15:31		Meadow Pipit	3	wet grassland;	AOD
MP104	15/07/2020	15:31		Meadow Pipit	1	montane heath;	AOD
SH017	15/07/2020	15:35		Sparrowhawk	1	mixed broadleaved/conifer woodland and conifer plantation; flying, flying over no age/sex	AOD
MP105	15/07/2020	15:49		Meadow Pipit	4	cutover bog;	AOD
MP106	15/07/2020	15:49		Meadow Pipit	2	upland blanket bog;	AOD
MP107	16/07/2020	12:19		Meadow Pipit	4	wet grassland;	AOD
MP108	16/07/2020	12:19		Meadow Pipit	1	wet grassland and montane heath;	AOD
MP109	16/07/2020	12:23		Meadow Pipit	1	montane heath;	AOD
MP110	16/07/2020	12:23		Meadow Pipit	3	montane heath;	AOD
MP111	16/07/2020	14:53		Meadow Pipit	6	montane heath;	AOD
MP112	16/07/2020	14:53		Meadow Pipit	1	montane heath;	AOD
MP113	16/07/2020	15:36		Meadow Pipit	2	montane heath;	AOD
MP114	15/07/2020	15:37		Meadow Pipit	4	montane heath;	AOD
MP115	15/07/2020	15:37		Meadow Pipit	2	montane heath;	AOD
MP116	15/07/2020	15:37		Meadow Pipit	3	montane heath;	AOD
MP117	16/07/2020	16:02		Meadow Pipit	1	montane heath;	AOD
MP118	16/07/2020	16:02		Meadow Pipit	4	montane heath;	AOD
MP119	16/07/2020	17:12		Meadow Pipit	3	montane heath;	AOD
MP120	16/07/2020	17:13		Meadow Pipit	7	montane heath;	AOD
MP121	16/07/2020	17:13		Meadow Pipit	4	montane heath;	AOD
MP122	16/07/2020	17:13		Meadow Pipit	2	montane heath;	AOD
RG007	16/07/2020	17:14		Red Grouse	1	montane heath; call, short call	AOD

Table 7 Breeding Raptor Survey Data

Ref.	BR	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
SH015		22/04/2020	13:12	Sparrowhawk	1	conifer plantation, alarm calling, alarming from suitable nest habitat wd4		AOD
SH016		22/04/2020	13:16	Sparrowhawk	1	conifer plantation, flying, flew from alarm call area. possible nest site		AOD
SH017		22/04/2020	13:27	Sparrowhawk	1	conifer plantation and montane heath, flying, carrying prey.		AOD
SH018		22/04/2020	14:30	Sparrowhawk	1	conifer plantation, flying, female flying low		AOD
SH019		22/04/2020	15:24	Sparrowhawk	1	conifer plantation, carrying prey/flying, carrying prey in nest area.no sex		AOD
SH020		22/04/2020	17:41	Sparrowhawk	1	conifer plantation, soaring, female moving north.pch 40s.		AOD
SH021		23/04/2020	16:34	Sparrowhawk	1	conifer plantation, foraging, female hunting in treetops 4s band 1/2.		AOD
BZ078		24/04/2020	13:29	Buzzard	2	conifer plantation and montane heath, flying/courtship, flying close together calling along hillside.		AOD
BZ079		24/04/2020	14:20	Buzzard	1	conifer plantation, flying, soaring band 2 over wd4		AOD
BZ080		12/05/2020	14:53	Buzzard	1	conifer plantation, flying, flying over		AOD
BZ081		13/05/2020	13:04	Buzzard	2	conifer plantation, flying, pair over hillside.		AOD
BZ082		15/05/2020	12:52	Buzzard	1	montane heath, flying/foraging, foraging along hillside.360s band 1/2.		AOD
BZ083		15/05/2020	12:54	Buzzard	1	montane heath, flying, foraging hovering into wind along hillside. different buzzard to 1st obs.		AOD
SH022		15/05/2020	16:30	Sparrowhawk	1	conifer plantation, alarm call, alarm call from suspected nest area		AOD
BZ084		18/05/2020	13:32	Buzzard	1	conifer plantation, flying, flying over mobbed by hooded crow		AOD
BZ085		19/05/2020	15:09	Buzzard	1	conifer plantation, flying, flew up hill calling		AOD
BZ086		19/05/2020	15:20	Buzzard	3	conifer plantation, flying/displaying, 3 birds calling one bird display flying		AOD
BZ087		03/06/2020	18:45	Buzzard	1	conifer plantation, foraging, near hen harrier nest2		AOD
SH023		04/06/2020	13:28	Sparrowhawk	1	conifer plantation, flying, low hunting male		AOD
BZ088		04/06/2020	15:16	Buzzard	1	conifer plantation, flying, over treetops		AOD
SH024		04/06/2020	15:30	Sparrowhawk	1	montane heath, carrying prey, carrying prey item along hillside		AOD

Ref.	BR	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
SH025		04/06/2020	18:36	Sparrowhawk	1	montane heath, flying, male flying back direction of earlier flight. provisoning flight		AOD
BZ089		08/06/2020	14:01	Buzzard	1	conifer plantation, soaring, over hen harrier nest2 possibly predated		AOD
SH026		08/06/2020	14:26	Sparrowhawk	1	conifer plantation, carrying prey, female into mature wd4 with prey.		AOD
BZ090		08/06/2020	18:18	Buzzard	1	conifer plantation, flying, flew from wd4		AOD
BZ091		12/06/2020	14:04	Buzzard	1	conifer plantation, flying, soaring over wd4		AOD
BZ092		12/06/2020	16:45	Buzzard	1	conifer plantation, flying, over wd4		AOD
BZ093		12/06/2020	14:34	Buzzard	1	conifer plantation, flying, over wd4		AOD
BZ094		02/07/2020	12:30	Buzzard	1	conifer plantation, foraging, flying over same spot dropping occasionally unusual behaviour. possible hen harrier fledgling unseen?		AOD
BZ095		02/07/2020	15:11	Buzzard	1	conifer plantation, flying, mobbed by hen harrier male		AOD
BZ096		02/07/2020	16:45	Buzzard	2	conifer plantation, mobbing, pair calling/flying/perching in hen harrier nest area. agitated behaviour. no hen harrier seen however		AOD
BZ097		06/07/2020	18:24	Buzzard	1	conifer plantation, flying, mobbed by hen harrier pair, female hen harrier drove it west.		AOD
BZ098		10/07/2020	10:35	Buzzard	2	conifer plantation and wet grassland, flying, pair soaring/calling		AOD
BZ099		10/07/2020	14:00	Buzzard	1	conifer plantation and montane heath, foraging over hillside		AOD
BZ100		27/07/2020	11:30	Buzzard	2	conifer plantation, alarming at nest		AOD
SH027		27/07/2020	13:00	Sparrowhawk	1	conifer plantation, call, begging juvenile call		AOD
BZ101		27/07/2020	15:46	Buzzard	1	conifer plantation, flying, flying		AOD
K008		28/07/2020	12:46	Kestrel	1	montane heath and conifer plantation, flying, k juvenile flying over mobbed by meadow pipit		AOD
BZ102		28/07/2020	14:55	Buzzard	1	montane heath, flying, foraging downhill		AOD
BZ103		28/07/2020	16:10	Buzzard	1	conifer plantation, flying, flying and alarm calling low		AOD
BZ104		31/07/2020	11:30	Buzzard	1	conifer plantation, f/p, juvenile perched on stump flew off into wd4 alarming. breeding success confirmed.		AOD

Ref.	BR	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
BZ105		31/07/2020	13:43	Buzzard	3	conifer plantation, calling/flying, 2 juvenile begging in wd4 and adult calling across the road to them. likely chicks from known nest.		AOD

Table 8 Breeding Woodcock Survey Data

Ref.	Transect	Date	Time	Species	Number	Habitat and activity	Surveyor
WK009		28/05/2020	22:27	Woodcock	1	conifer plantation, roding	AOD
WK010		28/05/2020	22:33	Woodcock	1	conifer plantation, roding	AOD
WK011		28/05/2020	22:36	Woodcock	1	conifer plantation, roding	AOD
WK012		28/05/2020	22:59	Woodcock	1	conifer plantation, roding	AOD
WK013		29/05/2020	22:43	Woodcock	1	conifer plantation, roding	AOD
WK014		10/06/2020	22:15	Woodcock	1	conifer plantation, roding	AOD
WK015		10/06/2020	22:25	Woodcock	1	conifer plantation, roding	AOD
WK016		10/06/2020	22:33	Woodcock	1	conifer plantation, roding	AOD
WK017		10/06/2020	22:56	Woodcock	1	conifer plantation, roding	AOD
WK018		10/06/2020	23:10	Woodcock	1	conifer plantation, roding	AOD
WK019		24/06/2020	22:25	Woodcock	1	conifer plantation and mixed broadleaved/conifer woodland, roding	AOD
WK020		24/06/2020	22:29	Woodcock	1	conifer plantation, roding	AOD
WK021		24/06/2020	22:45	Woodcock	1	conifer plantation, roding	AOD
WK022		24/06/2020	22:51	Woodcock	1	conifer plantation, roding	AOD
WK023		24/06/2020	22:59	Woodcock	1	conifer plantation, roding	AOD
WK024		24/06/2020	23:09	Woodcock	1	conifer plantation, roding	AOD
WK025		25/06/2020	22:22	Woodcock	1	conifer plantation, roding	AOD
WK026		25/06/2020	22:57	Woodcock	1	conifer plantation, roding	AOD

Table 9 Incidental Survey Data

Ref.	Location	Date	Species	Number	Habitat and activity	Surveyor
SN024	Vantage Point Survey; VP4	21/04/2020	Snipe	3	present	AOD
RG005	Breeding Raptor Survey;	23/04/2020	Red Grouse	1	montane heath; call, unseen calling bird	AOD
LB016	Breeding Raptor Survey;	23/04/2020	Lesser Black-backed Gull	1	improved agricultural grassland and montane heath; travelling, adult	AOD
LB017	Breeding Raptor Survey;	23/04/2020	Lesser Black-backed Gull	1	conifer plantation; flying, adult flying over	AOD
SN025	Breeding Raptor Survey;	24/04/2020	Snipe	1	wet grassland; flying, flushed on hill	AOD
GP002	Breeding Raptor Survey;	24/04/2020	Golden Plover	86	montane heath; flying, flock flushed on hilltop settled north side dough. some in breeding plumage.80s band1/2	AOD
LB018	Breeding Raptor Survey;	28/04/2020	Lesser Black-backed Gull	2	conifer plantation; flying, adults flying over.pch.	AOD
LB019	Breeding Raptor Survey;	29/04/2020	Lesser Black-backed Gull	2	conifer plantation; flying, adults flying over	AOD
CM001	Breeding Raptor Survey;	12/05/2020	Common Gull	3	conifer plantation and improved agricultural grassland; flying, flying over	AOD
SN026	Breeding Raptor Survey;	13/05/2020	Snipe	1	conifer plantation and wet grassland; drumming, drumming bird then perched chipping on post.	AOD
RG006	Breeding Raptor Survey;	18/05/2020	Red Grouse	1	montane heath; call, unseen	AOD
SN027	Breeding Raptor Survey;	18/05/2020	Snipe	2	upland blanket bog and montane heath; chipping, 2 birds chipping flying over bog.	AOD
SN028	Breeding Raptor Survey;	19/05/2020	Snipe	2	montane heath; chipping, 2 birds chipping	AOD
LB020	Breeding Raptor Survey;	19/05/2020	Lesser Black-backed Gull	6	improved agricultural grassland; flying/feeding, 6 adults feeding flushed from field.	AOD
SN029	Vantage Point Survey; VP1	20/05/2020	Snipe	1	present	AOD
SN030	Vantage Point Survey; VP4	21/05/2020	Snipe	2	present	AOD
SN031	Vantage Point Survey; VP3	25/05/2020	Snipe	2	present	AOD
LB021	Breeding Raptor Survey;	02/06/2020	Lesser Black-backed Gull	1	conifer plantation; flying, travelling over	AOD

Ref.	Location	Date	Species	Number	Habitat and activity	Surveyor
H.003	Breeding Raptor Survey;	03/06/2020	Grey Heron	1	conifer plantation; flying, travelling low	AOD
RG007	Breeding Raptor Survey;	04/06/2020	Red Grouse	1	montane heath; flying, flushed	AOD
LB022	Breeding Raptor Survey;	04/06/2020	Lesser Black-backed Gull	1	montane heath and improved agricultural grassland; flying, flying calling in flight	AOD
LB023	Breeding Raptor Survey;	08/06/2020	Lesser Black-backed Gull	6	improved agricultural grassland; flying, flying	AOD
LB024	Breeding Raptor Survey;	08/06/2020	Lesser Black-backed Gull	3	improved agricultural grassland; flying, flying over	AOD
SN032	Breeding Raptor Survey;	09/06/2020	Snipe	1	montane heath; call, call	AOD
SN033	Breeding Raptor Survey;	09/06/2020	Snipe	1	montane heath; drumming, drumming	AOD
SN034	Breeding Raptor Survey;	09/06/2020	Snipe	1	wet grassland; drumming, drumming then perched chipping on post	AOD
SN035	Breeding Raptor Survey;	12/06/2020	Snipe	1	montane heath; calling, chipping in flight	AOD
LB025	Breeding Raptor Survey;	12/06/2020	Lesser Black-backed Gull	2	montane heath and conifer plantation; flying, flying over low	AOD
SN036	Breeding Raptor Survey;	09/07/2020	Snipe	1	montane heath; flying, flushed	AOD
RG008	Breeding Raptor Survey;	09/07/2020	Red Grouse	1	montane heath; flying, flushed	AOD
LB026	Breeding Raptor Survey;	09/07/2020	Lesser Black-backed Gull	4	improved agricultural grassland; feeding, adults feeding in silage	AOD
LB027	Breeding Raptor Survey;	10/07/2020	Lesser Black-backed Gull	2	improved agricultural grassland; flying, adults flying over	AOD
LB028	Breeding Raptor Survey;	27/07/2020	Lesser Black-backed Gull	2	conifer plantation; flying, flying over adults	AOD
RG009	Breeding Raptor Survey;	28/07/2020	Red Grouse	1	montane heath; flying, flew uphill	AOD
RG010	Breeding Raptor Survey;	28/07/2020	Red Grouse	1	montane heath; flying, flushed	AOD

Table 10 Non-target Species

Date	Survey	Species	Notes	Surveyor
16/04/2020	Vantage Point Survey, 2	Meadow Pipit		AOD
16/04/2020	Vantage Point Survey, 2	House Martin		AOD
16/04/2020	Vantage Point Survey, 2	Raven		AOD
16/04/2020	Vantage Point Survey, 2	Sand Martin		AOD
16/04/2020	Vantage Point Survey, 2	Barn Swallow		AOD
16/04/2020	Vantage Point Survey, 2	Chaffinch		AOD
16/04/2020	Vantage Point Survey, 2	Hooded Crow		AOD
16/04/2020	Vantage Point Survey, 2	Woodpigeon		AOD
16/04/2020	Vantage Point Survey, 2	Skylark		AOD
17/04/2020	Vantage Point Survey, 1	Hooded Crow		AOD
17/04/2020	Vantage Point Survey, 1	Raven		AOD
17/04/2020	Vantage Point Survey, 1	Meadow Pipit		AOD
17/04/2020	Vantage Point Survey, 1	Woodpigeon		AOD
17/04/2020	Vantage Point Survey, 1	Starling		AOD
17/04/2020	Vantage Point Survey, 1	Chaffinch		AOD
17/04/2020	Vantage Point Survey, 1	Willow Warbler		AOD
17/04/2020	Vantage Point Survey, 3	Meadow Pipit		AOD
17/04/2020	Vantage Point Survey, 3	Raven		AOD
17/04/2020	Vantage Point Survey, 3	Hooded Crow		AOD
17/04/2020	Vantage Point Survey, 3	Blackbird		AOD
17/04/2020	Vantage Point Survey, 3	Song Thrush		AOD
17/04/2020	Vantage Point Survey, 3	Starling		AOD
17/04/2020	Vantage Point Survey, 3	Cuckoo		AOD
20/04/2020	Vantage Point Survey, 3	Sand Martin		AOD
20/04/2020	Vantage Point Survey, 3	Meadow Pipit		AOD
20/04/2020	Vantage Point Survey, 3	Song Thrush		AOD
20/04/2020	Vantage Point Survey, 3	Mistle Thrush		AOD
20/04/2020	Vantage Point Survey, 3	Starling		AOD
20/04/2020	Vantage Point Survey, 3	Robin		AOD
20/04/2020	Vantage Point Survey, 3	Wren		AOD
20/04/2020	Vantage Point Survey, 1	Raven		AOD

Date	Survey	Species	Notes	Surveyor
20/04/2020	Vantage Point Survey, 1	Meadow Pipit		AOD
20/04/2020	Vantage Point Survey, 1	Skylark		AOD
20/04/2020	Vantage Point Survey, 1	Hooded Crow		AOD
20/04/2020	Vantage Point Survey, 1	Barn Swallow		AOD
20/04/2020	Vantage Point Survey, 1	Sand Martin		AOD
20/04/2020	Vantage Point Survey, 1	Robin		AOD
20/05/2020	Vantage Point Survey, 1	Raven		AOD
20/05/2020	Vantage Point Survey, 1	Meadow Pipit		AOD
20/05/2020	Vantage Point Survey, 1	Skylark		AOD
20/05/2020	Vantage Point Survey, 1	Wren		AOD
20/05/2020	Vantage Point Survey, 1	Blackbird		AOD
20/05/2020	Vantage Point Survey, 1	Pheasant		AOD
20/05/2020	Vantage Point Survey, 1	Song Thrush		AOD
20/05/2020	Vantage Point Survey, 1	Grey Wagtail		AOD
20/05/2020	Vantage Point Survey, 4	Woodpigeon		AOD
20/05/2020	Vantage Point Survey, 4	Hooded Crow		AOD
20/05/2020	Vantage Point Survey, 4	Meadow Pipit		AOD
20/05/2020	Vantage Point Survey, 4	Willow Warbler		AOD
20/05/2020	Vantage Point Survey, 4	Chiffchaff		AOD
20/05/2020	Vantage Point Survey, 4	Cuckoo		AOD
20/05/2020	Vantage Point Survey, 4	Barn Swallow		AOD
20/05/2020	Vantage Point Survey, 4	Wren		AOD
20/05/2020	Vantage Point Survey, 4	Sedge Warbler		AOD
20/05/2020	Vantage Point Survey, 4	Grasshopper Warbler		AOD
20/05/2020	Vantage Point Survey, 4	Raven		AOD
20/05/2020	Vantage Point Survey, 4	Whitethroat		AOD
21/05/2020	Vantage Point Survey, 4	Woodpigeon		AOD
21/05/2020	Vantage Point Survey, 4	Blackbird		AOD
21/05/2020	Vantage Point Survey, 4	Whitethroat		AOD
21/05/2020	Vantage Point Survey, 4	Robin		AOD
21/05/2020	Vantage Point Survey, 4	Grasshopper Warbler		AOD

Date	Survey	Species	Notes	Surveyor
21/05/2020	Vantage Point Survey, 4	Meadow Pipit		AOD
21/05/2020	Vantage Point Survey, 4	Hooded Crow		AOD
21/05/2020	Vantage Point Survey, 4	Willow Warbler		AOD
21/05/2020	Vantage Point Survey, 4	Chiffchaff		AOD
21/05/2020	Vantage Point Survey, 4	Song Thrush		AOD
21/05/2020	Vantage Point Survey, 4	Wren		AOD
21/05/2020	Vantage Point Survey, 4	Chaffinch		AOD
21/05/2020	Vantage Point Survey, 4	Barn Swallow		AOD
21/05/2020	Vantage Point Survey, 4	Jay		AOD
21/05/2020	Vantage Point Survey, 1	Sand Martin		AOD
21/05/2020	Vantage Point Survey, 1	Barn Swallow		AOD
21/05/2020	Vantage Point Survey, 1	Meadow Pipit		AOD
21/05/2020	Vantage Point Survey, 1	Skylark		AOD
21/05/2020	Vantage Point Survey, 1	Woodpigeon		AOD
25/05/2020	Vantage Point Survey, 3	Cuckoo		AOD
25/05/2020	Vantage Point Survey, 3	Raven		AOD
25/05/2020	Vantage Point Survey, 3	Meadow Pipit		AOD
25/05/2020	Vantage Point Survey, 3	Skylark		AOD
25/05/2020	Vantage Point Survey, 3	Lesser Redpoll		AOD
25/05/2020	Vantage Point Survey, 3	Siskin		AOD
25/05/2020	Vantage Point Survey, 3	Barn Swallow		AOD
25/05/2020	Vantage Point Survey, 3	Sand Martin		AOD
26/05/2020	Vantage Point Survey, 2	Cuckoo		AOD
26/05/2020	Vantage Point Survey, 2	Meadow Pipit		AOD
26/05/2020	Vantage Point Survey, 2	Blackbird		AOD
26/05/2020	Vantage Point Survey, 2	Robin		AOD
10/06/2020	Vantage Point Survey, 4	Song Thrush		AOD
10/06/2020	Vantage Point Survey, 4	Blackbird		AOD
10/06/2020	Vantage Point Survey, 4	Willow Warbler		AOD
10/06/2020	Vantage Point Survey, 4	Chiffchaff		AOD
10/06/2020	Vantage Point Survey, 4	Robin		AOD

Date	Survey	Species	Notes	Surveyor
10/06/2020	Vantage Point Survey, 4	Blackcap		AOD
10/06/2020	Vantage Point Survey, 4	Woodpigeon		AOD
11/06/2020	Vantage Point Survey, 1	Meadow Pipit		AOD
11/06/2020	Vantage Point Survey, 1	Skylark		AOD
11/06/2020	Vantage Point Survey, 1	Barn Swallow		AOD
11/06/2020	Vantage Point Survey, 1	Sand Martin		AOD
11/06/2020	Vantage Point Survey, 1	Lesser Redpoll		AOD
15/06/2020	Vantage Point Survey, 1	Meadow Pipit		AOD
15/06/2020	Vantage Point Survey, 1	Willow Warbler		AOD
15/06/2020	Vantage Point Survey, 1	Chaffinch		AOD
15/06/2020	Vantage Point Survey, 1	Sedge Warbler		AOD
15/06/2020	Vantage Point Survey, 1	Barn Swallow		AOD
15/06/2020	Vantage Point Survey, 1	Sand Martin		AOD
15/06/2020	Vantage Point Survey, 1	Lesser Redpoll		AOD
15/06/2020	Vantage Point Survey, 1	Raven		AOD
15/06/2020	Vantage Point Survey, 1	Skylark		AOD
15/06/2020	Vantage Point Survey, 4	Chiffchaff		AOD
15/06/2020	Vantage Point Survey, 4	Willow Warbler		AOD
15/06/2020	Vantage Point Survey, 4	Wren		AOD
15/06/2020	Vantage Point Survey, 4	Skylark		AOD
15/06/2020	Vantage Point Survey, 4	Woodpigeon		AOD
15/06/2020	Vantage Point Survey, 4	Raven		AOD
15/06/2020	Vantage Point Survey, 4	Hooded Crow		AOD
15/06/2020	Vantage Point Survey, 4	Chaffinch		AOD
15/06/2020	Vantage Point Survey, 4	Robin		AOD
23/06/2020	Vantage Point Survey, 2	Meadow Pipit		AOD
23/06/2020	Vantage Point Survey, 2	Raven		AOD
23/06/2020	Vantage Point Survey, 2	Skylark		AOD
23/06/2020	Vantage Point Survey, 2	Barn Swallow		AOD
23/06/2020	Vantage Point Survey, 2	Sand Martin		AOD
23/06/2020	Vantage Point Survey, 2	Mistle Thrush		AOD

Date	Survey	Species	Notes	Surveyor
23/06/2020	Vantage Point Survey, 2	Song Thrush		AOD
23/06/2020	Vantage Point Survey, 2	Starling		AOD
24/06/2020	Vantage Point Survey, 2	Sand Martin		AOD
24/06/2020	Vantage Point Survey, 2	Barn Swallow		AOD
24/06/2020	Vantage Point Survey, 2	Sedge Warbler		AOD
24/06/2020	Vantage Point Survey, 2	Meadow Pipit		AOD
24/06/2020	Vantage Point Survey, 2	Lesser Redpoll		AOD
24/06/2020	Vantage Point Survey, 2	Skylark		AOD
24/06/2020	Vantage Point Survey, 2	Starling		AOD
24/06/2020	Vantage Point Survey, 2	Blackbird		AOD
25/06/2020	Vantage Point Survey, 3	Meadow Pipit		AOD
25/06/2020	Vantage Point Survey, 3	Barn Swallow		AOD
25/06/2020	Vantage Point Survey, 3	Sedge Warbler		AOD
25/06/2020	Vantage Point Survey, 3	Chaffinch		AOD
25/06/2020	Vantage Point Survey, 3	Wren		AOD
25/06/2020	Vantage Point Survey, 3	Blackbird		AOD
25/06/2020	Vantage Point Survey, 3	Whitethroat		AOD
07/07/2020	Vantage Point Survey, 2	Meadow Pipit		AOD
07/07/2020	Vantage Point Survey, 2	Skylark		AOD
07/07/2020	Vantage Point Survey, 2	Blackbird		AOD
07/07/2020	Vantage Point Survey, 2	Wren		AOD
07/07/2020	Vantage Point Survey, 2	Mistle Thrush		AOD
07/07/2020	Vantage Point Survey, 2	Barn Swallow		AOD
07/07/2020	Vantage Point Survey, 4	Meadow Pipit		AOD
07/07/2020	Vantage Point Survey, 4	Blackbird		AOD
07/07/2020	Vantage Point Survey, 4	Wren		AOD
07/07/2020	Vantage Point Survey, 4	Mistle Thrush		AOD
07/07/2020	Vantage Point Survey, 4	Robin		AOD
07/07/2020	Vantage Point Survey, 4	Willow Warbler		AOD
07/07/2020	Vantage Point Survey, 4	Barn Swallow		AOD
07/07/2020	Vantage Point Survey, 4	Woodpigeon		AOD

Date	Survey	Species	Notes	Surveyor
08/07/2020	Vantage Point Survey, 2	Raven		AOD
08/07/2020	Vantage Point Survey, 2	Hooded Crow		AOD
08/07/2020	Vantage Point Survey, 2	Barn Swallow		AOD
08/07/2020	Vantage Point Survey, 2	Meadow Pipit		AOD
08/07/2020	Vantage Point Survey, 2	Skylark		AOD
08/07/2020	Vantage Point Survey, 2	Pied Wagtail		AOD
08/07/2020	Vantage Point Survey, 1	Meadow Pipit		AOD
08/07/2020	Vantage Point Survey, 1	Mistle Thrush		AOD
08/07/2020	Vantage Point Survey, 1	Sand Martin		AOD
08/07/2020	Vantage Point Survey, 1	Song Thrush		AOD
08/07/2020	Vantage Point Survey, 1	Wren		AOD
09/07/2020	Vantage Point Survey, 4	Woodpigeon		AOD
09/07/2020	Vantage Point Survey, 4	Hooded Crow		AOD
09/07/2020	Vantage Point Survey, 4	Barn Swallow		AOD
09/07/2020	Vantage Point Survey, 4	Whitethroat		AOD
09/07/2020	Vantage Point Survey, 4	Sand Martin		AOD
09/07/2020	Vantage Point Survey, 4	Song Thrush		AOD
09/07/2020	Vantage Point Survey, 4	Blackbird		AOD
09/07/2020	Vantage Point Survey, 4	Robin		AOD
09/07/2020	Vantage Point Survey, 4	Magpie		AOD
09/07/2020	Vantage Point Survey, 4	Starling		AOD
20/07/2020	Vantage Point Survey, 1	Sand Martin		AOD
20/07/2020	Vantage Point Survey, 1	Barn Swallow		AOD
20/07/2020	Vantage Point Survey, 1	Meadow Pipit		AOD
20/07/2020	Vantage Point Survey, 1	Pied Wagtail		AOD
20/07/2020	Vantage Point Survey, 1	Woodpigeon		AOD
20/07/2020	Vantage Point Survey, 1	Hooded Crow		AOD
29/07/2020	Vantage Point Survey, 3	Meadow Pipit		AOD
29/07/2020	Vantage Point Survey, 3	Skylark		AOD
29/07/2020	Vantage Point Survey, 3	Raven		AOD
29/07/2020	Vantage Point Survey, 3	Lesser Redpoll		AOD

Date	Survey	Species	Notes	Surveyor
29/07/2020	Vantage Point Survey, 3	Woodpigeon		AOD
29/07/2020	Vantage Point Survey, 3	Jay		AOD
05/08/2020	Vantage Point Survey, 2	Meadow Pipit		AOD
05/08/2020	Vantage Point Survey, 2	Barn Swallow		AOD
05/08/2020	Vantage Point Survey, 2	Raven		AOD
05/08/2020	Vantage Point Survey, 2	Skylark		AOD
05/08/2020	Vantage Point Survey, 2	Swift		AOD
05/08/2020	Vantage Point Survey, 2	Hooded Crow		AOD
05/08/2020	Vantage Point Survey, 2	Lesser Redpoll		AOD
05/08/2020	Vantage Point Survey, 2	Blackbird		AOD
05/08/2020	Vantage Point Survey, 2	Starling		AOD
06/08/2020	Vantage Point Survey, 4	Barn Swallow		AOD
06/08/2020	Vantage Point Survey, 4	Blackbird		AOD
06/08/2020	Vantage Point Survey, 1	Barn Swallow		AOD
06/08/2020	Vantage Point Survey, 1	Swift		AOD
06/08/2020	Vantage Point Survey, 1	Meadow Pipit		AOD
06/08/2020	Vantage Point Survey, 1	House Martin		AOD
06/08/2020	Vantage Point Survey, 1	Raven		AOD
10/08/2020	Vantage Point Survey, 1	Woodpigeon		AOD
10/08/2020	Vantage Point Survey, 1	Raven		AOD
10/08/2020	Vantage Point Survey, 1	Hooded Crow		AOD
10/08/2020	Vantage Point Survey, 1	Meadow Pipit		AOD
10/08/2020	Vantage Point Survey, 4	Raven		AOD
10/08/2020	Vantage Point Survey, 4	Barn Swallow		AOD
10/08/2020	Vantage Point Survey, 4	Blackbird		AOD
11/08/2020	Vantage Point Survey, 3	Barn Swallow		AOD
11/08/2020	Vantage Point Survey, 3	Mistle Thrush		AOD
11/08/2020	Vantage Point Survey, 3	Lesser Redpoll		AOD
11/08/2020	Vantage Point Survey, 3	Stonechat		AOD
11/08/2020	Vantage Point Survey, 3	Woodpigeon		AOD
11/08/2020	Vantage Point Survey, 3	Meadow Pipit		AOD

Date	Survey	Species	Notes	Surveyor
11/08/2020	Vantage Point Survey, 3	Wren		AOD
03/09/2020	Vantage Point Survey, 4	Raven		AOD
03/09/2020	Vantage Point Survey, 4	Jay		AOD
03/09/2020	Vantage Point Survey, 4	Barn Swallow		AOD
03/09/2020	Vantage Point Survey, 4	Blackbird		AOD
03/09/2020	Vantage Point Survey, 4	Robin		AOD
03/09/2020	Vantage Point Survey, 4	Hooded Crow		AOD
03/09/2020	Vantage Point Survey, 4	Starling		AOD
03/09/2020	Vantage Point Survey, 4	Magpie		AOD
03/09/2020	Vantage Point Survey, 4	Wren		AOD
04/09/2020	Vantage Point Survey, 2	Raven		AOD
04/09/2020	Vantage Point Survey, 2	Barn Swallow		AOD
04/09/2020	Vantage Point Survey, 2	Meadow Pipit		AOD
13/09/2020	Vantage Point Survey, 2	Raven		AOD
13/09/2020	Vantage Point Survey, 2	Barn Swallow		AOD
13/09/2020	Vantage Point Survey, 2	Meadow Pipit		AOD
13/09/2020	Vantage Point Survey, 1	Raven		AOD
13/09/2020	Vantage Point Survey, 1	Barn Swallow		AOD
13/09/2020	Vantage Point Survey, 1	Meadow Pipit		AOD
13/09/2020	Vantage Point Survey, 1	Wren		AOD
14/09/2020	Vantage Point Survey, 1	Blackbird		AOD
14/09/2020	Vantage Point Survey, 1	Raven		AOD
14/09/2020	Vantage Point Survey, 1	Meadow Pipit		AOD
14/09/2020	Vantage Point Survey, 3	Pied Wagtail		AOD
14/09/2020	Vantage Point Survey, 3	Meadow Pipit		AOD
14/09/2020	Vantage Point Survey, 3	Lesser Redpoll		AOD
14/09/2020	Vantage Point Survey, 3	Mistle Thrush		AOD
14/09/2020	Vantage Point Survey, 3	Blackbird		AOD
14/09/2020	Vantage Point Survey, 3	Woodpigeon		AOD
30/09/2020	Vantage Point Survey, 3	Magpie		AOD
30/09/2020	Vantage Point Survey, 3	Hooded Crow		AOD

Date	Survey	Species	Notes	Surveyor
30/09/2020	Vantage Point Survey, 3	Raven		AOD
30/09/2020	Vantage Point Survey, 3	Barn Swallow		AOD
30/09/2020	Vantage Point Survey, 3	Robin		AOD
30/09/2020	Vantage Point Survey, 3	Lesser Redpoll		AOD
30/09/2020	Vantage Point Survey, 3	Meadow Pipit		AOD
30/09/2020	Vantage Point Survey, 3	Jay		AOD
30/09/2020	Vantage Point Survey, 1	Raven		AOD
30/09/2020	Vantage Point Survey, 1	Meadow Pipit		AOD
30/09/2020	Vantage Point Survey, 1	Starling		AOD
30/09/2020	Vantage Point Survey, 1	Grey Wagtail		AOD
30/09/2020	Vantage Point Survey, 1	Robin		AOD
30/09/2020	Vantage Point Survey, 1	Blackbird		AOD

APPENDIX 3

CONFIDENTIAL SURVEY DATA

Appendix 6-3

Bird Survey Report Winter 2020-21

Planning and Environmental Consultants

Winter Bird Survey Report 2020-2021

Lissinagroagh Wind Farm, Co. Leitrim



DOCUMENT DETAILS

Client:	**FuturEnergy Ireland**
Project Title:	**Lissinagroagh Wind Farm, Co. Leitrim**
Project Number:	**200217-a**
Document Title:	**Winter Bird Survey Report 2020-2021**
Document File Name:	**Lissinagroagh Winter Season 2020-2021 Report - F - 2025.01.08 - 200217-a**
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Planning and Environmental Consultants

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01	Draft	23/09/2024	ZOC	PC
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03	Final	08/01/2025	ZOC	PM

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1. SUMMARY

Ornithological surveys have been undertaken at the site of Lissinagroagh Wind Farm, Co. Leitrim, since September 2017. This report outlines the findings from surveys completed during the 2020-2021 winter season. The following surveys were undertaken:

- Vantage Point Surveys
- Winter Walkover Surveys
- Hen Harrier Roost Surveys

The key observation during the survey period was related to a possible red grouse breeding territory identified within 500m of the site.

2. INTRODUCTION

MKO were appointed to carry out bird surveys at Lissinagroagh Wind Farm, Co. Leitrim for the 2020-2021 winter season. This report describes the ornithological survey methods employed and survey data collected at Lissinagroagh Wind Farm, Co. Leitrim for the period from October 2020 to March 2021 inclusive.

2.1 Site Description

The site is located 3km northeast of Manerhamilton (Grid Ref: G 90949 42157). The dominant habitat onsite is conifer plantation and upland blanket bog with accompanying smaller areas of mixed conifer woodland and heath. The wider surroundings are predominantly improved agricultural grassland and wet grassland.

2.2 Details of the Proposed Development

The total area of the development is approximately 152 hectares. Figure 1 shows the wind farm site boundary.

2.3 Purpose of this Report

This report describes the ornithological survey methods employed and survey data collected at Lissinagroagh Wind Farm for the period October 2020 to March 2021 inclusive. This report aims to provide robust baseline ornithological survey data for the wintering season. This data will be used to inform a separate ecological impact assessment and appropriate assessment for the proposed development.

2.4 Relevant Legislation

The following key legislative provisions are applicable to wild birds in Ireland: Irish Wildlife Act 1976 (revised).; the Birds Directive (EU Directive 2009/147/EC on the conservation of wild birds); the European Communities (Birds and Natural Habitats) Regulations 2011, as amended (S.I. no. 477 of 2011) and the International Convention on Wetlands of International Importance (the Ramsar Convention), 1971.

3. METHODS

3.1 Scope

3.1.1 Description of Study Area

The ornithology study area was defined as a 500m radius of the viable area for turbines (Figure 2-1). This boundary accounts for both detecting birds that use the wind farm site occasionally and spatial inaccuracies in observational data, as well as ancillary structures. The ornithology study area was used for Vantage Point Surveys, following Scottish Natural Heritage (SNH; now NatureScot) 2017 guidance that flight activity surveys encompass an area extending 500m beyond the potential outermost proposed turbines. A 500m radius of the ornithology study area boundary was used for Winter Walkover Surveys, as SNH (2017) does not prescribe a specific winter walkover methodology, the methodology was broadly based on breeding bird survey methodologies described in Bibby *et al.* (2000) and Gilbert *et al.* (1998). A 2km radius of the ornithology study area boundary was used for Hen Harrier Roost Surveys, based on SNH (2017), Gilbert et al. (1998) and O'Donoghue (2019).

3.1.2 Ecological Features Considered

Ecological features considered in the scope of the surveys were the habitats present on-site and, in the hinterland, as reviewed by aerial photography and reconnaissance visits, and the Special Protection Areas (SPA) designated under the Birds and Habitats (92/43/EEC) Directives Natura 2000 network within foraging range for SCI species and/or 15km of the site. Bird species' ecological importance and nature conservation interest was also considered. Species of conservation concern included those listed on Annex I of the Birds Directive that occur in Ireland, species that are a Special Conservation Interest (SCI) of SPAs within foraging range for SCI species and/or 15km of the site, species on the Red List of Birds of Conservation Concern in Ireland (Gilbert *et al.,* 2021) and all raptor species that occur in Ireland, because these species are particularly sensitive to wind farm developments.

3.1.3 Consultation

MKO undertook a consultation exercise to inform the scope of the surveys. Table 3-1 provides a list of the organisations consulted and notes where responses have been received.

Table 3-1 Consultation Response Summary

No.	Consultee	Response to Consultation
1	Birdwatch Ireland	No response
2	National Parks & Wildlife Service	Initial response received 18/06/2018. Confirmation received 30/12/2019 from NPWS that no more recent information was available.

3.2 Desk Study

A comprehensive desk study was undertaken prior to surveys to search for any relevant information on species of conservation concern which potentially use the study area. The assessment included a thorough review of the available ornithological data including:

- Review of online web-mappers from the National Parks and Wildlife Service (NPWS) and National Biodiversity Data Centre (NBDC);
- Review of Irish Wetland Bird Survey (I-WeBS) data;
- Review of the Bird Atlas (Balmer *et al.,* 2013);

- Review of specially requested records from the NPWS Rare and Protected Species Database.

3.3 Field Surveys

The approach to wintering bird surveys for the proposed wind farm is based on recommendations given in Scottish Natural Heritage (SNH; now NatureScot) 2017 guidance (SNH, 2017). This guidance is recognised as standard good practice guidance throughout the UK and Ireland for surveying birds to inform impact assessment for onshore wind farms. Field surveys were undertaken from October 2020 to March 2021 inclusive. Individual survey types are described below.

3.3.1 Vantage Point Surveys

Vantage point surveys were undertaken following the guidance of SNH (2017) from four vantage point locations during the 2020-2021 winter season.

Vantage Point Locations and Viewshed Analysis

Vantage point locations are presented in Table 3-2. Viewshed analysis was carried out to confirm the sufficiency of the chosen vantage point locations. Viewsheds were calculated using Resoft Wind Farm ZTV (Zone of Theoretical Visibility) software in combination with Mapinfo Professional (Version 10.0) using a notional layer suspended at 25m, which is representative of the minimum height considered for the Potential Collision Height (PCH) based on the turbine model at the time the vantage point locations were selected. Note that while the relevance of being able to view as much of the site to ground level is acknowledged, the SNH guidance emphasises the importance of visibility of the 'collision risk volume' when the data is to be used to estimate the risk of collision for birds with turbines. Therefore, the viewshed analysis aims to identify the most suitable locations to site vantage points such that the airspace of the turbine rotor swept area is in view using the fewest possible number of vantage points. The vantage point locations were tested for visibility coverage by creating a viewshed point 1.75m in height (to represent the height of the observer) on a map using 10m contours terrain data. The relative height of any surrounding trees and its effects on visibility is also accounted for in the analysis. Using the ZTV software, a viewshed of 360° was produced calculating an area 25m from ground level up to a 2km radius. The resulting viewshed image was then cropped to 180° to give the viewshed.

Survey Effort

A total of 36 hours of watches was undertaken at each of the vantage point locations, equating to a total of six hours per vantage point per month. The survey effort is summarised in Table 3-2 and full details are presented in Appendix 2 of this report, including dates, times, duration and weather conditions. The location of vantage points is shown in Appendix 2.

Table 3-2 Summary of Vantage Point Survey effort

	VP1 ITM [1] X 592930 Y 842236	VP2 ITM X 592615 Y 842428	VP3 ITM X 593496 Y 843692	VP4 ITM X 590407 Y 840997
Month	**Hours**			
October	20/10/2020 6 hrs	13/10/2020 6 hrs	23/10/2020 6 hrs	21/10/2020 6 hrs
November	19/11/2020 6 hrs	26/11/2020 6 hrs	25/11/2020 6 hrs	27/11/2020 6 hrs
December	19/12/2020 6 hrs	15/12/2020 6 hrs	14/12/2020 6 hrs	16/12/2020 6 hrs
January	11/01/2020 6 hrs	15/01/2020 6 hrs	13/01/2020 6 hrs	17/01/2020 6 hrs

[1] Irish Transverse Mercator Co-Ordinates

	VP1 ITM [1] X 592930 Y 842236	VP2 ITM X 592615 Y 842428	VP3 ITM X 593496 Y 843692	VP4 ITM X 590407 Y 840997
Month	**Hours**			
February	06/02/2020 6 hrs	04/02/2020 6 hrs	19/02/2020 6 hrs	21/02/2020 6 hrs
March	06/03/2020 6 hrs	08/03/2020 6 hrs	18/03/2020 6 hrs	10/03/2020 6 hrs
Total Hours	**36:00**	**36:00**	**36:00**	**36:00**

Primary Target Species

The target species for vantage point surveys were defined by legal and/or conservation status, following SNH (2017) guidance, which states that "*in most circumstances the target species will be limited to those species which are afforded a higher level of legislative protection.*" A list of primary target species was draw from the following sources:

- Species that are SCIs of the SPAs within foraging range for SCI species and/or 15km of the site;
- Species listed on Annex I of the Birds Directive that occur in Ireland;
- Species listed on the Red List of Birds of Conservation Concern in Ireland (Gilbert *et al.*, 2021) with the exception of Red List passerines, as these are generally not significantly impacted by wind energy developments.

Secondary Target Species

SNH (2017) also states that "*local circumstances may indicate that survey information should also be acquired on other species, especially those of regional conservation concern*". A list of secondary target species comprised:

- All other waterbirds that occur in Ireland that are not included as primary target species;
- All raptors that occur in Ireland that are not included as primary target species.

Data Collection

Data on bird observations and flight activity was collected by the surveyor by scanning the arc of 180° and a 2km radius from the fixed location. Surveys were scheduled to provide a spread over the full daylight period including at dawn and dusk (starting or ending an hour before dawn or an hour after dusk on alternate months for six months) to coincide with the highest peaks of bird activity and to record any wildfowl migration or crepuscular species. Breaks of at least 30 minutes were taken every 3 hours to minimise observer fatigue. A 10-minute settling in period was allowed for at the start of each vantage point to allow the surveyor to get into place, and to minimise the impact of surveyor disturbance on flight activity. For each primary target species observation, the following details were recorded:

- Date, time, and location of observation;
- Number of species recorded;
- Total duration of flightline observation;
- Duration at each of flightline at each height band;
- Species age and sex (where determinable);
- Habitat(s);
- Behaviour.

Recording height bands were determined based on the likely turbine specifications under consideration at the time of the survey (upper tip height 175m and lower tip height 25m). Flight heights were attributed to four distinct height bands as follows:

- Band 1 = 0 - 10m (below the likely rotor swept area);
- Band 2 = 10 - 25m (potentially within the likely rotor swept area, at least in part);
- Band 3 = 25 - 175m (within the likely rotor swept area, PCH);
- Band 4 = >175m (above the likely rotor swept area).

Although recording of secondary species is subsidiary to recording of primary target species, secondary target species were also recorded to provide an index of flight activity for secondary target species within the site.

3.3.2 Winter Walkover Surveys

Winter walkover surveys were undertaken to determine the presence of bird species of conservation concern within the study area. Transect routes were devised to ensure coverage of different habitat complexes between vantage point locations within the study area. Because SNH does not prescribe a specific winter walkover methodology, the methodology was broadly based on breeding bird survey methodologies described in Bibby *et al.* (2000) and Gilbert *et al.* (1998).

The site was visited and transects walked four times between October and March. Survey effort is presented in Appendix 2, including dates, times, duration and weather conditions A map of the survey area is presented in Appendix 1.

3.3.3 Hen Harrier Roost Surveys

Potential hen harrier roost sites within 2km of the proposed development area were surveyed for the presence of roosting hen harrier during hen harrier roost surveys in line with SNH (2017). Survey work was undertaken following methodology by Gilbert *et al.* (1998) and O'Donoghue (2019) from October to March. Surveys were conducted from four locations each month which overlooked the most suitable hen harrier roosting habitat. Survey effort is presented in Appendix 2, including dates, times, duration and weather conditions. A map of the survey locations is presented in Appendix 1.

3.4 Project Team

This report has been prepared by Zak O'Connor (B.Sc.), Ornithologist of MKO, and reviewed by Thalie Konstantinidis (B.Sc.), Ornithologist, Patrick Manely (B.Sc.), Senior Ornithologist of MKO and Padraig Cregg (B.Sc. M.Sc.), Principal Ornithologist of MKO. All are suitably qualified ornithologists with experience in completing avifaunal assessments and competent experts for the purposes of the preparation of this report, following SNH (2017) and CIEEM (2017) ecological reporting guidelines.

3.4.1 Field Team

Field surveys were undertaken by Lee Dark and Robert Vaughan. Surveyors are suitably qualified competent experts in field ornithology.

3.5 Survey Limitations

A comprehensive suite of bird surveys was undertaken at the site between October 2020 and March 2021. Results from the 2020-2021 winter season are derived from a continuous six months of surveying undertaken in accordance with best practice guidance, SNH (2017). The survey duration and scope are

considered entirely satisfactory. There were no issues relating to study area access/weather/time of year/Coillte forestry operations.

4. RESULTS

4.1 Desk Review

4.1.1 Sites Designated for Nature Conservation

Using GIS software, sites designated for nature conservation within the potential zone of influence of the proposed wind farm development were identified. In the absence of any specific European or Irish guidance, SNH (2016) was consulted. This document provides guidance in relation to the identification of connectivity between proposed development proposals and SPAs. It takes into consideration the distances some species may travel beyond the boundary of their SPAs and outlines information on dispersal and foraging ranges of certain bird species. In addition, using a precautionary approach, sites within a 15km radius of the proposed wind farm were identified. Sites designated for birds are listed below in Table 4-1.

Table 4-1 Special Protection Areas within 15 kilometres of site

Designated site and code	Special Conservation Interest Species[2]	Distance from wind farm site (km)
Sligo/Leitrim Uplands (004187)	› Peregrine › Chough	9.2km

4.1.2 Previous Survey Data

4.1.2.1 Breeding/Wintering Bird Atlas Records

Bird Atlas 2007-11: The breeding and wintering birds of Britain and Ireland' (Balmer *et al.,* 2013) is the most recent comprehensive work on wintering/breeding birds in Ireland. It provides information on species and their wintering/breeding status in 10km hectads. The site lies within hectad G94. Table 4-2 presents a list of nine species of conservation interest recorded within this hectad.

Table 4-2 Bird atlas data for relevant hectads

Species Name	Bird Atlas 2007-2011		Conservation Status
	G94 Breeding	G94 Winter	
Golden Plover	-	Present	BD, RL
Peregrine	Prob	-	BD, SCI
Hen Harrier	Conf	Present	BD
Greenland White-fronted Goose	-	Present	BD
Merlin	Poss	-	BD
Woodcock	-	Present	RL
Red Grouse	Prob	Present	RL
Kestrel	Prob	Present	RL
Meadow Pipit	Conf	Present	RL

BD=Birds Directive; RL = BoCCI Red List; Poss = possible breeding; Prob = probable breeding; Conf= confirmed breeding; Seen = present without evidence of breeding.

[2] *It is noted that a determination will be made on whether there is connectivity between the SPAs and the wind farm site at the appropriate assessment stage*

4.1.2.2 Rare and Protected Species Dataset

An information request was sent to the NPWS requesting records from the Rare and Protected Species Database. The sections below provide records obtained from the NPWS of the rare and protected breeding bird species:

Hen Harrier

Table 4-3 below presents the NPWS records for hen harrier nest sites to defined radii (km) of the development site.

Table 4-3 NPWS Hen Harrier Nest Site Records

Year	Within Site Boundary	0-1km from site boundary	1-3km from site boundary	3-5km from site boundary
2015	No Records	1 confirmed breeding site	No Records	1 confirmed breeding site
2010	No Records	3 confirmed breeding sites	1 sighting	1 confirmed breeding site, 1 additional sighting
2005	No Records	3 sightings	No records	No records
1998-2004	No Records	No Records	No Records	No records

Peregrine

The NPWS identified one confirmed peregrine nest site within 3-5km of the site. The observation was recorded during a survey in 2002.

Red Grouse

The NPWS hold records of red grouse in the area. Between 2000 and 2011, this species was recorded on nine occasions. One observation was recorded on site. There were two records located approximately 500m from the site, one just south of Dough Mountain and the other just north of Kilea. The remainder of the observations were recorded over 3km from the proposed development area. Three of these observations were recorded in the vicinity of Thur Mountain, to the south-east of the proposed development area.

4.2 Field Surveys

4.2.1 Flight Activity Survey

Observations during vantage point surveys, winter walkover surveys, hen harrier roost and incidental observations are provided below. Summaries include individual species accounts of primary and secondary target species.

4.2.2 Vantage Point Surveys

4.2.2.1 Primary Target Species

Golden Plover

There was one observation of golden plover during vantage point surveys. This observation was of a flock of at least ten birds being flushed near Dough Mountain. With poor visibility that day, it was difficult to follow these birds in flight, and therefore no time was recorded at PCH. Observations are shown in Appendix 1 Figure 1.2.

Hen Harrier

There were five observations of hen harrier during vantage point surveys. All observations were of individual birds hunting within 500m of the site at both the northern and southern sections of the site. These observations were recorded in December and January. No time was recorded at PCH. Observations are shown in Appendix 1 Figure 1.1.

Merlin

There was one observation of merlin during vantage point surveys. This observation was of an individual bird commuting through the northern section of the site in February. No time was recorded at PCH. Observations are shown in Appendix 1 Figure 1.3.

Red Grouse

There were two observations of red grouse during vantage point surveys. One observation was of a pair of birds in February, with the male in song, and the other observation was of a male calling in late March. Both observations were on, or within 500m of the northern section of the site. Observations are shown in Appendix 1 Figure 1.4.

Snipe

There were six observations of snipe during vantage point surveys. All observations were of birds flying within 500m of the site. Four of these observations occurred at VP3 near Killea. There was no time recorded at PCH. Observations are shown in Appendix 1 Figure 1.5.

Woodcock

There were four observations of woodcock during vantage point surveys. All observations occurred around dusk during the February survey at VP4 near Tawnyfeacle. Observations were of individual birds commuting. No time was recorded at PCH. Observations are shown in Appendix 1 Figure 1.6.

4.2.2.2 Secondary Target Species

Buzzard

There were 20 observations of buzzard during vantage point surveys. Just five observations occurred within 500m of the site with the remainder occurring within 1.5km of the site. Most observations were of birds flying with some observations of birds perching, calling and hunting. There was one observation of an individual displaying in February and another observation of an individual displaying in early March. Nine observations were recorded at PCH for a combined time of 715 seconds. Observations are shown in Appendix 1 Figure 1.7.

Greenshank

There were three observations of greenshank during vantage point surveys. All observations occurred at VP3 during the November survey. Birds were only heard calling up at Dough Mountain and it is thought there were at most four individuals.

Sparrowhawk

There were seven observations of sparrowhawk during vantage point surveys. Most observations were of birds commuting or hunting but there were two observations of a bird displaying within 500m of the site in January and March. An additional three observations occurred within 500m of the site. Two observations occurred at PCH for a total combined time of 106 seconds. Observations are shown in Appendix 1 Figure 1.8.

4.2.3 Winter Walkover Surveys

Hen Harrier

There were two observations of hen harrier during winter walkover surveys. Both observations occurred within 500m of the site in October. One observation was of an individual commuting north of Boleyboy and the other was of an individual being flushed by the surveyor near Saddle Hill. Observations are shown in Appendix 1 Figure 2.1.

Golden Eagle

There was one observation of a golden eagle during winter walkover surveys. In March, an immature bird was seen circling over a conifer plantation on site before flying south. Observations are shown in Appendix 1 Figure 2.2.

Meadow Pipit

There were ten observations of meadow pipit during winter walkover surveys. These observations were recorded across the site and flock size varied from 2 to 30 birds.

Red Grouse

There were five observations of red grouse during winter walkover surveys. One individual was heard displaying near Killea within 500m of the site in late February. The other observations were recordings of red grouse latrines (droppings/feathers), indicating the presence of this species. Observations are shown in Appendix 1 Figure 2.3.

Redwing

There were seven observations of redwing during winter walkover surveys. These observations were recorded across the site the flock size varied from 4 to 50 birds.

Snipe

There were nine observations of snipe during winter walkover surveys. Observations ranged from one to three birds. Most observations were of birds being flushed by the surveyor but there was one instance of three birds flying overhead. Observations are shown in Appendix 1 Figure 2.4.

Woodcock

There were four observations of woodcock during winter walkover surveys. Two observations were of individual birds being flushed by the surveyor. The other two observations were recordings of woodcock tracks on the ground, indicating the presence of this species. Observations are shown in Appendix 1 Figure 2.5

Buzzard

There were four observations of buzzard during winter walkover surveys. All observations occurred on, or within 500m of the site. Observations consisted of between one and two individuals with birds observed displaying in February and March. Observations are shown in Appendix 1 Figure 2.6.

Jack Snipe

There was one observation of a jack snipe during the winter walkover surveys. One individual was flushed near Lisdarush in February.

Sparrowhawk

There were three observations of sparrowhawk during winter walkover surveys. Observations were of individual birds perching and commuting and one observation was of an individual bird displaying in January.

4.2.4 Hen Harrier Roost Surveys

There were two observations of hen harrier during the hen harrier roost surveys. Both observations occurred in October 2020 with birds seen commuting within 500m of the site. There was no roosting observed throughout the winter season. Observations are shown in Appendix 1 Figure 3.1.

4.2.5 Incidentals Observations

Whooper Swan

There was one incidental observation of whooper swan during a hen harrier roost survey. In October 2020, a flock of six birds was observed commuting 850m north of the site near Coolodonnell. Observations are shown in Appendix 1 Figure 4.1.

Kestrel

There was one incidental observation of a kestrel during a hen harrier roost survey. This observation was of a female bird to the north of the site, near Coolodonnell, in October 2020. Observations are shown in Appendix 1 Figure 4.2.

Snipe

There were three incidental observations of snipe during the survey period. One observation occurred within 500m of the site. The other two were recorded within 1km of the site. There was one observation of a bird drumming (displaying) in March near Mullanyduffy. Observations are shown in Appendix 1 Figure 4.3.

Woodcock

There were four incidental observations of woodcock during the winter survey period. Observations ranged from one to two individuals with birds either flushed by the surveyor or observed flying and calling. Observations are shown in Appendix 1 Figure 4.4.

Buzzard

There were five incidental observations of buzzard during hen harrier roost surveys. All observations were of individual birds commuting or calling and were recorded within 700m of the site. Observations are shown in Appendix 1 Figure 4.5.

Sparrowhawk

There were four incidental observations of sparrowhawk during hen harrier roost surveys. Observations were of individual birds commuting with just one observation recorded within 500m of the site. Observations are shown in Appendix 1 Figure 4.6.

5. DISCUSSION

Ornithological surveys were conducted at the Lissinagroagh wind farm site from October 2020 to March 2021.

The key observations during surveys are outlined below:

- A possible red grouse breeding territory was identified within 500m of the site. A pair of birds were observed together in February and male territorial calls were heard from suitable breeding habitat in March.

The remaining pertinent observations are listed below:

- Snipe, woodcock, buzzard and sparrowhawk are resident at the site and were frequently observed utilising habitats on, or within 500m of the site.
- Hen harrier was recorded occasionally during the winter survey period. No roosting activity was observed, however, this species was observed hunting and commuting over the site.
- Golden eagle and whooper swan were recorded infrequently and in low numbers at the wind farm site.

REFERENCES

Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. & Fuller, R.J. (2013) *Bird Atlas 2007-11: The breeding and wintering birds of Britain and Ireland*. BTO Books, Thetford.

Bibby, C.J., Burgess, N.D., Hill, D.A., and Mustoe, S. (2000) *Bird Census Techniques*. Academic Press, London.

Council Directive 92/43/EEC 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31992L0043

Council Directive 2009/147/EC 30 November 2009 on the conservation of wild birds. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32009L0147

Gilbert, G., Gibbons, D.W. and Evans, J. (1998) *Bird Monitoring Methods.* Bedfordshire, England: Pelagic Publishing, Royal Society for the protection of Birds.

Gilbert, G., Stanbury, A. and Lewis, A. (2021). Birds of Conservation Concern in Ireland 4: 2020-2026. *Irish Birds,* 43:1-22. Available at: https://birdwatchireland.ie/birds-of-conservation-concern-in-ireland/

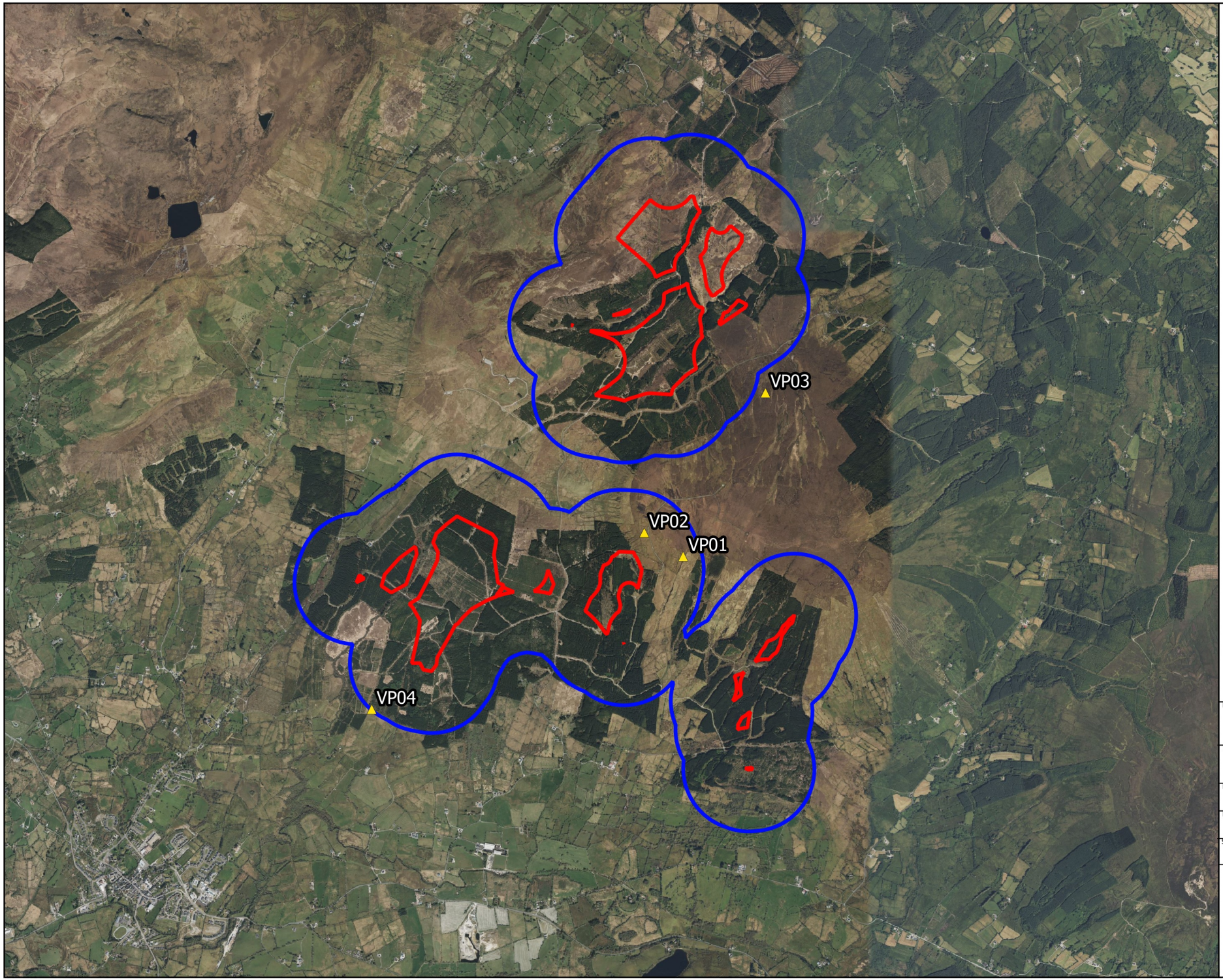
O'Donoghue (2019). Hen Harrier Roost Types and Guidelines to Roost Watching. Hen Harrier Winter Survey Report. Available at: http://www.ihhws.ie/IHHWS_Guide.pdf

SNH (2016). Assessing connectivity with Special Protection Areas (SPAs). Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2018-08/Assessing%20connectivity%20with%20special%20protection%20areas.pdf

SNH (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms. Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2018-06/Guidance%20Note%20-%20Recommended%20bird%20survey%20methods%20to%20inform%20impact%20assessment%20of%20onshore%20windfarms.pdf

APPENDIX 1

FIGURES



Map Legend

- Wind Farm Site
- 500m Survey Radius
- Vantage Point Location

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Drawing Title
Vantage Point Survey Locations

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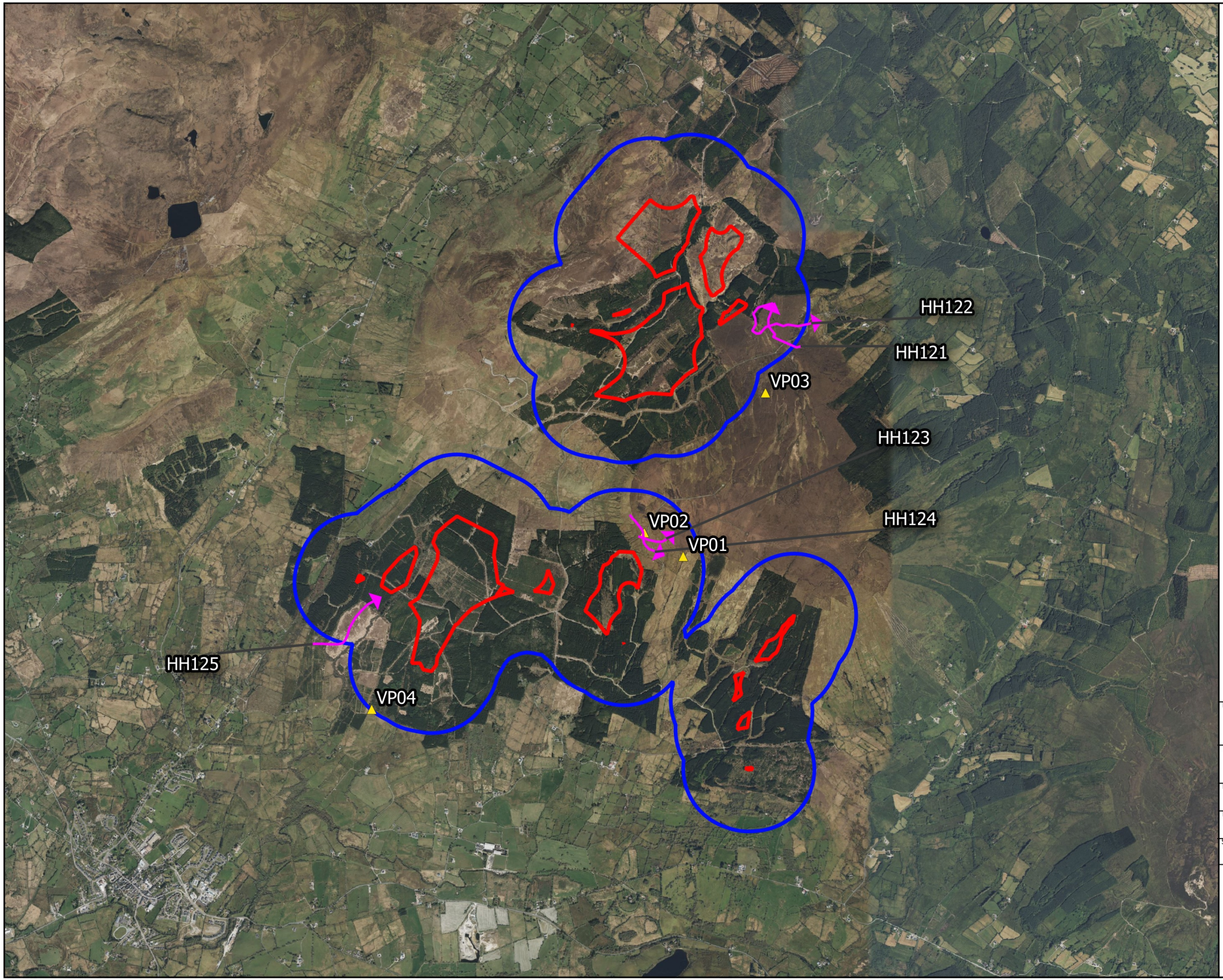

Map Legend

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- 500m Survey Radius
- Vantage Point Location
- Flightline

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Vantage Point Survey
Hen Harrier Observations

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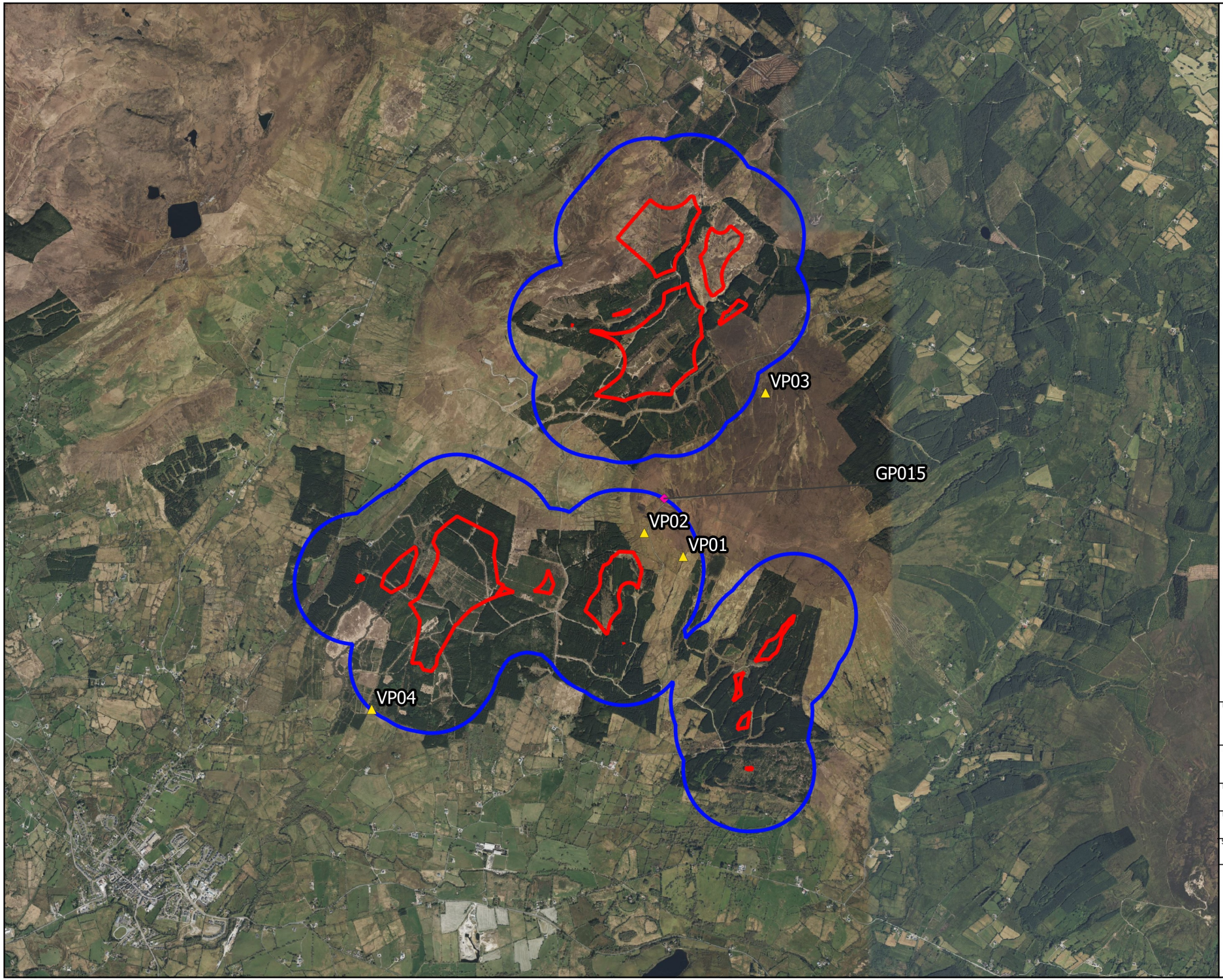

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Vantage Point Survey
Golden Plover Observations

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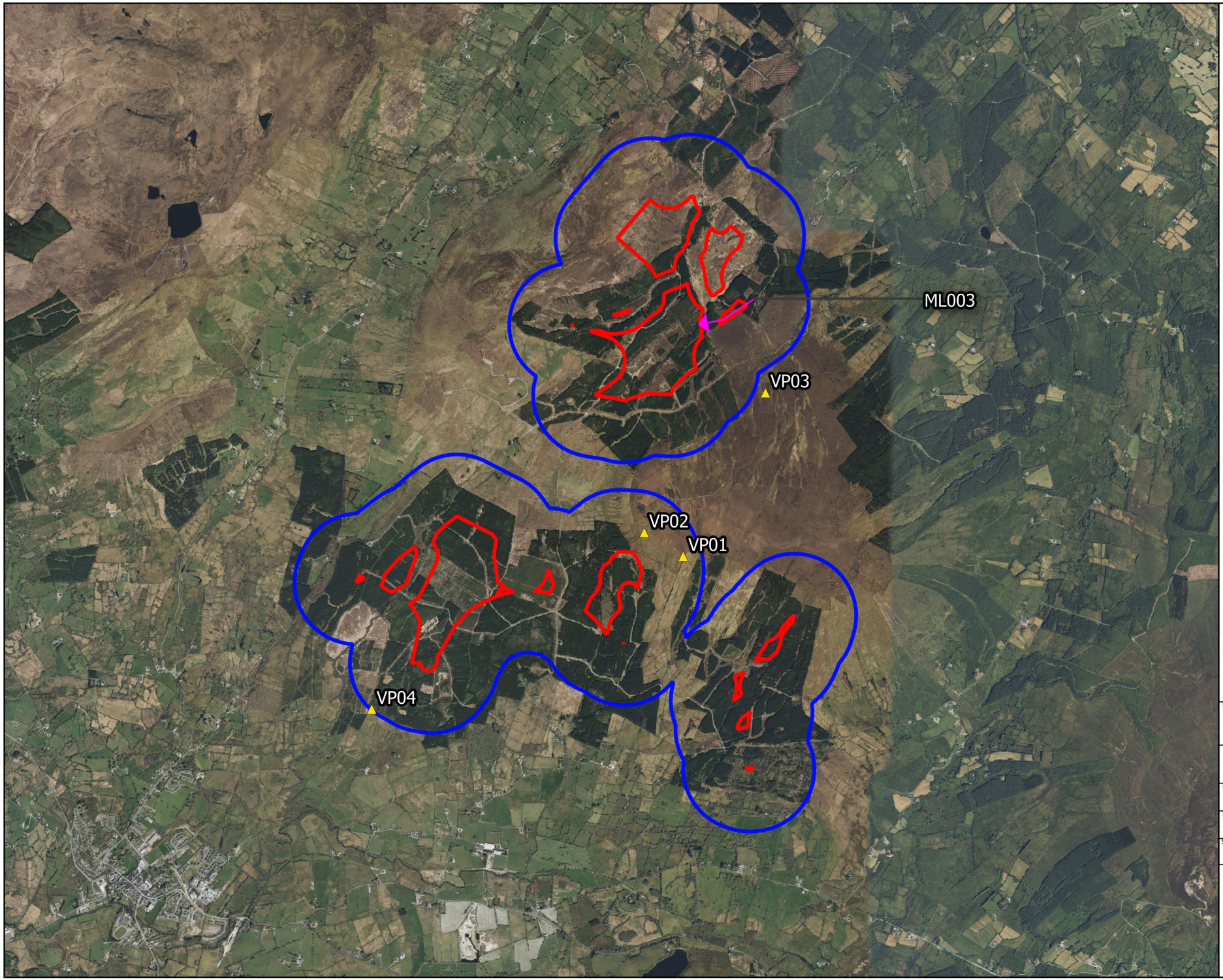

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Vantage Point Survey
Merlin Observations

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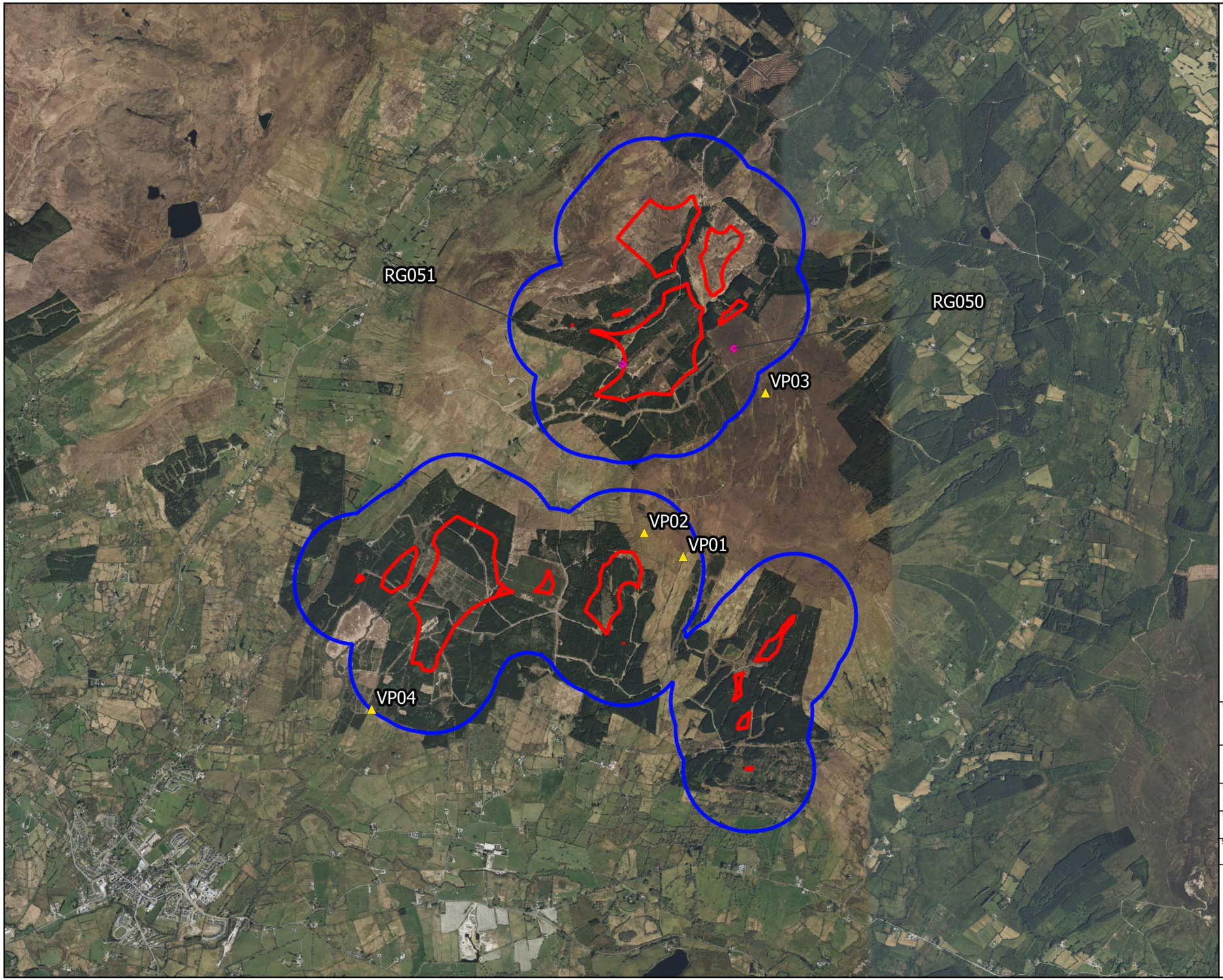

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Red Grouse Observations

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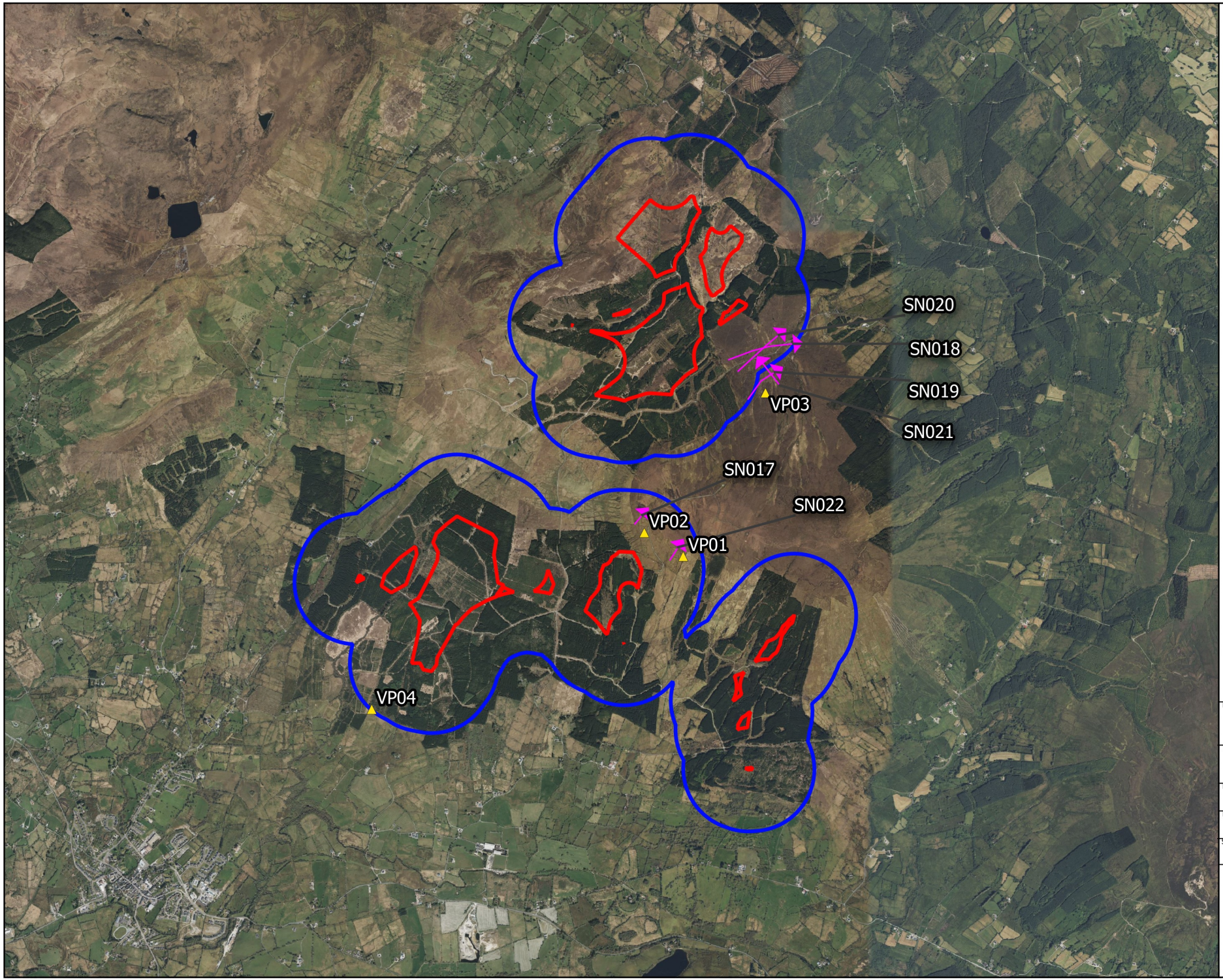

Map Legend

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- Vantage Point Location
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Vantage Point Survey
Snipe Observations

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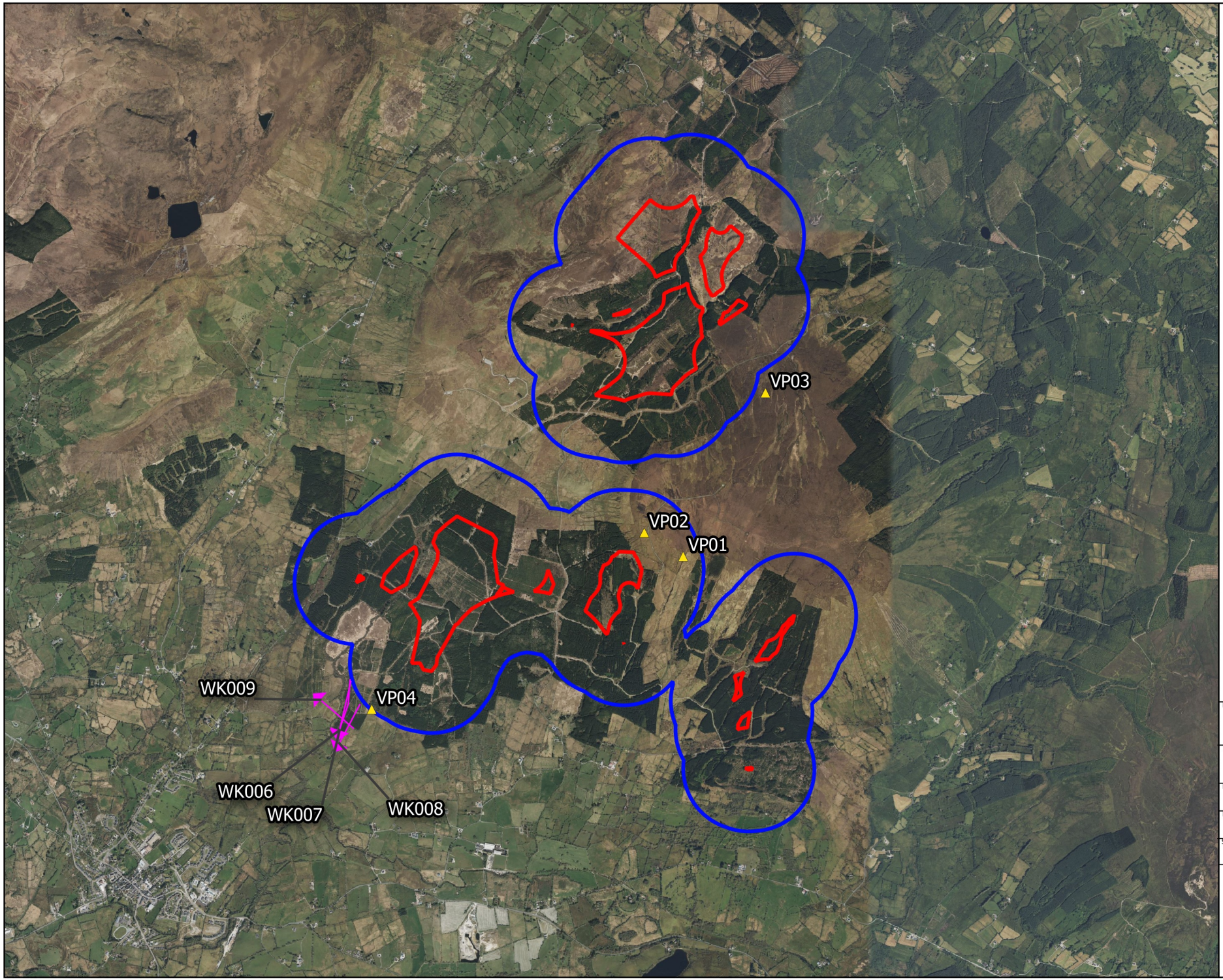

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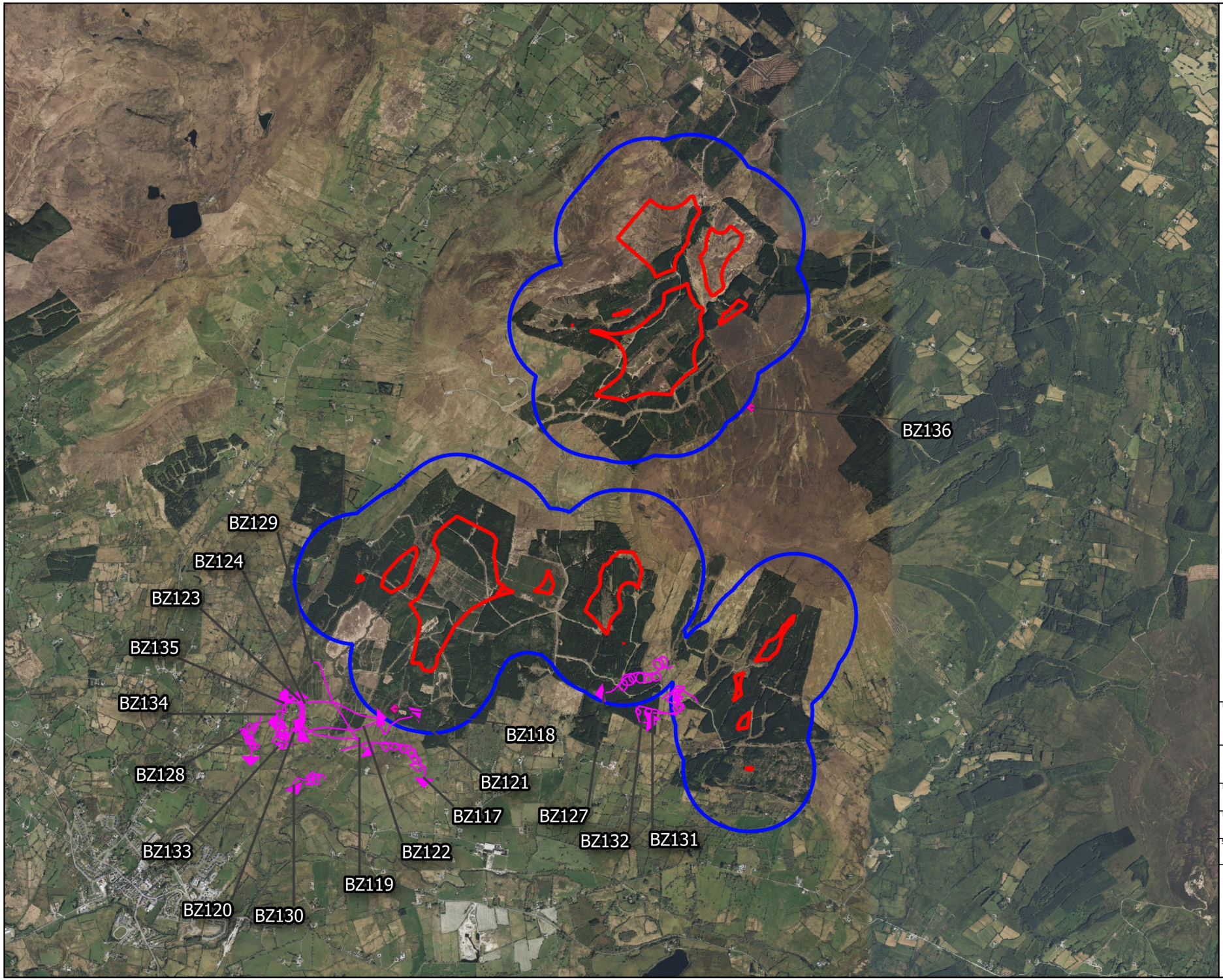

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Vantage Point Location
- Flightline
- Observation

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Drawing Title
Vantage Point Survey
Buzzard Observations

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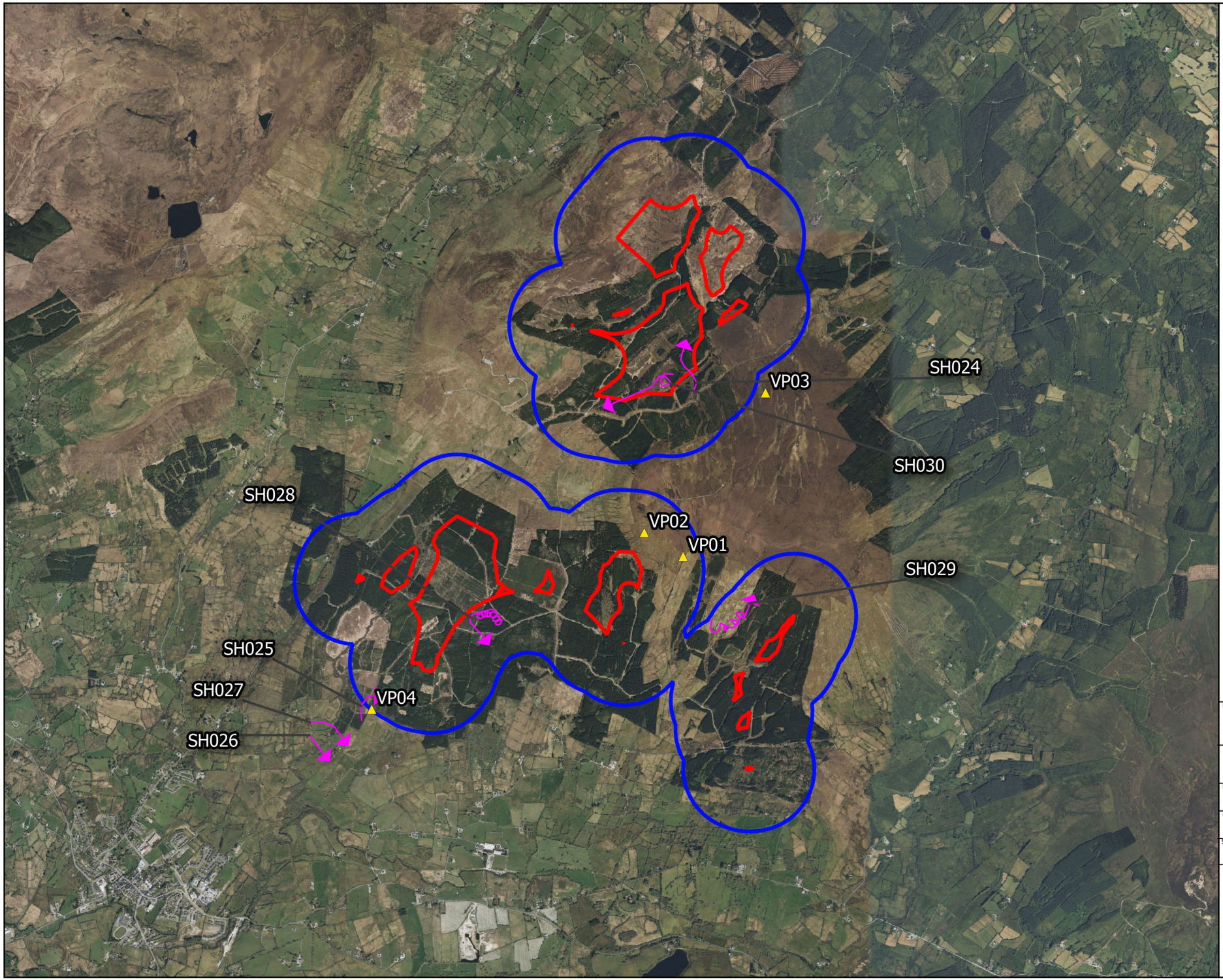

Map Legend

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- Vantage Point Location
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Vantage Point Survey
Sparrowhawk Observations

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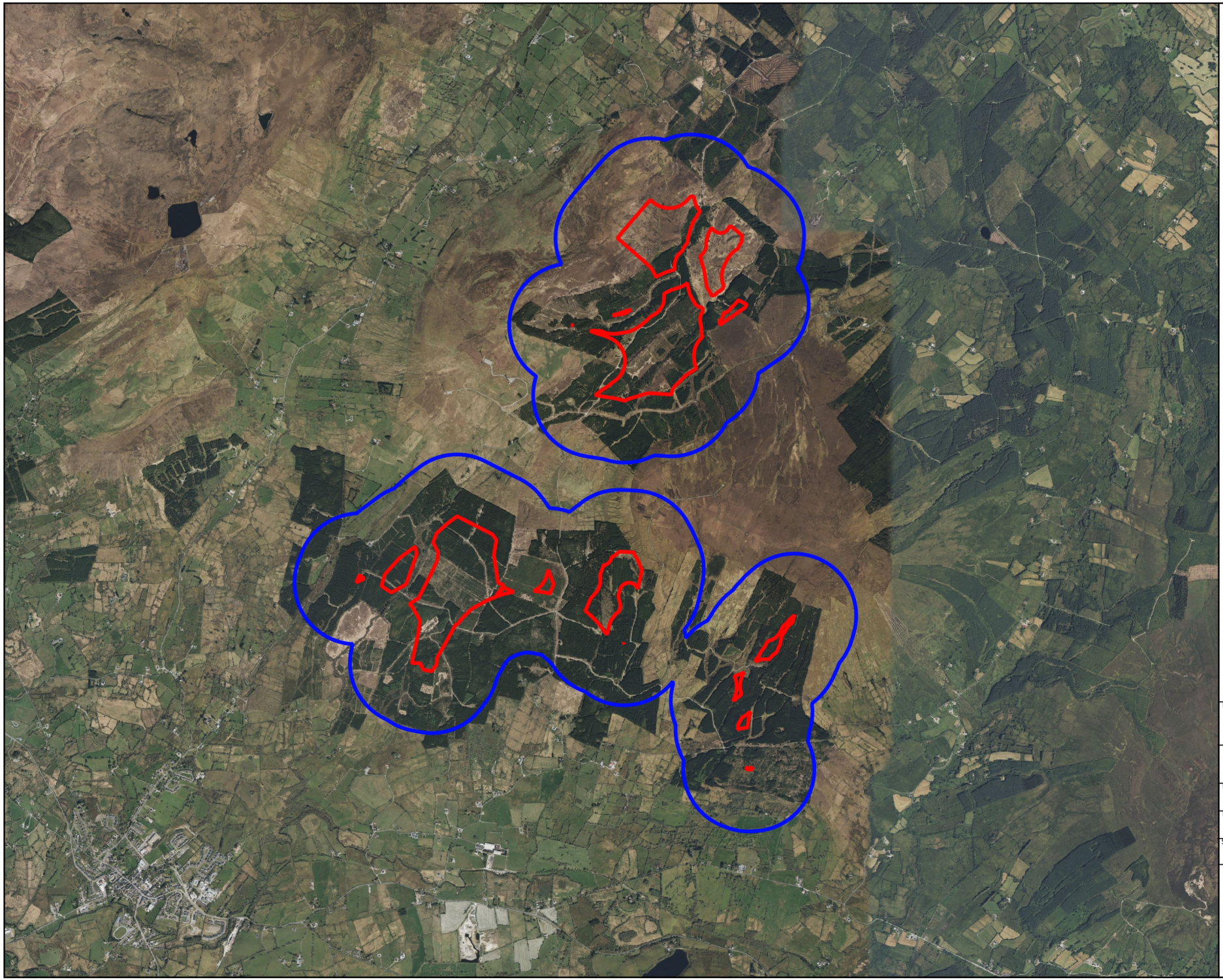

Map Legend

- Wind Farm Site
- 500m Survey Radius

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Winter Walkover Survey Area

Project Title
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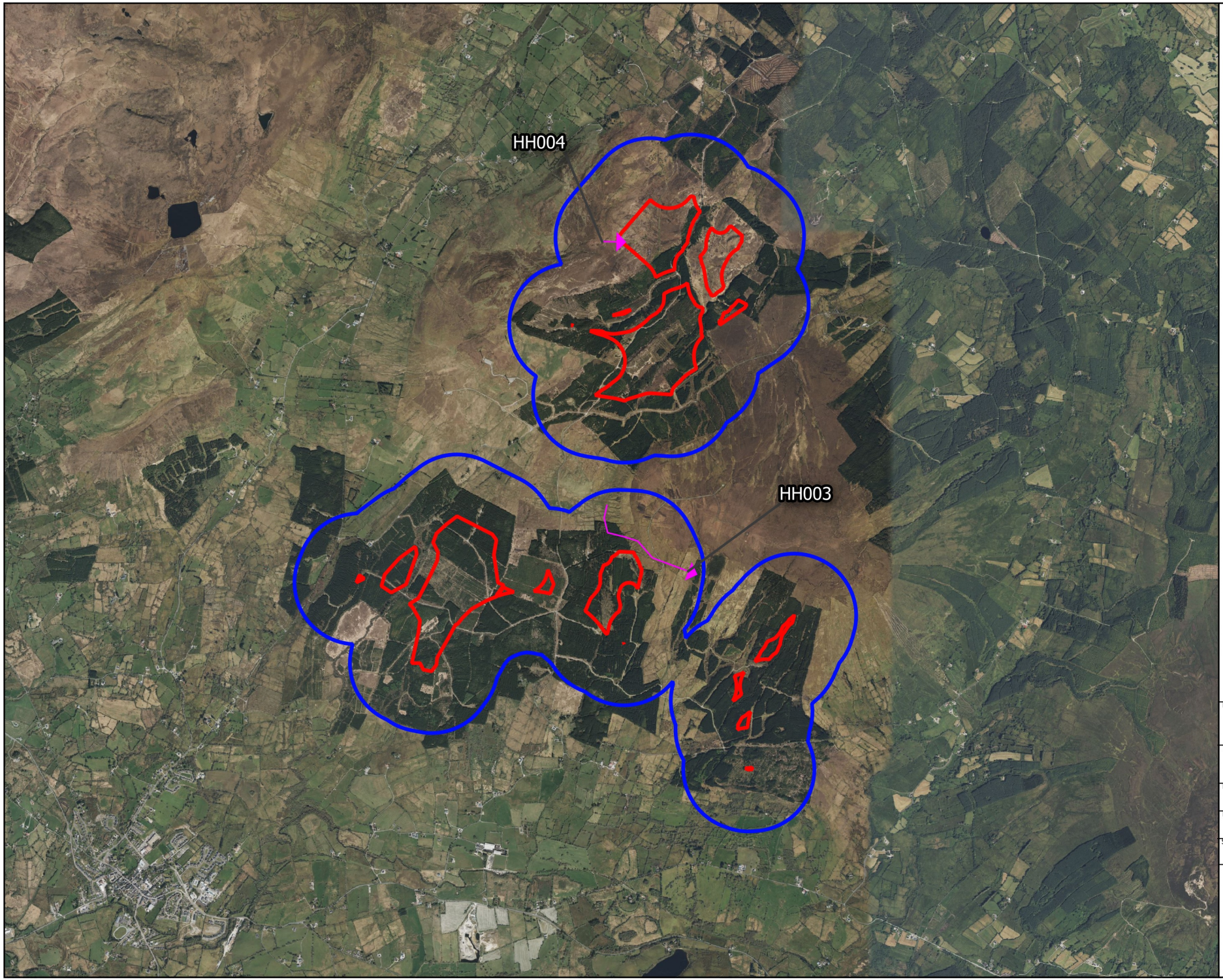

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Flightline

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Winter Walkover Survey
Hen Harrier Observations

Project Title
Lissinagroagh Wind Farm

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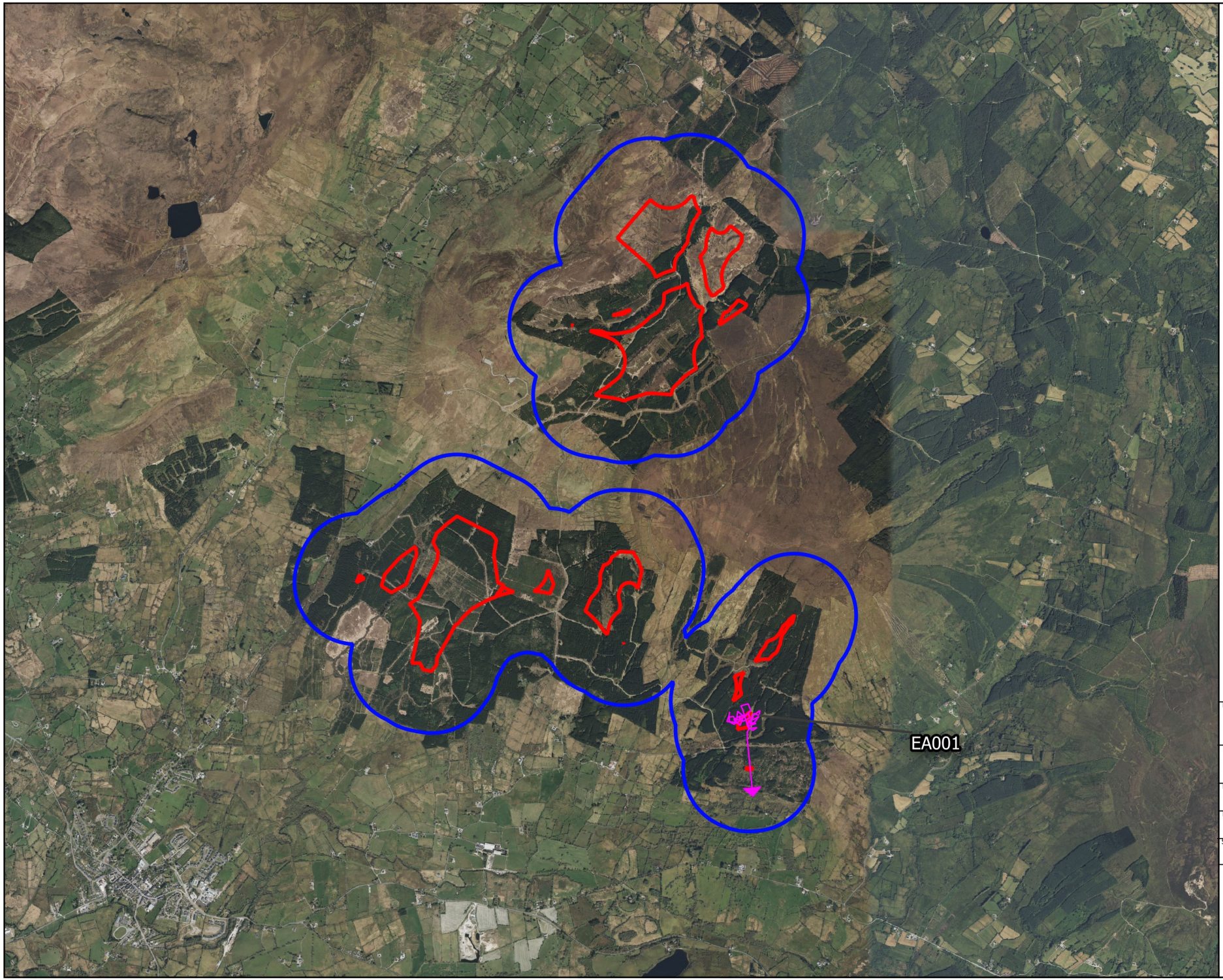

Map Legend

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- Flightline

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Winter Walkover Survey
Golden Eagle Observations

Project Title
Lissinagroagh Wind Farm

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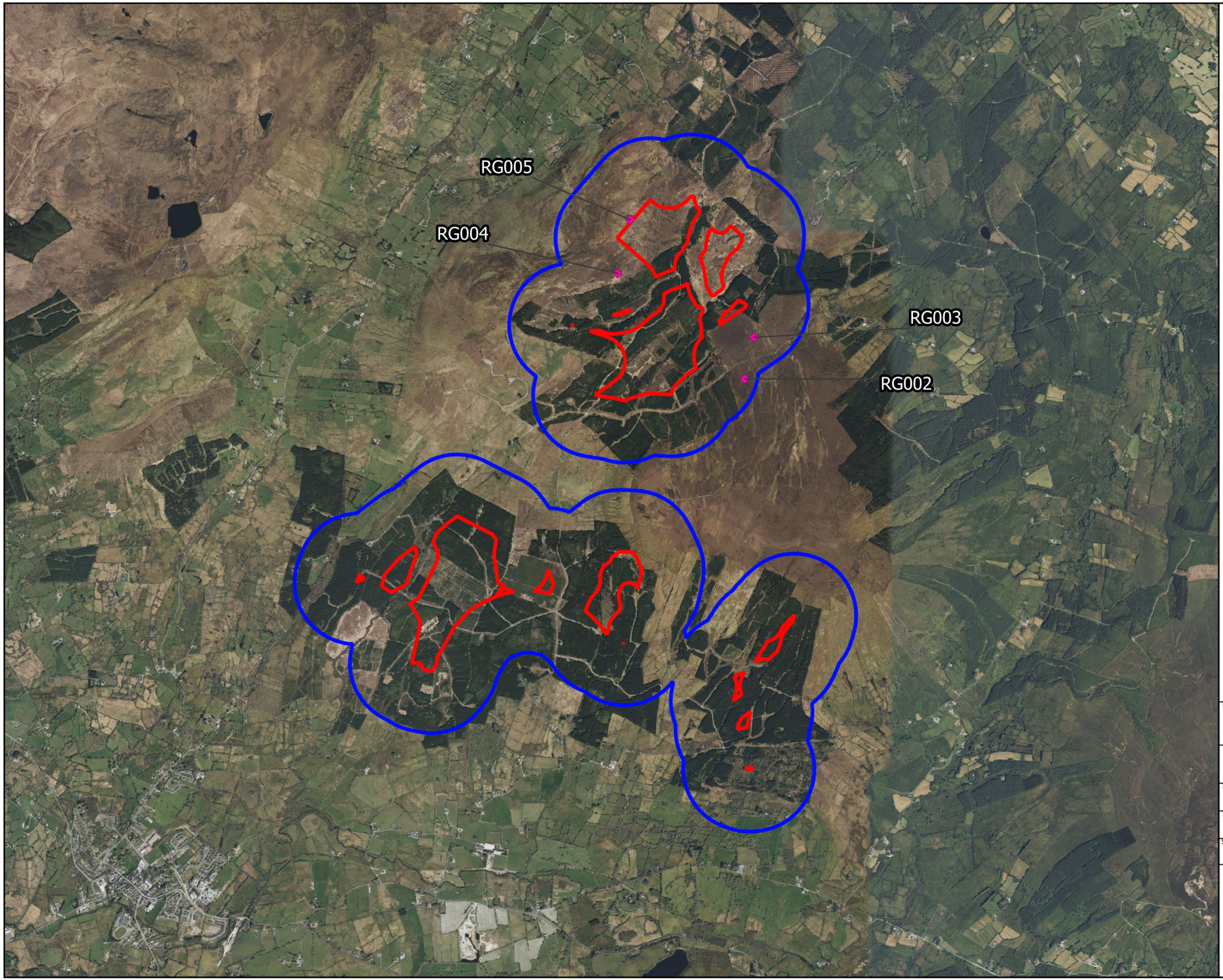

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Observation

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Drawing Title
Winter Walkover Survey
Red Grouse Observations

Project Title
Lissinagroagh Wind Farm

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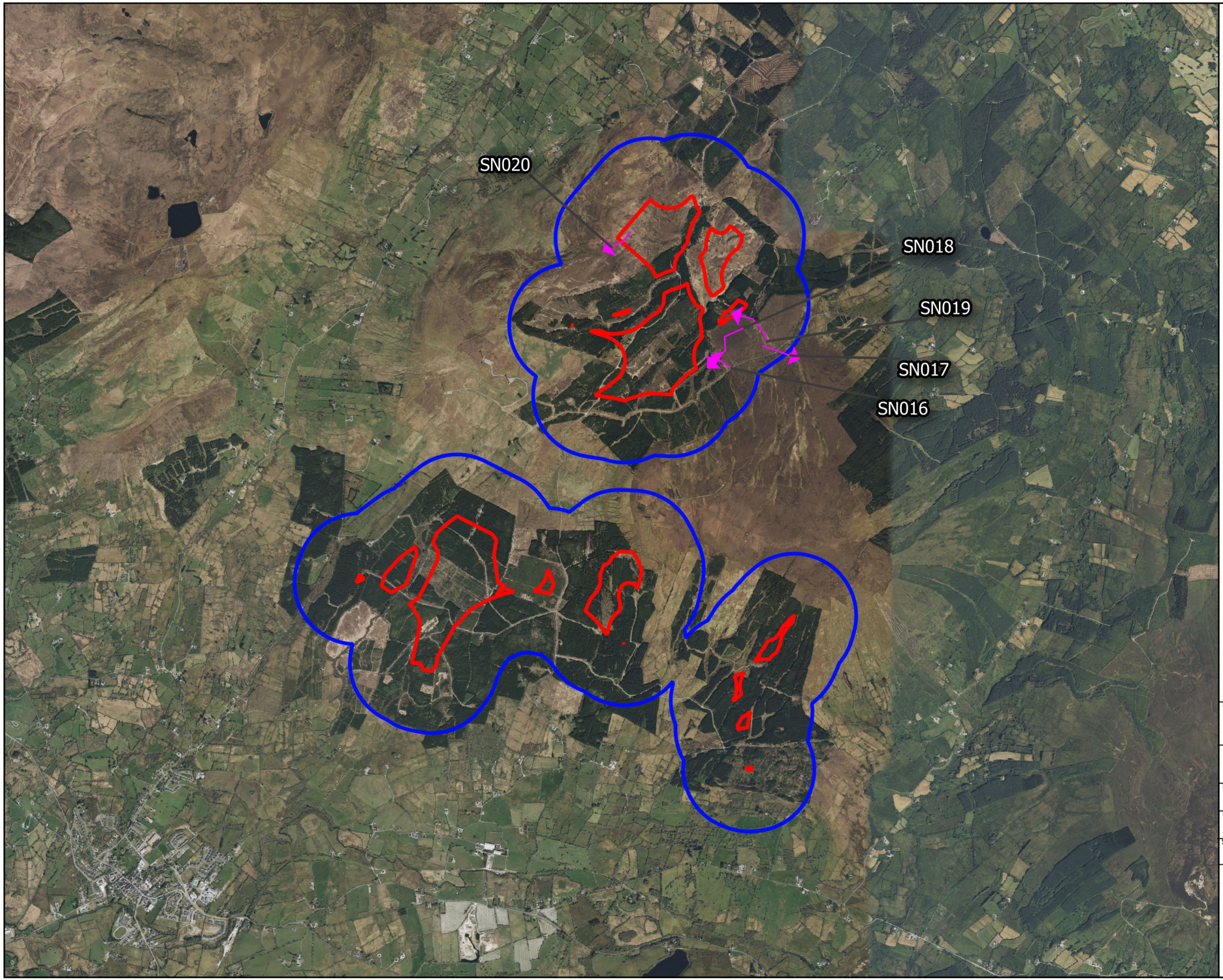

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Flightline

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Drawing Title
Winter Walkover Survey
Snipe Observations

Project Title
Lissinagroagh Wind Farm

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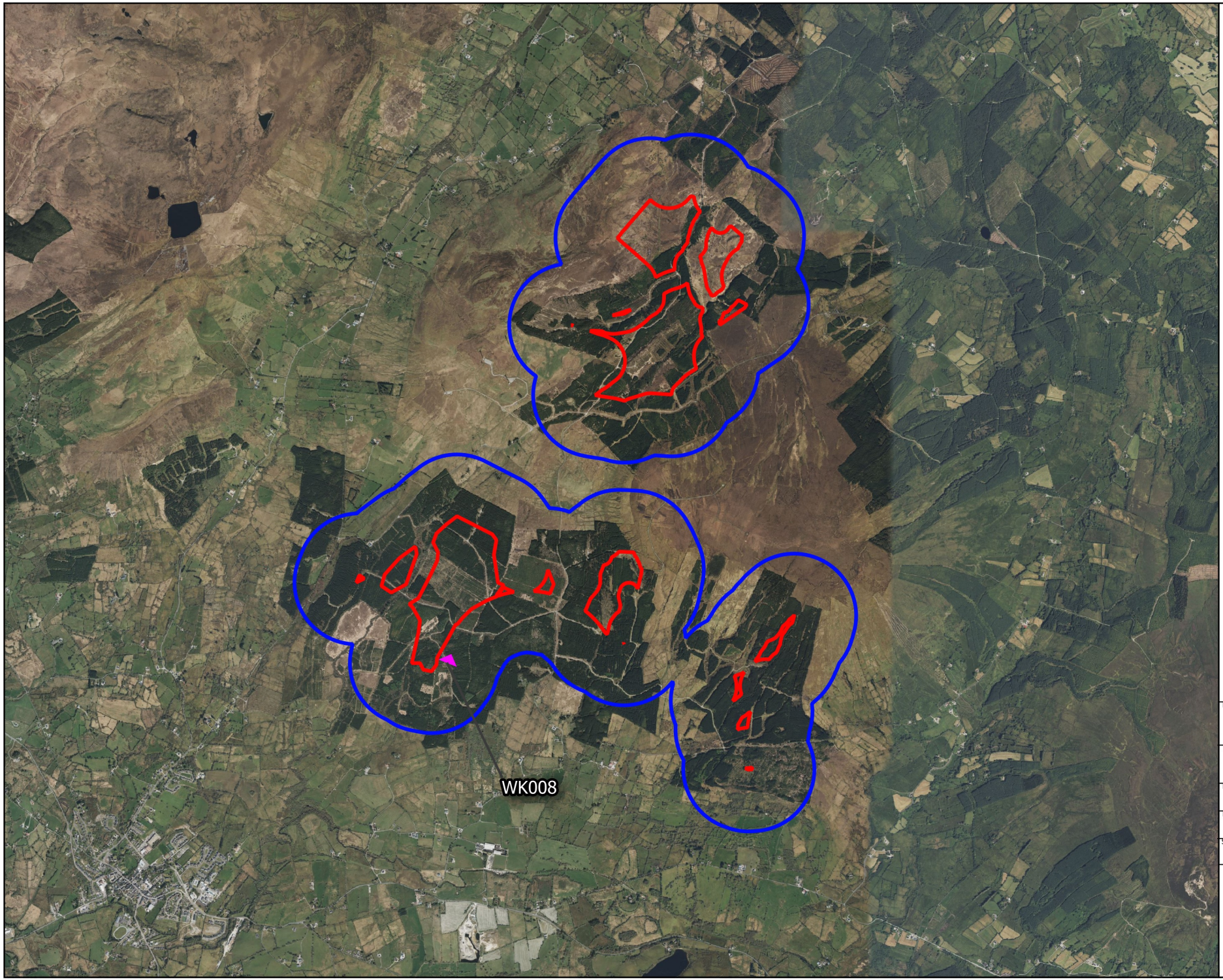

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Flightline

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Drawing Title
Winter Walkover Survey
Woodcock Observations

Project Title
Lissinagroagh Wind Farm

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Project No.	Drawing No.
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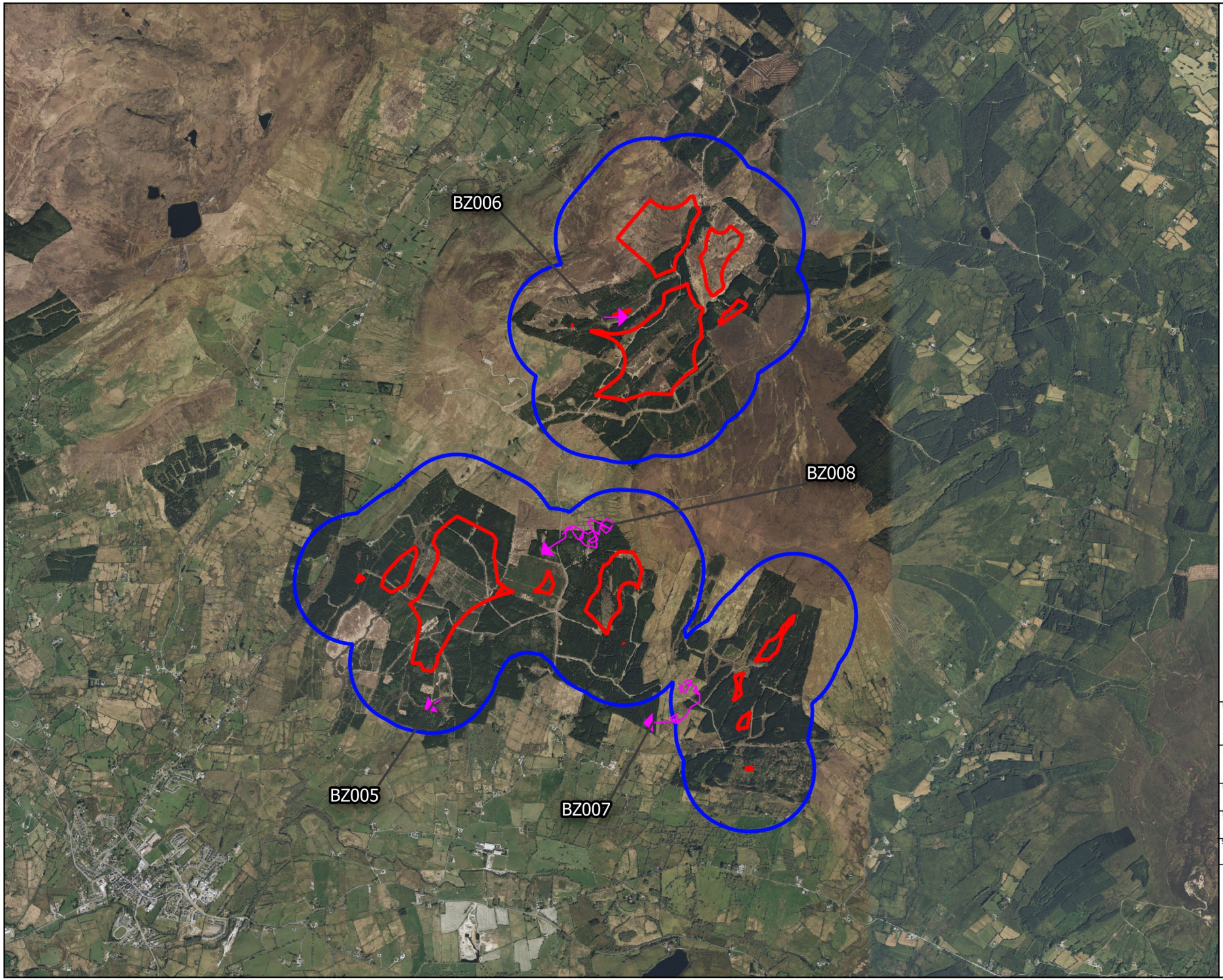

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Flightline

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Drawing Title
Winter Walkover Survey
Buzzard Observations

Project Title
Lissinagroagh Wind Farm

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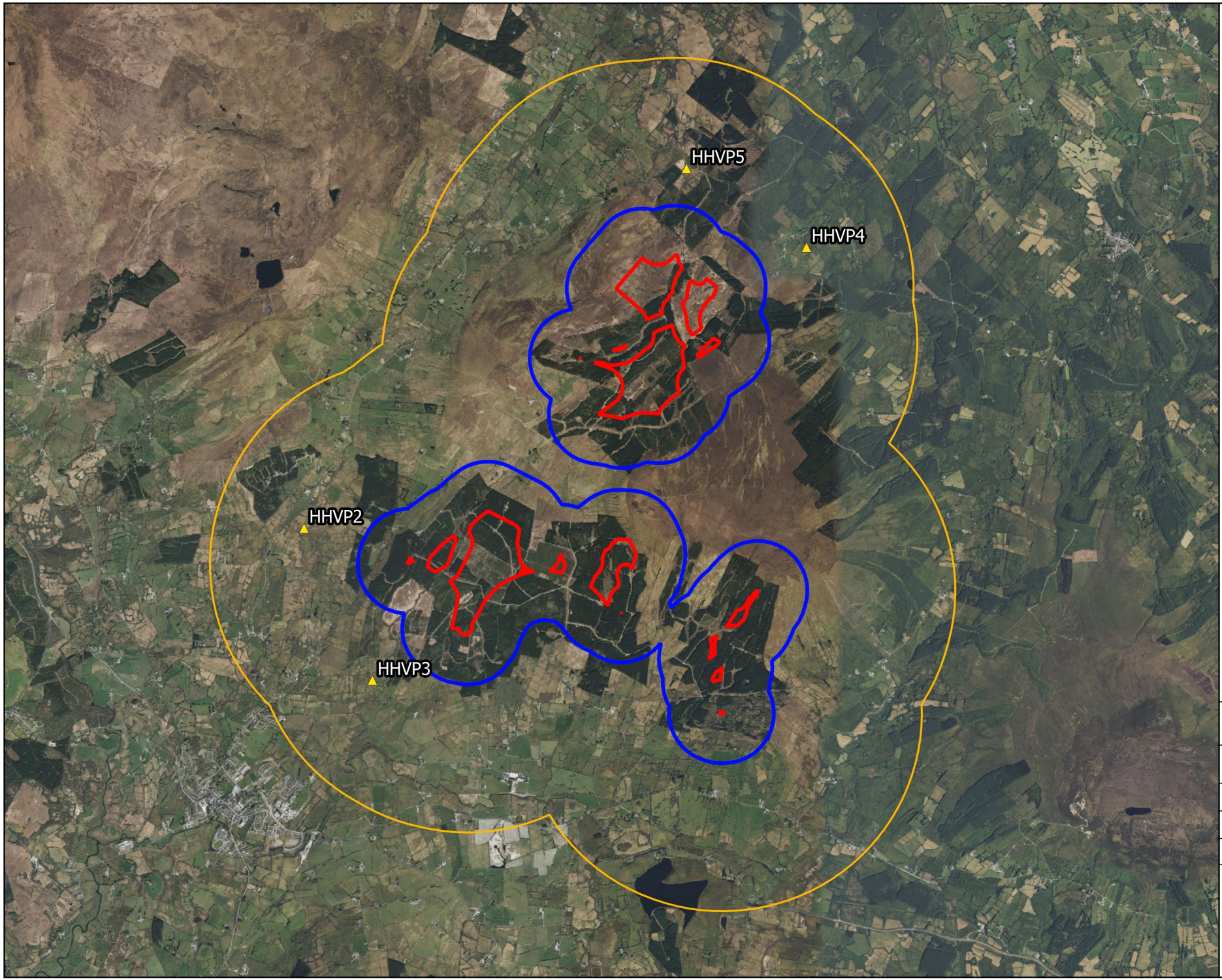

Map Legend

- Wind Farm Site
- 500m Survey Radius
- 2km Survey Radius
- Hen Harrier Roost Survey Location

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Drawing Title
Hen Harrier Roost Survey Locations

Project Title
Lissinagroagh Wind Farm

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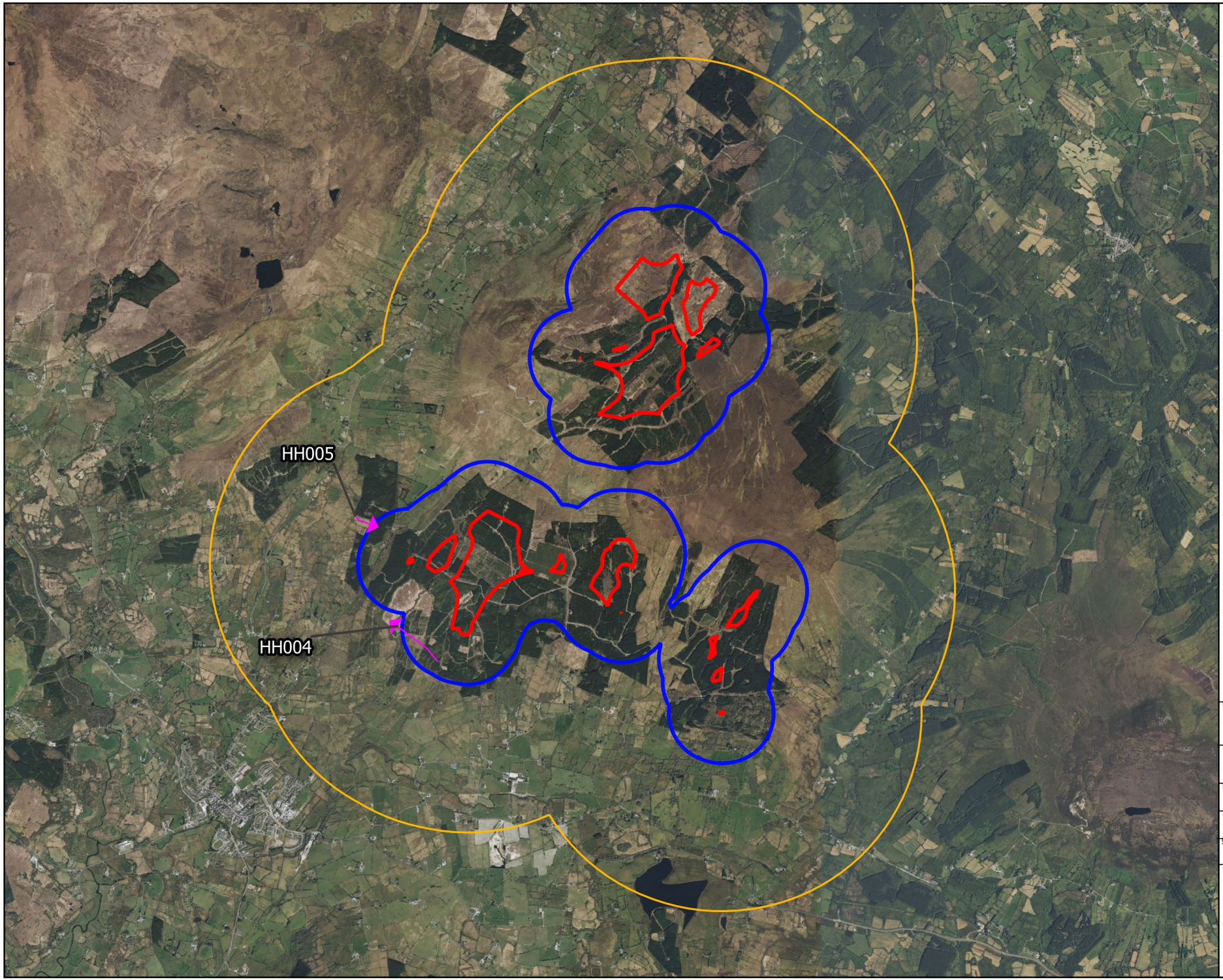

Map Legend

- Wind Farm Site
- 500m Survey Radius
- 2km Survey Radius
- Flightline

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Drawing Title
Hen Harrier Roost
Hen Harrier Observations

Project Title
Lissinagroagh Wind Farm

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Project No.	Drawing No.
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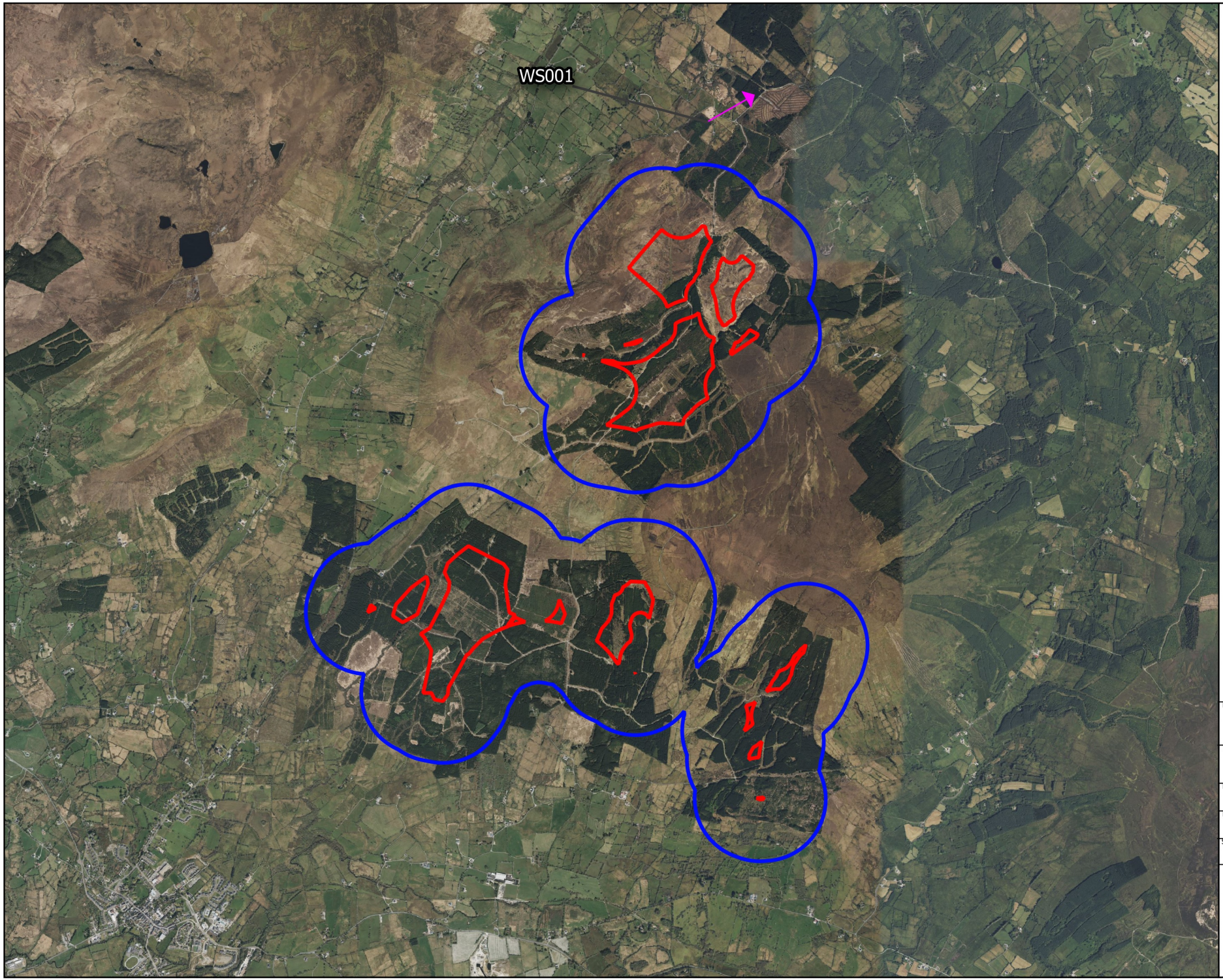

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Flightline

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Drawing Title
Incidental Whooper Swan Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 4.1
Scale	Date
1:40,000	20.09.2024

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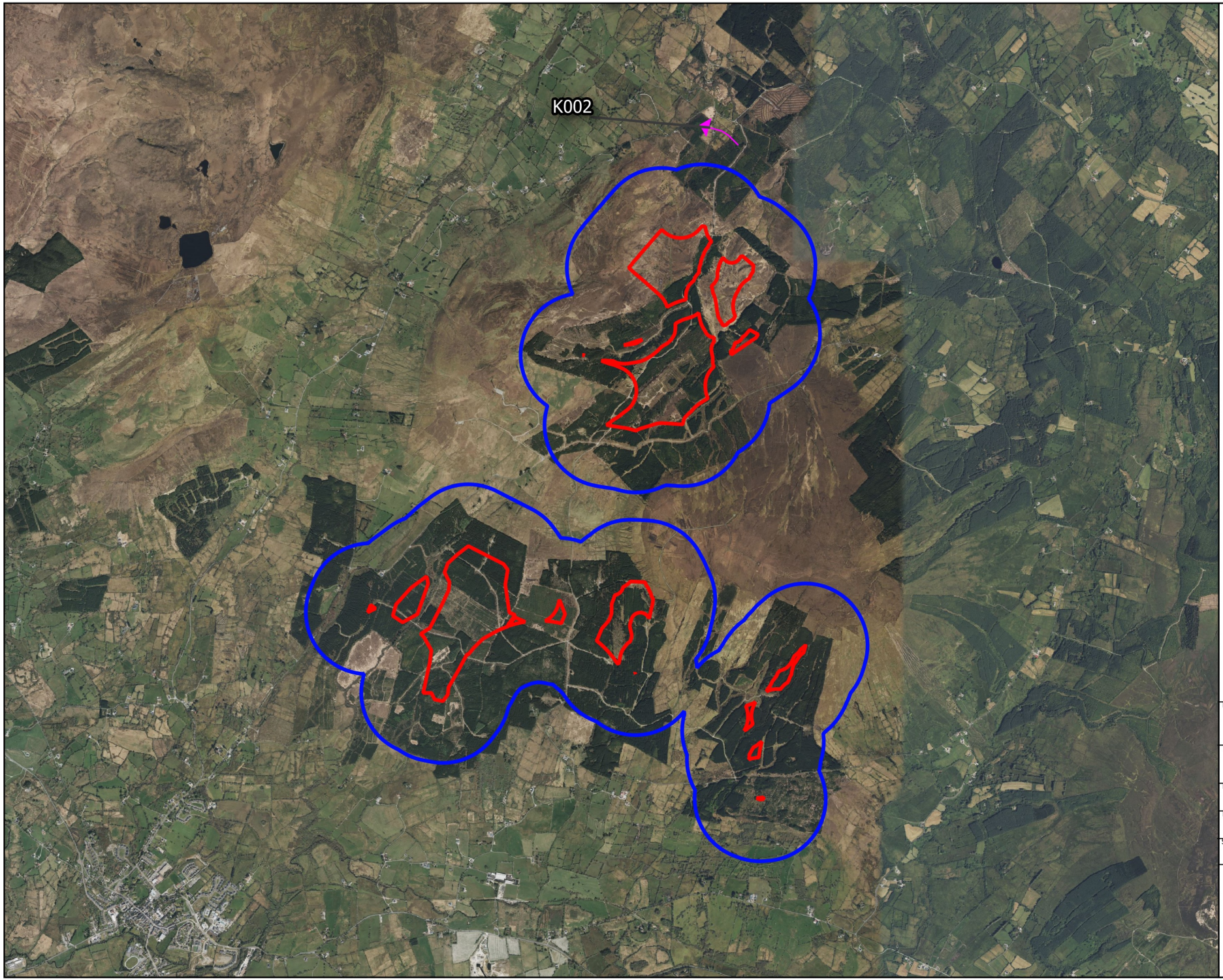

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Flightline

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Drawing Title
Incidental Kestrel Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 4.2
Scale	Date
1:40,000	20.09.2024

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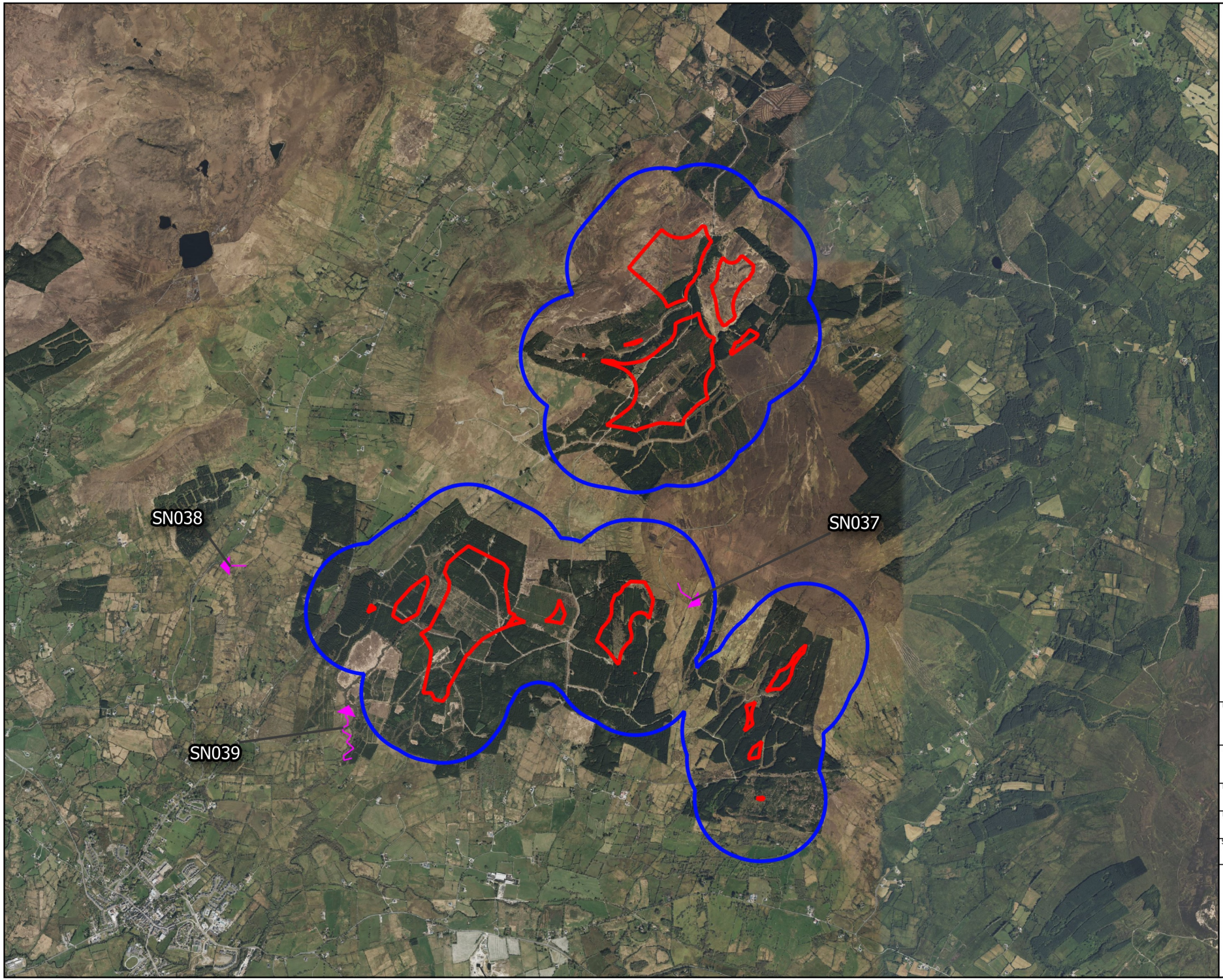

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Flightline

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Drawing Title
Incidental Snipe Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 4.3
Scale	Date
1:40,000	20.09.2024

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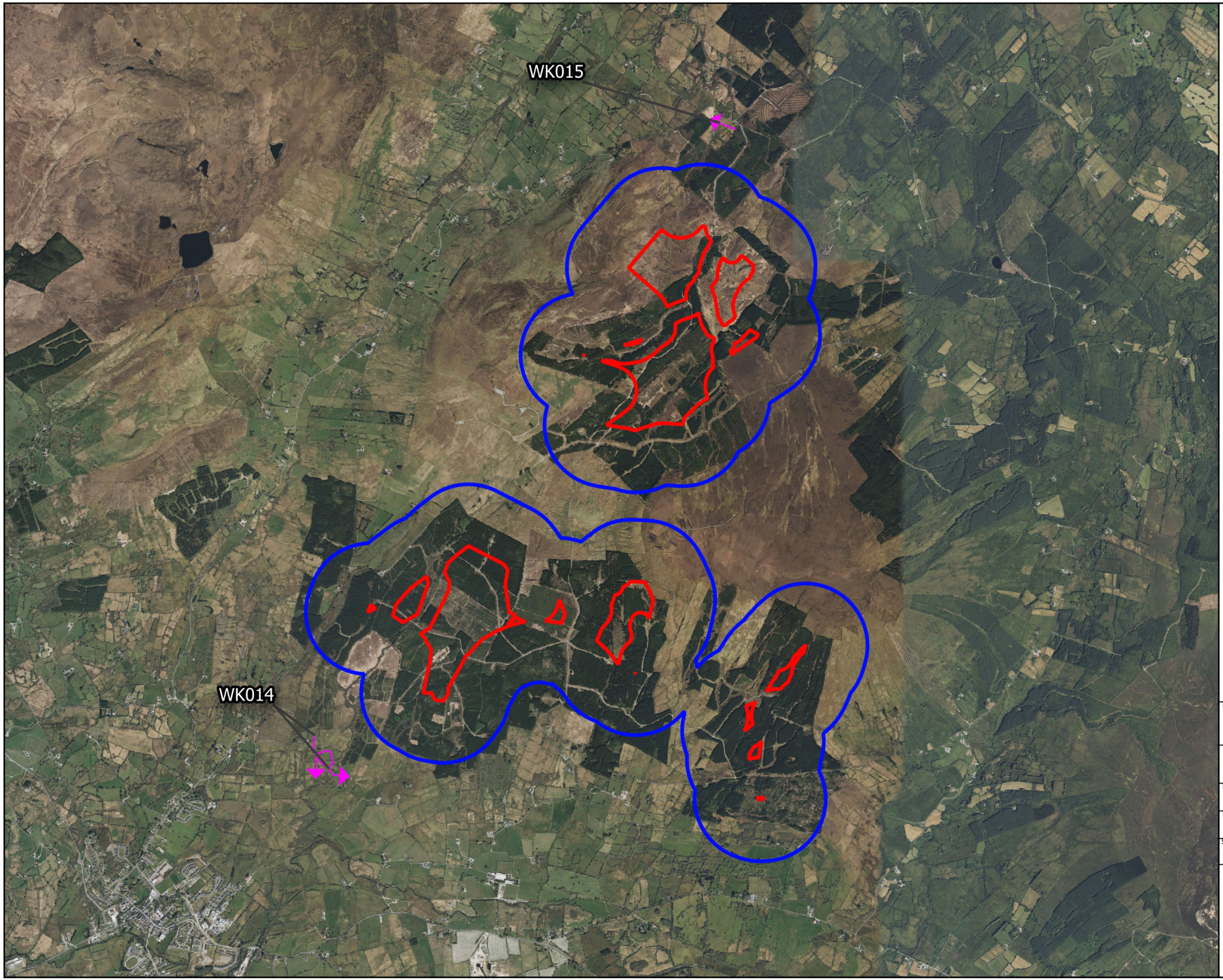

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Flightline

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Drawing Title
Incidental Woodcock Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 4.4
Scale	Date
1:40,000	20.09.2024

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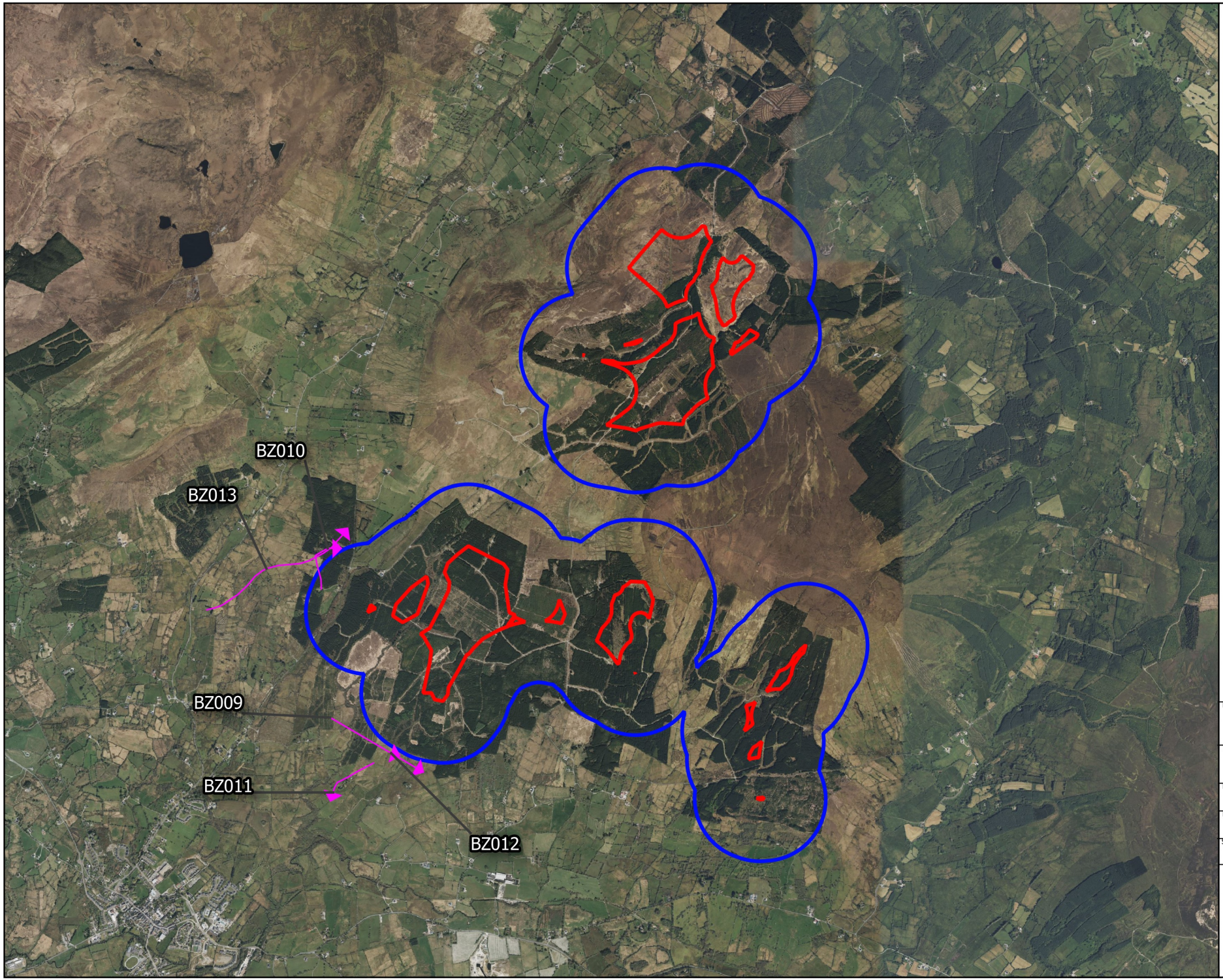

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Flightline

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Drawing Title
Incidental Buzzard Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 4.5
Scale	Date
1:40,000	20.09.2024

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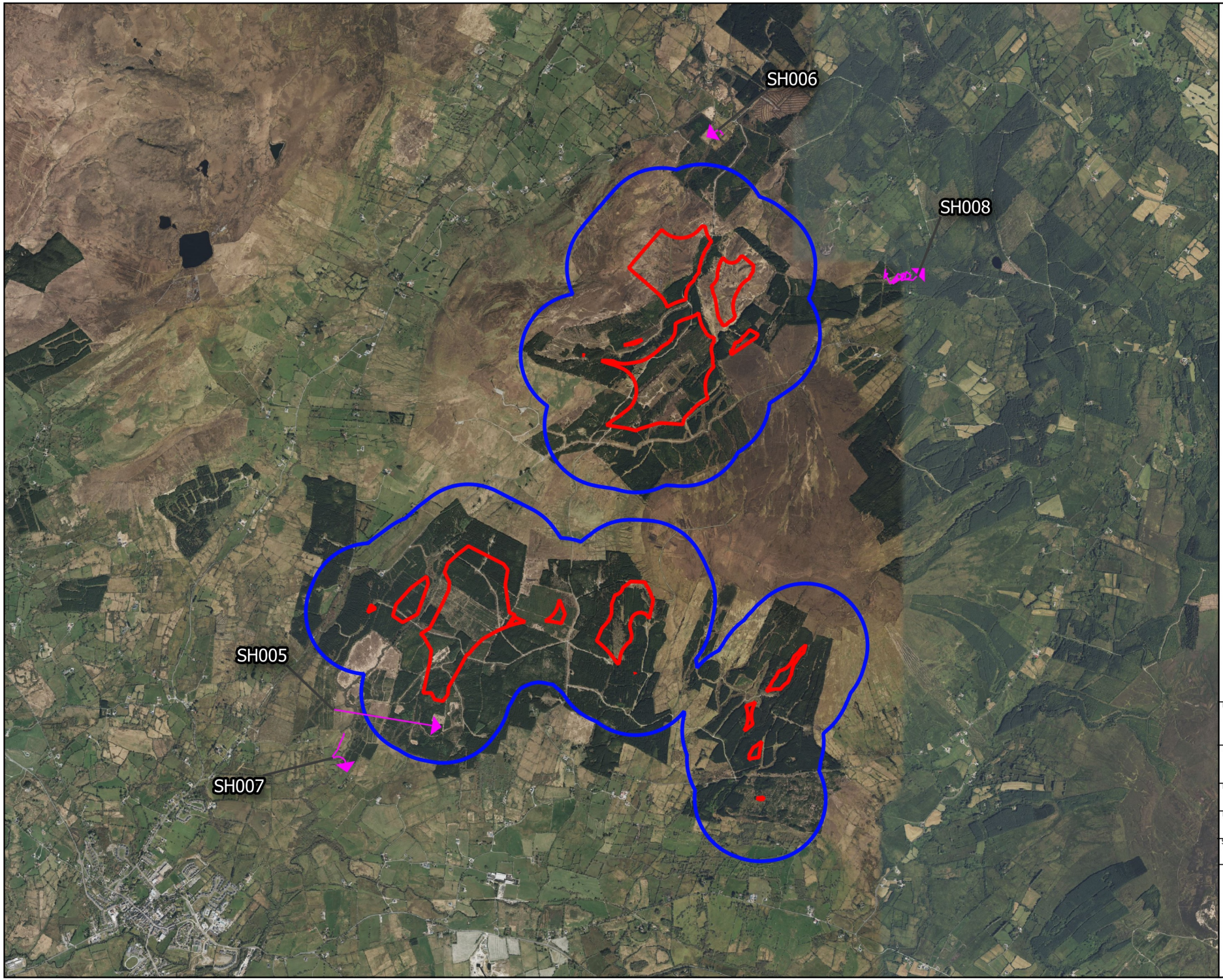

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Flightline

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Drawing Title
Incidental Sparrowhawk Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-a	Fig 4.6
Scale	Date
1:40,000	20.09.2024

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APPENDIX 2

SURVEY DATA

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Table 1 Vantage Point Survey Effort

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
13/10/2020	Vantage Point Survey	VP2	6:30 starting at 13:10	Visibility: good; Wind speed and direction: moderate breeze N-NE; Cloud cover and height: 0% >500m; Rain: none; Frost: none; Snow: none		RV
20/10/2020	Vantage Point Survey	VP1	6:30 starting at 12:55	Visibility: good; Wind speed and direction: moderate breeze S-SE; Cloud cover and height: 0% 150-500m; Rain: light showers; Frost: none; Snow: none	Light Rain gradually getting heavier throughout	RV
21/10/2020	Vantage Point Survey	VP4	6:30 starting at 12:50	Visibility: poor; Wind speed and direction: moderate breeze N-NW; Cloud cover and height: 0% >500m; Rain: drizzle; Frost: none; Snow: none	Constant drizzle and passing misty conditions in front of hill	RV
23/10/2020	Vantage Point Survey	VP3	6:32 starting at 12:45	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 0% >500m; Rain: none; Frost: none; Snow: none		RV
19/11/2020	Vantage Point Survey	VP1	3:00 starting at 07:11	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none	A cold, calm morning and fairly quiet form the elevated Vantage Point, with the exception of plenty of activity from the Raven's near their roost and a handful of Hooded Crow's.	LD
19/11/2020	Vantage Point Survey	VP1	3:00 starting at 10:41	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none	A cold, calm morning and fairly quiet form the elevated Vantage Point, with the exception of plenty of activity from the Raven's near their roost and a handful of Hooded Crow's.	LD
25/11/2020	Vantage Point Survey	VP3	2:00 starting at 07:22	Visibility: moderate; Wind speed and direction: gentle breeze W; Cloud cover and height: <150m% <150m; Rain: light showers; Frost: none; Snow: none		LD
25/11/2020	Vantage Point Survey	VP3	1:00 starting at 09:22	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: <150m% <150m; Rain: light showers; Frost: none; Snow: none		LD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
25/11/2020	Vantage Point Survey	VP3	1:00 starting at 10:52	Visibility: good; Wind speed and direction: fresh breeze W; Cloud cover and height: <150m% <150m; Rain: light showers; Frost: none; Snow: none		LD
25/11/2020	Vantage Point Survey	VP3	2:00 starting at 11:52	Visibility: moderate; Wind speed and direction: strong breeze W; Cloud cover and height: <150m% <150m; Rain: light showers; Frost: none; Snow: none		LD
26/11/2020	Vantage Point Survey	VP2	6:30 starting at 07:20	Visibility: limited; Wind speed and direction: gentle breeze SW; Cloud cover and height: 0% <150m; Rain: none; Frost: none; Snow: none		RV
27/11/2020	Vantage Point Survey	VP4	6:30 starting at 07:25	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 0% >500m; Rain: none; Frost: none; Snow: none		RV
14/12/2020	Vantage Point Survey	VP3	6:30 starting at 10:40	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 0% >500m; Rain: none; Frost: none; Snow: none	Light showers and F5 last 2 hours	RV
15/12/2020	Vantage Point Survey	VP2	1:00 starting at 10:34	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 150-500m% 150-500m; Rain: light showers; Frost: none; Snow: none		LD
15/12/2020	Vantage Point Survey	VP2	2:00 starting at 11:34	Visibility: good; Wind speed and direction: fresh breeze SE; Cloud cover and height: 150-500m% 150-500m; Rain: light showers; Frost: none; Snow: none		LD
15/12/2020	Vantage Point Survey	VP2	2:00 starting at 14:04	Visibility: good; Wind speed and direction: strong breeze SE; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		LD
15/12/2020	Vantage Point Survey	VP2	1:00 starting at 16:04	Visibility: good; Wind speed and direction: near gale SE; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none		LD
16/12/2020	Vantage Point Survey	VP4	6:30 starting at 10:40	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 150-500m; Rain: light showers; Frost: none; Snow: none	Rain at start and end of survey, otherwise dry.	RV
19/12/2020	Vantage Point Survey	VP1	3:00 starting at 10:35	Visibility: good; Wind speed and direction: strong breeze S; Cloud cover and height: <150m% <150m; Rain: heavy showers; Frost: none; Snow: none	A wet and windy day. Regular showers and misty on the higher hills. Very quiet, although there were regular Raven's in flight around their roost. Also saw a Buzzard hunting away in the distance on two occasions. See Target tab and map for location.	LD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
19/12/2020	Vantage Point Survey	VP1	2:00 starting at 14:05	Visibility: good; Wind speed and direction: near gale S; Cloud cover and height: <150m% <150m; Rain: heavy showers; Frost: none; Snow: none	A wet and windy day. Regular showers and misty on the higher hills. Very quiet, although there were regular Raven's in flight around their roost. Also saw a Buzzard hunting away in the distance on two occasions. See Target tab and map for location.	LD
19/12/2020	Vantage Point Survey	VP1	1:00 starting at 16:05	Visibility: good; Wind speed and direction: strong breeze S; Cloud cover and height: <150m% <150m; Rain: heavy showers; Frost: none; Snow: none	A wet and windy day. Regular showers and misty on the higher hills. Very quiet, although there were regular Raven's in flight around their roost. Also saw a Buzzard hunting away in the distance on two occasions. See Target tab and map for location.	LD
11/01/2021	Vantage Point Survey	VP1	6:30 starting at 07:50	Visibility: poor; Wind speed and direction: fresh breeze WEST; Cloud cover and height: 0% 150-500m; Rain: light showers; Frost: none; Snow: none		RV
13/01/2021	Vantage Point Survey	VP3	6:30 starting at 07:50	Visibility: limited; Wind speed and direction: gentle breeze S-SW; Cloud cover and height: 150-500m; Rain: light showers; Frost: none; Snow: none		RV
15/01/2021	Vantage Point Survey	VP2	6:30 starting at 07:45	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 0% >500m; Rain: none; Frost: none; Snow: none		RV
17/01/2021	Vantage Point Survey	VP4	6:30 starting at 07:40	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: >500m; Rain: none; Frost: none; Snow: none		RV
04/02/2021	Vantage Point Survey	VP2	6:30 starting at 11:45	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: <150m; Rain: none; Frost: none; Snow: none		RV
06/02/2021	Vantage Point Survey	VP1	6:30 starting at 11:50	Visibility: good; Wind speed and direction: gentle breeze E; Cloud cover and height: >500m; Rain: none; Frost: none; Snow: none		RV
19/02/2021	Vantage Point Survey	VP3	6:30 starting at 12:15	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: >500m; Rain: none; Frost: none; Snow: none		RV

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
21/02/2021	Vantage Point Survey	VP4	6:30 starting at 12:20	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: >500m; Rain: none; Frost: none; Snow: none		RV
06/03/2021	Vantage Point Survey	VP1	6:30 starting at 06:10	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 50% >500m; Rain: none; Frost: none; Snow: none		RV
08/03/2021	Vantage Point Survey	VP2	6:30 starting at 06:05	Visibility: poor; Wind speed and direction: moderate breeze S; Cloud cover and height: 100% 150-500m; Rain: none; Frost: none; Snow: none	Thick fog and light drizzle at times	RV
10/03/2021	Vantage Point Survey	VP4	6:30 starting at 06:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 100% 150-500m; Rain: drizzle; Frost: none; Snow: none	mostly dry, but some brief heavy showers	RV
18/03/2021	Vantage Point Survey	VP3	6:30 starting at 05:40	Visibility: moderate; Wind speed and direction: gentle breeze N-NW; Cloud cover and height: 100% 150-500m; Rain: none; Frost: none; Snow: none	Cold, damp fog but no rain to 08:30	RV

Table 2 Winter Walkover Survey Effort

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
22/10/2020	Winter Walkover Survey	T1	1:31 starting at 11:49	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 0% <150m; Rain: none; Frost: none; Snow: none		RV
22/10/2020	Winter Walkover Survey	T2	1:49 starting at 13:59	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 0% <150m; Rain: none; Frost: none; Snow: none		RV
23/10/2020	Winter Walkover Survey	T3	2:36 starting at 09:21	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 0% >500m; Rain: none; Frost: none; Snow: none		RV
30/10/2020	Winter Walkover Survey	T4	1:36 starting at 09:18	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 0% >500m; Rain: none; Frost: none; Snow: none		RV
30/10/2020	Winter Walkover Survey	T5	1:25 starting at 11:57	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 0% >500m; Rain: none; Frost: none; Snow: none		RV
06/01/2021	Winter Walkover Survey	T1	2:03 starting at 09:21	Visibility: good; Wind speed and direction: light breeze S-SW; Cloud cover and height: >500m; Rain: none; Frost: light; Snow: none		RV
06/01/2021	Winter Walkover Survey	T2	1:44 starting at 12:19	Visibility: good; Wind speed and direction: light breeze S-SW; Cloud cover and height: >500m; Rain: none; Frost: light; Snow: none		RV
08/01/2021	Winter Walkover Survey	T3	3:20 starting at 09:19	Visibility: good; Wind speed and direction: light air N; Cloud cover and height: >500m; Rain: none; Frost: light; Snow: on ground		RV
08/01/2021	Winter Walkover Survey	T4	1:13 starting at 13:14	Visibility: good; Wind speed and direction: light breeze N; Cloud cover and height: >500m; Rain: none; Frost: light; Snow: on ground		RV
17/01/2021	Winter Walkover Survey	T5	1:31 starting at 14:49	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 150-500m; Rain: light showers; Frost: light; Snow: none		RV
15/02/2021	Winter Walkover Survey	T1	1:55 starting at 09:44	Visibility: good; Wind speed and direction: moderate breeze E; Cloud cover and height: 150-500m; Rain: none; Frost: none; Snow: none		RV
15/02/2021	Winter Walkover Survey	T2	1:34 starting at 12:12	Visibility: good; Wind speed and direction: moderate breeze E; Cloud cover and height: >500m; Rain: none; Frost: none; Snow: none		RV
15/02/2021	Winter Walkover Survey	T4	1:11 starting at 14:08	Visibility: good; Wind speed and direction: moderate breeze E; Cloud cover and height: >500m; Rain: none; Frost: none; Snow: none		RV
28/02/2021	Winter Walkover Survey	T4	2:44 starting at 08:55	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: >500m; Rain: none; Frost: none; Snow: none		RV
28/02/2021	Winter Walkover Survey	T5	1:44 starting at 12:39	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: >500m; Rain: none; Frost: none; Snow: none		RV

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
06/03/2021	Winter Walkover Survey	T1	1:11 starting at 15:23	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 33% >500m; Rain: none; Frost: none; Snow: none		RV
17/03/2021	Winter Walkover Survey	T2	1:31 starting at 12:53	Visibility: good; Wind speed and direction: light breeze N-NW; Cloud cover and height: 75% 150-500m; Rain: none; Frost: none; Snow: none		RV
17/03/2021	Winter Walkover Survey	T3	1:54 starting at 14:55	Visibility: good; Wind speed and direction: light breeze N-NW; Cloud cover and height: 100% 150-500m; Rain: none; Frost: none; Snow: none		RV
18/03/2021	Winter Walkover Survey	T4	2:34 starting at 12:38	Visibility: good; Wind speed and direction: gentle breeze N-NW; Cloud cover and height: 100% >500m; Rain: none; Frost: none; Snow: none		RV
19/03/2021	Winter Walkover Survey	T5	1:44 starting at 14:59	Visibility: good; Wind speed and direction: light breeze N; Cloud cover and height: 100% >500m; Rain: none; Frost: none; Snow: none		RV

Table 3 Hen Harrier Roost Survey Effort

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
12/10/2020	Hen Harrier Roost Survey	HHVP5	3:00 starting at 17:15	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: 0% >500m; Rain: none; Frost: none; Snow: none		RV
15/10/2020	Hen Harrier Roost Survey	HHVP3	2:40 starting at 16:30	Visibility: good; Wind speed and direction: light breeze E; Cloud cover and height: 0% >500m; Rain: none; Frost: none; Snow: none		RV
22/10/2020	Hen Harrier Roost Survey	HHVP2	2:10 starting at 17:00	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 0% 150-500m; Rain: none; Frost: none; Snow: none		RV
30/10/2020	Hen Harrier Roost Survey	HHVP4	2:20 starting at 06:40	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 0% >500m; Rain: none; Frost: none; Snow: none		RV
19/11/2020	Hen Harrier Roost Survey	HHVP4	1:00 starting at 14:34	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none	A cold and very quiet evening, with winds increasing from the north-west. Very little bird activity, and no Hen Harrier's seen this evening.	LD
19/11/2020	Hen Harrier Roost Survey	HHVP4	1:22 starting at 15:34	Visibility: good; Wind speed and direction: fresh breeze NW; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none	A cold and very quiet evening, with winds increasing from the north-west. Very little bird activity, and no Hen Harrier's seen this evening.	LD
25/11/2020	Hen Harrier Roost Survey	HHVP5	1:00 starting at 14:37	Visibility: good; Wind speed and direction: strong breeze NW; Cloud cover and height: 150-500m% 150-500m; Rain: light showers; Frost: none; Snow: none	A fresh to strong breeze from the west, with occasional light rain or showers. Very quiet, and no Hen Harrier's observed this evening.	LD
25/11/2020	Hen Harrier Roost Survey	HHVP5	1:18 starting at 15:37	Visibility: good; Wind speed and direction: near gale NW; Cloud cover and height: 150-500m% 150-500m; Rain: light showers; Frost: none; Snow: none	A fresh to strong breeze from the west, with occasional light rain or showers. Very quiet, and no Hen Harrier's observed this evening.	LD
26/11/2020	Hen Harrier Roost Survey	HHVP2	2:15 starting at 15:00	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 0% >500m; Rain: none; Frost: none; Snow: none		RV
27/11/2020	Hen Harrier Roost Survey	HHVP3	2:00 starting at 15:15	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 0% >500m; Rain: none; Frost: none; Snow: none		RV

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
14/12/2020	Hen Harrier Roost Survey	HHVP4	2:35 starting at 07:45	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: >500m; Rain: none; Frost: none; Snow: none	Sky clear at start	RV
15/12/2020	Hen Harrier Roost Survey	HHVP3	1:00 starting at 08:00	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none	A calm and quiet morning, but I did hear a Buzzard calling from the edge of forestry and scrub, then seen flying over farmland. See map for location.	LD
15/12/2020	Hen Harrier Roost Survey	HHVP3	1:20 starting at 09:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 150-500m% 150-500m; Rain: none; Frost: none; Snow: none	A calm and quiet morning, but I did hear a Buzzard calling from the edge of forestry and scrub, then seen flying over farmland. See map for location.	LD
16/12/2020	Hen Harrier Roost Survey	HHVP5	2:25 starting at 07:45	Visibility: good; Wind speed and direction: fresh breeze SE; Cloud cover and height: 150-500m; Rain: light showers; Frost: none; Snow: none	Heavy rain for a period during survey around sunrise	RV
19/12/2020	Hen Harrier Roost Survey	HHVP2	1:00 starting at 08:18	Visibility: good; Wind speed and direction: fresh breeze S; Cloud cover and height: 150-500m% 150-500m; Rain: heavy showers; Frost: none; Snow: none	A fresh breeze with some heavy showers. Very quiet this morning, and no Hen Harrier's seen on site.	LD
19/12/2020	Hen Harrier Roost Survey	HHVP2	1:10 starting at 09:18	Visibility: good; Wind speed and direction: strong breeze S; Cloud cover and height: 150-500m% 150-500m; Rain: heavy showers; Frost: none; Snow: none	A fresh breeze with some heavy showers. Very quiet this morning, and no Hen Harrier's seen on site.	LD
06/01/2021	Hen Harrier Roost Survey	HHVP3	2:20 starting at 15:00	Visibility: good; Wind speed and direction: light air SW; Cloud cover and height: >500m; Rain: none; Frost: light; Snow: on ground		RV
08/01/2021	Hen Harrier Roost Survey	HHVP2	2:00 starting at 15:20	Visibility: good; Wind speed and direction: light breeze N; Cloud cover and height: >500m; Rain: none; Frost: light; Snow: on ground		RV
11/01/2021	Hen Harrier Roost Survey	HHVP4	2:05 starting at 15:20	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 150-500m; Rain: drizzle; Frost: none; Snow: none		RV
15/01/2021	Hen Harrier Roost Survey	HHVP5	2:00 starting at 15:30	Visibility: good; Wind speed and direction: moderate breeze S-SE; Cloud cover and height: 150-500m; Rain: none; Frost: none; Snow: none		RV
04/02/2021	Hen Harrier Roost Survey	HHVP2	2:10 starting at 07:20	Visibility: good; Wind speed and direction: light air E; Cloud cover and height: 150-500m; Rain: none; Frost: none; Snow: none		RV
06/02/2021	Hen Harrier Roost Survey	HHVP3	2:15 starting at 07:15	Visibility: good; Wind speed and direction: gentle breeze E-NE; Cloud cover and height: 150-500m; Rain: none; Frost: none; Snow: none		RV

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
15/02/2021	Hen Harrier Roost Survey	HHVP4	2:25 starting at 06:55	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 150-500m; Rain: none; Frost: none; Snow: none		RV
28/02/2021	Hen Harrier Roost Survey	HHVP5	2:00 starting at 06:25	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: >500m; Rain: none; Frost: none; Snow: none		RV
06/03/2021	Hen Harrier Roost Survey	HHVP2	2:00 starting at 17:20	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 50% >500m; Rain: none; Frost: none; Snow: none		RV
08/03/2021	Hen Harrier Roost Survey	HHVP3	2:00 starting at 17:20	Visibility: good; Wind speed and direction: moderate breeze E-NE; Cloud cover and height: 100% 150-500m; Rain: none; Frost: none; Snow: none		RV
17/03/2021	Hen Harrier Roost Survey	HHVP4	2:00 starting at 17:35	Visibility: good; Wind speed and direction: light breeze N-NW; Cloud cover and height: 100% 150-500m; Rain: light showers; Frost: none; Snow: none		RV
19/03/2021	Hen Harrier Roost Survey	HHVP5	2:00 starting at 17:40	Visibility: good; Wind speed and direction: light air N; Cloud cover and height: 0% >500m; Rain: none; Frost: none; Snow: none		RV

Table 4 Vantage Point Survey Data

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
BZ117	4	21/10/2020	14:55	Buzzard	1	63		8	55		conifer plantation and improved agricultural grassland; flying then circling	RV
SH024	3	23/10/2020	13:21	Sparrowhawk	1	16		16			conifer plantation; flying, female flew low over plantation	RV
GK001	3	25/11/2020	09:38	Greenshank	1						wet grassland, dry siliceous heath and lakes and ponds; calling, probable greenshank heard calling from a fair way off, higher up on moor above the vp above lough, with freshwater pools and bog on the level ground. heard a few times, with occasional short, busts of song, but the bird was not seen or heard at close quarters.	L. DARK
GK002	3	25/11/2020	10:11	Greenshank	2						wet grassland, dry siliceous heath and lakes and ponds; calling, probable greenshank heard calling from a fair way off, higher up on moor above the vp above lough, with freshwater pools and bog on the level ground. heard a few times, with occasional short, busts of song, but the bird was not seen or heard at close quarters.	L. DARK
GB002	3	25/11/2020	10:44	Great Black-backed Gull	3	48		48			lakes and ponds and improved agricultural grassland; travelling , great black backed gull seen travelling over/on the edge of lough...	L. DARK
GK003	3	25/11/2020	12:10	Greenshank	4						wet grassland, dry siliceous heath and lakes and ponds; calling, probable greenshank heard calling from a fair way off, higher up on moor above the vp above lough, with freshwater pools and bog on the level ground. heard a few times, with occasional short, busts of song, but the bird was not seen or heard at close quarters.	L. DARK
BZ118	4	27/11/2020	08:13	Buzzard							present	RV
SH025		27/11/2020	08:20	Sparrowhawk	1	10	10				present	RV
BZ119	4	27/11/2020	09:42	Buzzard	1	25		5	20		present	RV

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
BZ120	4	27/11/2020	11:07	Buzzard	1	125		25	100		present	RV
HH121	3	14/12/2020	14:41	Hen Harrier	1	35	35				present	RV
HH122	3	14/12/2020	15:14	Hen Harrier	2	47	40	7			present	RV
BZ121	2	15/12/2020	11:16	Buzzard	1	47					conifer plantation, wet grassland and scrub; hunting and travelling, a buzzard was seen hunting over farmland fields way off in the distance over farmland fields and forestry, before flying out of view. see map for location.	L. DARK
BZ122	4	16/12/2020	11:23	Buzzard	1	16		16			present	RV
BZ123	4	16/12/2020	11:55	Buzzard	2	11		11			present	RV
SH026	4	16/12/2020	13:45	Sparrowhawk	3	7	7				present	RV
SH027	4	16/12/2020	15:56	Sparrowhawk	4	8	8				present	RV
BZ124	4	16/12/2020	16:07	Buzzard	5	15		15			present	RV
BZ125	1	19/12/2020	11:41	Buzzard	1	74	4	70			wet grassland, improved agricultural grassland and scrub; hunting, a buzzard was seen hunting away in the distance on two occasions over farmland field and grassland, before dropping out of view into scrub.	L. DARK
BZ126	1	19/12/2020	11:53	Buzzard	2	25	20	5			wet grassland, improved agricultural grassland and scrub; travelling, the bird was seen shortly after, travelling over the fields and out of view again.	L. DARK
SH028	2	15/01/2021	09:23	Sparrowhawk	1	64		30	34		freshwater; circling, displaying, circling and displaying over plantation	RV
BZ127	2	15/01/2021	09:36	Buzzard	2	146		25	121		present	RV
HH123	2	15/01/2021	10:56	Hen Harrier	3	12	12				present	RV
HH124	2	15/01/2021	11:21	Hen Harrier	4	18	18				present	RV
BZ128	4	17/01/2021	09:28	Buzzard	1	178	-	45	133		present	RV
HH125	4	17/01/2021	09:52	Hen Harrier	2	18	18				present	RV
BZ129	4	17/01/2021	12:28	Buzzard	3	21	-	21			present	RV
SN017	VP2	04/02/2021	15:10	Snipe	-	-	-	-	-	-	upland blanket bog; flushed	RV

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
GP015	VP2	04/02/2021	11:10	Golden Plover	10	0	0	0	0	0	upland blanket bog; flushed by tractor at 11:10 behind vp, hard to follow due to fog, approx 10 seen, but more heard. flight details not recorded	RV
ML003	VP3	19/02/2021	14:36	Merlin	-	-	-	-	-	0	lowland blanket bog; flying	RV
RG050	VP3	19/02/2021	13:22	Red Grouse	2	-	-	-	-	-	upland blanket bog; pair, male singing	RV
SN018	VP3	19/02/2021	17:55	Snipe	-	-	-	-	-	-	upland blanket bog; flew over after sunset	RV
SN019	VP3	19/02/2021	17:55	Snipe	1	-	-	-	-	-	upland blanket bog; flew over after sunset, flight details not recorded	RV
SN020	VP3	19/02/2021	17:55	Snipe	1	-	-	-	-	-	upland blanket bog; flew over after sunset, flight details not recorded	RV
SN021	VP3	19/02/2021	17:55	Snipe	1	-	-	-	-	-	upland blanket bog; flew over after sunset, flight details not recorded	RV
BZ130	VP4	21/02/2021	14:41	Buzzard	-	-	-	-	-	0	conifer plantation and improved agricultural grassland; displaying	RV
WK006	VP4	21/02/2021	18:29	Woodcock	1						upland blanket bog; seen flying to south, first at 18:29, flight details not recorded	RV
WK007	VP4	21/02/2021	18:29	Woodcock	1						upland blanket bog; seen flying to south, first at 18:29, flight details not recorded	RV
WK008	VP4	21/02/2021	18:29	Woodcock	1						upland blanket bog; seen flying to south, first at 18:29, flight details not recorded	RV
WK009	VP4	21/02/2021	18:29	Woodcock	1						upland blanket bog; seen flying to south, first at 18:29, flight details not recorded	RV
BZ131	VP1	06/03/2021	10:13	Buzzard	1	93			93		conifer plantation and improved agricultural grassland; circling/displaying, circled and called, i spotted a second bird recorded below in a tree while watching this bird	RV
SH029	VP1	06/03/2021	08:47	Sparrowhawk	1	72			72		conifer plantation; circling/displaying, slowly circling over plantation and drifted out of few.	RV
BZ132	VP1	06/03/2021	10:14	Buzzard	1	85		20	65		conifer plantation and improved agricultural grassland; perching/circling, spotted in a dead tree, almost immediately began circling with bird above, both disappeared into plantation.	RV

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
SN022	VP1	06/03/2021	06:38	Snipe	-	-	-	-	-	0	upland blanket bog; flying, flew over my head as it was beginning to get bright.	RV
BZ133	VP4	10/03/2021	10:02	Buzzard	2	65		15	50		scrub and improved agricultural grassland; circling, 2 circling over area i was told that a sheep carcass had been left by local farmer. both landed on ground out of view.	RV
BZ134	VP4	10/03/2021	11:47	Buzzard	2	93		15	78		scrub and improved agricultural grassland; circling, 2 circling, one dropped back to ground after 15 seconds, second bird circled and moved north.	RV
BZ135	VP4	10/03/2021	12:21	Buzzard	1	10		10			scrub and improved agricultural grassland; flying, flew away from carcass, disappeared in the same area as first bird.	RV
BZ136	VP3	18/03/2021	08:28	Buzzard	1	-	-	-	-	-	conifer plantation; calling, calling bird as fog cleared.	RV
SH030	VP3	18/03/2021	10:27	Sparrowhawk	1	27		27			conifer plantation; circling/gliding, circled and then glided away	RV
RG051	VP3	18/03/2021	06:27	Red Grouse	1	-	-	-	-	-	upland blanket bog; calling, male calling in thick fog above vp, last heard at 08:25 as fog cleared.	RV

Table 5 Winter Walkover Survey Data

Ref.	Date	Time	Transect	Species	Number	Habitat and activity	Surveyor
MP001	22/10/2020	09:05		Meadow Pipit	23	raised bog, conifer plantation and scrub/transitional woodland; migrants and feeding flocks, 11:49-13:20 (wintering)	RV
RE001	22/10/2020			Redwing	4	improved agricultural grassland and conifer plantation; flyovers (wintering)	RV
HH003	22/10/2020	12:45		Hen Harrier	1	improved agricultural grassland, eroding blanket bog and conifer plantation; flying, flew south, mapped (wintering)	RV
SN011	22/10/2020			Snipe	3	upland blanket bog; flushed, flushed on mountain top (wintering)	RV
RE002	22/10/2020			Redwing	20	conifer plantation; migrants, flyovers, probably more (wintering)	RV
MP002	22/10/2020			Meadow Pipit	12	improved agricultural grassland; feeding and migrants (wintering)	RV
RE003	23/10/2020			Redwing	50	mixed broadleaved/conifer woodland and conifer plantation; flyovers, dozens flying over early on (wintering)	RV
MP003	23/10/2020			Meadow Pipit	30	upland blanket bog; flying, flyovers and flushed (wintering)	RV
SN012	23/10/2020			Snipe	3	upland blanket bog; flying, flyovers, not flushed (wintering)	RV
RE004	30/10/2020			Redwing	17	scrub; flyovers (wintering)	RV
MP004	30/10/2020			Meadow Pipit	27	upland blanket bog; flyovers (wintering)	RV
HH004	30/10/2020	10:22		Hen Harrier	1	upland blanket bog; flushed, flushed from depression and flew east (wintering)	RV
RG001	30/10/2020			Red Grouse		upland blanket bog; latrine, latrine close to plantation edge (wintering)	RV
SH001	30/10/2020			Sparrowhawk	1	upland blanket bog and conifer plantation; flying, flew east (wintering)	RV
RE005	30/10/2020			Redwing	37	conifer plantation; flyovers, 12 singles and flock of 25+ (wintering)	RV
MP005	30/10/2020			Meadow Pipit	3	scrub; feeding, along roadside (wintering)	RV
RE006	06/01/2021			Redwing	1	freshwater; flying, flyover (wintering)	RV
SH002	06/01/2021			Sparrowhawk	1	freshwater; displaying, heard calling and seen circling with slow motion wing beats. (wintering)	RV
MP006	06/01/2021			Meadow Pipit	3	present	RV
WK005	06/01/2021			Woodcock	1	freshwater; flying, flushed from side of path (wintering)	RV
MP007	06/01/2021			Meadow Pipit	5	present	RV
SN013	06/01/2021			Snipe	1	present	RV
SH003	08/01/2021			Sparrowhawk	1	present	RV
MP008	08/01/2021			Meadow Pipit	3	present	RV
SN014	08/01/2021			Snipe	1	present	RV

Ref.	Date	Time	Transect	Species	Number	Habitat and activity	Surveyor
WK006	08/01/2021			Woodcock	4	freshwater; tracks of 4 individuals in snow, 1 crossed between walk up and back to car (wintering)	RV
MP009	08/01/2021			Meadow Pipit	2	present	RV
WK007	08/01/2021			Woodcock	1	freshwater; , 1 set of tracks in snow (wintering)	RV
RE007	17/01/2021			Redwing	2	present	RV
MP010	17/01/2021			Meadow Pipit	2	present	RV
SN015	17/01/2021			Snipe	2	present	RV
WK008	15/02/2021			Woodcock	1	scrub and mixed broadleaved/conifer woodland; flushed (wintering)	RV
BZ005	15/02/2021			Buzzard	1	mixed broadleaved/conifer woodland and conifer plantation; displaying and calling (wintering)	RV
SN016	28/02/2021			Snipe	1	upland blanket bog; flushed (wintering)	RV
SN017	28/02/2021			Snipe	2	upland blanket bog; flushed (wintering)	RV
RG002	28/02/2021			Red Grouse	1	upland blanket bog; displaying and latrine found separately (wintering)	RV
BZ006	28/02/2021			Buzzard	1	mixed broadleaved/conifer woodland; heard calling several times (wintering)	RV
RG003	28/02/2021			Red Grouse	1	upland blanket bog; latrine found (wintering)	RV
JS001	28/02/2021			Jack Snipe	1	cutover bog; flushed , feathers gathered (wintering)	RV
BZ007	06/03/2021	15:23		Buzzard	2	improved agricultural grassland, conifer plantation and scrub; displaying, pair in roadside trees, 1 got up and circled calling in alarm as i passed and began transect 1. (wintering)	RV
EA001	06/03/2021	15:55		Golden Eagle	1	conifer plantation; circling, 1 immature circling over plantation, gaining height before gliding south, last seen 16:03 (wintering)	RV
BZ008	17/03/2021	12:53		Buzzard	2	improved agricultural grassland and conifer plantation; circling, 2 adults, 1 quickly disappeared over plantation, second circled for 108 s. (wintering)	RV
SN018	18/03/2021	14:03		Snipe	1	upland blanket bog; flushed, flushed from ditch (wintering)	RV
SN019	18/03/2021	14:14		Snipe	1	upland blanket bog; flushed, flushed from ditch (wintering)	RV
RG004	19/03/2021			Red Grouse		upland blanket bog; , some feathers found (wintering)	RV
SN020	19/03/2021	16:20		Snipe	1	upland blanket bog; flushed, flushed from wet patch (wintering)	RV
RG005	19/03/2021			Red Grouse		upland blanket bog; , fresh latrine found (wintering)	RV

Table 6 Hen Harrier Roost Survey Data

Ref.	HHVP	Date	Time	Species	Number	Habitat and activity	Surveyor
HH004	3	15/10/2020	18:41	Hen Harrier	1	improved agricultural grassland, mixed broadleaved/conifer woodland and conifer plantation, flying, male flew low across site, was in and out of view, not sure if it was full or sub adult	RV
HH005	2	22/10/2020	17:53	Hen Harrier	1	improved agricultural grassland and conifer plantation, flying, female or immature flew low in front of plantation	RV

Table 7 Incidental Survey Data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
KESTREL002	Hen Harrier Roost Survey; HHVP5_01	12/10/2020		Kestrel	1	present	RV
WHOOPER SWAN001	Hen Harrier Roost Survey; HHVP5_02	12/10/2020		Whooper Swan	6	present	RV
BUZZARD009	Hen Harrier Roost Survey; HHVP3_01	15/10/2020		Buzzard	1	present	RV
SPARROWHAWK005	Hen Harrier Roost Survey; HHVP3_02	15/10/2020		Sparrowhawk	1	present	RV
FOX005	Vantage Point Survey; Lissinagroagh	21/10/2020		Red Fox	1	present	RV
FOX006	Transect 4; Lissinagroagh	30/10/2020		Red Fox	1	present	RV
WOODCOCK012	Vantage Point Survey; Close to VP1	19/11/2020		Woodcock	2	present	LD
FOX007	Vantage Point Survey; Close to VP1	19/11/2020		Red Fox	1	present	LD
HARE008	Vantage Point Survey; Close to VP1	19/11/2020		Hare	1	present	LD
WOODCOCK013	Vantage Point Survey; Close to VP1	25/11/2020		Woodcock	1	present	LD
BUZZARD010	Hen Harrier Roost Survey;	26/11/2020		Buzzard	1	present	RV
HARE009	Hen Harrier Roost Survey; HHVP04	14/12/2020		Hare	2	present	RV
BUZZARD011	Hen Harrier Roost Survey;	15/12/2020		Buzzard	1	present	LD
BUZZARD012	Hen Harrier Roost Survey;	15/12/2020		Buzzard	1	present	LD
SPARROWHAWK006	Hen Harrier Roost Survey;	16/12/2020		Sparrowhawk	1	present	RV
SPARROWHAWK007	Hen Harrier Roost Survey; HHVP3	06/01/2021		Sparrowhawk	1	present	RV
BUZZARD013	Hen Harrier Roost Survey; HHVP2	08/01/2021		Buzzard	1	present	RV
FOX008	Transect 3; Lissinagroagh	08/01/2021		Red Fox	1	present	RV

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
FOX009	Transect 4; Lissinagroagh	08/01/2021		Red Fox	1	present	RV
FOX010	Vantage Point Survey; Lissinagroagh	15/01/2021		Red Fox	1	present	RV
HARE010	Vantage Point Survey; Lissinagroagh	17/01/2021		Hare	1	present	RV
SN037	Vantage Point Survey; VP1	06/02/2021	11:45	Snipe	-	upland blanket bog and conifer plantation; flushed	RV
SN038	Hen Harrier Roost Survey; HHRVP2	06/03/2021	19:00	Snipe	1	improved agricultural grassland; drumming, flew over in dark and drummed briefly	RV
WK014	Hen Harrier Roost Survey; HHRVP3	08/03/2021	18:51	Woodcock	2	improved agricultural grassland; flying, flew in together, 1 bird circled around me calling.	RV
SN039	Hen Harrier Roost Survey; HHRVP3	08/03/2021	17:56	Snipe	1	improved agricultural grassland; flying, flew in and dropped sharply into field by vp	RV
SH008	Hen Harrier Roost Survey; HHRVP4	17/03/2021	18:07	Sparrowhawk	1	scrub and conifer plantation; circling, male circling over edge of plantation	RV
WK015	Hen Harrier Roost Survey; HHRVP5	19/03/2021	19:17	Woodcock	1	improved agricultural grassland and scrub; flying, flew across in front of vp	RV

Table 8 Non-target Species

Date	Survey	Species	Notes	Surveyor
13/10/2020	Vantage Point Survey, 2	Raven	at least 70 flew south east past vp from 17:00, not sure if birds looped behind me or were different individuals.	RV
13/10/2020	Vantage Point Survey, 2	Meadow Pipit	feeding around vp	RV
13/10/2020	Vantage Point Survey, 2	Hooded Crow	flying below vp	RV
13/10/2020	Vantage Point Survey, 2	Golden Plover	heard but not seen behind vp, probably double figures based on calls.	RV
13/10/2020	Vantage Point Survey, 2	Magpie	flock moving below vp.	RV
13/10/2020	Vantage Point Survey, 2	Lesser Redpoll	flyovers	RV
13/10/2020	Vantage Point Survey, 2	Siskin	flyovers	RV
13/10/2020	Vantage Point Survey, 2	Wren	feeding around vp	RV
13/10/2020	Vantage Point Survey, 2	Woodpigeon	flying over view shed	RV
20/10/2020	Vantage Point Survey, 1	Raven	flying and perching around plantation	RV
20/10/2020	Vantage Point Survey, 1	Meadow Pipit	feeding around vp	RV
20/10/2020	Vantage Point Survey, 1	Snipe	flew east past vp, not flushed by me.	RV
20/10/2020	Vantage Point Survey, 1	Woodpigeon	flying in front of vp	RV
20/10/2020	Vantage Point Survey, 1	Hooded Crow	flying around vp	RV
20/10/2020	Vantage Point Survey, 1	Magpie	flying around vp	RV
20/10/2020	Vantage Point Survey, 1	Crossbill	flyovers	RV
21/10/2020	Vantage Point Survey, 4	Jay	flyovers	RV
21/10/2020	Vantage Point Survey, 4	Raven	flyovers	RV
21/10/2020	Vantage Point Survey, 4	Hooded Crow	flyovers	RV
21/10/2020	Vantage Point Survey, 4	Magpie	feeding around viewshed	RV
21/10/2020	Vantage Point Survey, 4	Lesser Redpoll	flyovers	RV
21/10/2020	Vantage Point Survey, 4	Siskin	flyovers	RV
21/10/2020	Vantage Point Survey, 4	Robin	singing and feeding around vp	RV
21/10/2020	Vantage Point Survey, 4	Wren	singing and feeding around vp	RV
21/10/2020	Vantage Point Survey, 4	Long-tailed Tit	feeding around vp	RV
21/10/2020	Vantage Point Survey, 4	Blue Tit	feeding around vp	RV
21/10/2020	Vantage Point Survey, 4	Great Tit	feeding around vp	RV
21/10/2020	Vantage Point Survey, 4	Coal Tit		RV
21/10/2020	Vantage Point Survey, 4	Pied Wagtail	10 flew east over vp into plantation at 18:01	RV
21/10/2020	Breeding Walkover Survey, VP4	Great Spotted Woodpecker		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Raven		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Hooded Crow		RV

Date	Survey	Species	Notes	Surveyor
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Magpie		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Fieldfare		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Song Thrush		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Mistle Thrush		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Blackbird		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Robin		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Wren		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Dunnock		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Coal Tit		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Blue Tit		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Great Tit		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Long-tailed Tit		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Goldcrest		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Chaffinch		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Raven		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Hooded Crow		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Jay		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Magpie		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Fieldfare		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Song Thrush		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Mistle Thrush		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Blackbird		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Robin		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Wren		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Dunnock		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Coal Tit		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Blue Tit		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Great Tit		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Long-tailed Tit	3 separate flocks	RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Chaffinch		RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Bullfinch	2 pairs	RV
22/10/2020	Winter Walkover Survey, 500m Survey Radius	Goldcrest		RV
23/10/2020	Vantage Point Survey, 3	Raven	singles and pairs regularly passing by.	RV
23/10/2020	Vantage Point Survey, 3	Hooded Crow		RV
23/10/2020	Vantage Point Survey, 3	Magpie		RV
23/10/2020	Vantage Point Survey, 3	Jay	flying over plantation	RV

Date	Survey	Species	Notes	Surveyor
23/10/2020	Vantage Point Survey, 3	Crossbill	flyovers	RV
23/10/2020	Vantage Point Survey, 3	Siskin	flyovers	RV
23/10/2020	Vantage Point Survey, 3	Lesser Redpoll	flyovers	RV
23/10/2020	Vantage Point Survey, 3	Coal Tit	feeding along plantation edge	RV
23/10/2020	Vantage Point Survey, 3	Goldcrest	with above coat tits	RV
23/10/2020	Vantage Point Survey, 3	Fieldfare	at least 75 flew south over hilltop in one flock	RV
23/10/2020	Vantage Point Survey, 3	Redwing	at least 20 flew south in singles and small flocks	RV
23/10/2020	Vantage Point Survey, 3	Song Thrush	feeing along roadside	RV
23/10/2020	Vantage Point Survey, 3	Blackbird	feeding along roadside	RV
23/10/2020	Vantage Point Survey, 3	Robin	feeding along roadside and singing	RV
23/10/2020	Vantage Point Survey, 3	Pied Wagtail	male feeding on road	RV
23/10/2020	Vantage Point Survey, 3	Wren	feeding and singing around vp	RV
23/10/2020	Vantage Point Survey, 3	Bullfinch	pair feeding around vp on and off	RV
23/10/2020	Vantage Point Survey, 3	Reed Bunting	flyover	RV
23/10/2020	Winter Walkover Survey, 500m Survey Radius	Raven		RV
23/10/2020	Winter Walkover Survey, 500m Survey Radius	Jay		RV
23/10/2020	Winter Walkover Survey, 500m Survey Radius	Hooded Crow		RV
23/10/2020	Winter Walkover Survey, 500m Survey Radius	Magpie		RV
23/10/2020	Winter Walkover Survey, 500m Survey Radius	Fieldfare	3 early on, then flock of 60+ near end of transect	RV
23/10/2020	Winter Walkover Survey, 500m Survey Radius	Song Thrush		RV
23/10/2020	Winter Walkover Survey, 500m Survey Radius	Blackbird		RV
23/10/2020	Winter Walkover Survey, 500m Survey Radius	Mistle Thrush		RV
23/10/2020	Winter Walkover Survey, 500m Survey Radius	Coal Tit		RV
23/10/2020	Winter Walkover Survey, 500m Survey Radius	Blue Tit		RV
23/10/2020	Winter Walkover Survey, 500m Survey Radius	Great Tit		RV
23/10/2020	Winter Walkover Survey, 500m Survey Radius	Long-tailed Tit	1 flock	RV
23/10/2020	Winter Walkover Survey, 500m Survey Radius	Goldcrest		RV
23/10/2020	Winter Walkover Survey, 500m Survey Radius	Robin		RV
23/10/2020	Winter Walkover Survey, 500m Survey Radius	Wren		RV
23/10/2020	Winter Walkover Survey, 500m Survey Radius	Dunnock		RV
23/10/2020	Winter Walkover Survey, 500m Survey Radius	Bullfinch	2 pairs	RV
23/10/2020	Winter Walkover Survey, 500m Survey Radius	Chaffinch		RV
23/10/2020	Winter Walkover Survey, 500m Survey Radius	Siskin		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Raven	09:18-10:54	RV

Date	Survey	Species	Notes	Surveyor
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Hooded Crow		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Magpie		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Robin		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Wren		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Blackbird		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Song Thrush		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Mistle Thrush		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Fieldfare		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Goldcrest		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Dunnock		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Bullfinch		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Chaffinch		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Siskin		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Blue Tit		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Great Tit		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Coal Tit		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Long-tailed Tit		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Crossbill		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Lesser Redpoll		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Raven	11:57-13:22	RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Hooded Crow		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Magpie		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Robin		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Wren		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Blackbird		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Song Thrush		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Fieldfare	1 large flock	RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Goldcrest		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Siskin		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Dunnock		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Chaffinch		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Blue Tit		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Great Tit		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Coal Tit		RV
30/10/2020	Winter Walkover Survey, 500m Survey Radius	Lesser Redpoll		RV
19/11/2020	Vantage Point Survey, 1	Robin		L. DARK

Date	Survey	Species	Notes	Surveyor
19/11/2020	Vantage Point Survey, 1	Wren		L. DARK
19/11/2020	Vantage Point Survey, 1	Coal Tit		L. DARK
19/11/2020	Vantage Point Survey, 1	Meadow Pipit		L. DARK
19/11/2020	Vantage Point Survey, 1	Meadow Pipit		L. DARK
19/11/2020	Vantage Point Survey, 1	Dunnock		L. DARK
19/11/2020	Vantage Point Survey, 1	Jay		L. DARK
19/11/2020	Vantage Point Survey, 1	Woodpigeon		L. DARK
19/11/2020	Vantage Point Survey, 1	Lesser Redpoll		L. DARK
19/11/2020	Vantage Point Survey, 1	Chaffinch		L. DARK
19/11/2020	Vantage Point Survey, 1	Magpie		L. DARK
19/11/2020	Vantage Point Survey, 1	Jackdaw		L. DARK
19/11/2020	Vantage Point Survey, 1	Raven	multiple raven's flying out from their roost to the west in the nearby conifers. most numerous species here today.	L. DARK
25/11/2020	Vantage Point Survey, 3	Robin		L. DARK
25/11/2020	Vantage Point Survey, 3	Meadow Pipit		L. DARK
25/11/2020	Vantage Point Survey, 3	Wren		L. DARK
25/11/2020	Vantage Point Survey, 3	Chaffinch		L. DARK
25/11/2020	Vantage Point Survey, 3	Hooded Crow		L. DARK
25/11/2020	Vantage Point Survey, 3	Reed Bunting		L. DARK
25/11/2020	Vantage Point Survey, 3	Chaffinch		L. DARK
25/11/2020	Vantage Point Survey, 3	Lesser Redpoll		L. DARK
25/11/2020	Vantage Point Survey, 3	Magpie		L. DARK
25/11/2020	Vantage Point Survey, 3	Mistle Thrush		L. DARK
25/11/2020	Vantage Point Survey, 3	Raven	pair of raven's in flight, 50m south of the vp. passing back and forth.	L. DARK
26/11/2020	Vantage Point Survey, 2	Raven	flying around vp	RV
26/11/2020	Vantage Point Survey, 2	Hooded Crow	flying below vp	RV
26/11/2020	Vantage Point Survey, 2	Magpie	flying below vp	RV
26/11/2020	Vantage Point Survey, 2	Jay	flying below vp	RV
26/11/2020	Vantage Point Survey, 2	Meadow Pipit	feeding around vp	RV
26/11/2020	Vantage Point Survey, 2	Snipe	flew overcalling at 07:42	RV
26/11/2020	Vantage Point Survey, 2	Wren	calling around vp	RV
26/11/2020	Vantage Point Survey, 2	Woodpigeon	flying below vp	RV
26/11/2020	Vantage Point Survey, 2	Mistle Thrush	feeding below vp	RV
27/11/2020	Vantage Point Survey, 4	Raven	flying around vp	RV
27/11/2020	Vantage Point Survey, 4	Jay	feeding around vp	RV

Date	Survey	Species	Notes	Surveyor
27/11/2020	Vantage Point Survey, 4	Magpie	feeding around vp	RV
27/11/2020	Vantage Point Survey, 4	Hooded Crow	feeding around vp	RV
27/11/2020	Vantage Point Survey, 4	Chaffinch	flyovers	RV
27/11/2020	Vantage Point Survey, 4	Robin	feeding and calling by vp	RV
27/11/2020	Vantage Point Survey, 4	Siskin	flyovers	RV
27/11/2020	Vantage Point Survey, 4	Lesser Redpoll	flyovers	RV
27/11/2020	Vantage Point Survey, 4	Wren	calling and singing by vp	RV
27/11/2020	Vantage Point Survey, 4	#N/A	feeding around vp	RV
27/11/2020	Vantage Point Survey, 4	Mistle Thrush	feeding around vp	RV
27/11/2020	Vantage Point Survey, 4	Fieldfare	flyovers	RV
27/11/2020	Vantage Point Survey, 4	Song Thrush	feeding around vp	RV
27/11/2020	Vantage Point Survey, 4	Blue Tit	feeding around vp	RV
27/11/2020	Vantage Point Survey, 4	Long-tailed Tit	feeding around vp	RV
27/11/2020	Vantage Point Survey, 4	Coal Tit	feeding around vp	RV
27/11/2020	Vantage Point Survey, 4	Goldcrest	feeding around vp	RV
27/11/2020	Vantage Point Survey, 4	Bullfinch	pair	RV
27/11/2020	Vantage Point Survey, 4	Meadow Pipit	feeding around vp	RV
27/11/2020	Vantage Point Survey, 4	Dunnock	feeding and calling by vp	RV
14/12/2020	Vantage Point Survey, 3	Raven		RV
14/12/2020	Vantage Point Survey, 3	Meadow Pipit		RV
14/12/2020	Vantage Point Survey, 3	Hooded Crow		RV
14/12/2020	Vantage Point Survey, 3	Magpie		RV
14/12/2020	Vantage Point Survey, 3	Fieldfare	flyovers	RV
14/12/2020	Vantage Point Survey, 3	Blackbird	1 singing	RV
14/12/2020	Vantage Point Survey, 3	Song Thrush	singing	RV
14/12/2020	Vantage Point Survey, 3	Wren		RV
14/12/2020	Vantage Point Survey, 3	Robin		RV
14/12/2020	Vantage Point Survey, 3	Siskin	flyovers	RV
14/12/2020	Vantage Point Survey, 3	Coal Tit	feeding around vp	RV
14/12/2020	Vantage Point Survey, 3	Goldcrest	feeding around vp	RV
15/12/2020	Vantage Point Survey, 2	Wren		L. DARK
15/12/2020	Vantage Point Survey, 2	Meadow Pipit		L. DARK
15/12/2020	Vantage Point Survey, 2	Great Tit		L. DARK
15/12/2020	Vantage Point Survey, 2	Hooded Crow		L. DARK
15/12/2020	Vantage Point Survey, 2	Coal Tit		L. DARK
15/12/2020	Vantage Point Survey, 2	Lesser Redpoll		L. DARK

Date	Survey	Species	Notes	Surveyor
15/12/2020	Vantage Point Survey, 2	Chaffinch		L. DARK
15/12/2020	Vantage Point Survey, 2	Mistle Thrush		L. DARK
15/12/2020	Vantage Point Survey, 2	Robin		L. DARK
15/12/2020	Vantage Point Survey, 2	Siskin		L. DARK
15/12/2020	Vantage Point Survey, 2	Raven	multiple birds flying in and out of their roost.	L. DARK
16/12/2020	Vantage Point Survey, 4	Jay		RV
16/12/2020	Vantage Point Survey, 4	Hooded Crow		RV
16/12/2020	Vantage Point Survey, 4	Magpie		RV
16/12/2020	Vantage Point Survey, 4	Raven		RV
16/12/2020	Vantage Point Survey, 4	Blackbird		RV
16/12/2020	Vantage Point Survey, 4	Redwing	flyovers	RV
16/12/2020	Vantage Point Survey, 4	Mistle Thrush		RV
16/12/2020	Vantage Point Survey, 4	Song Thrush		RV
16/12/2020	Vantage Point Survey, 4	Fieldfare	flyover	RV
16/12/2020	Vantage Point Survey, 4	Dunnock		RV
16/12/2020	Vantage Point Survey, 4	Robin		RV
16/12/2020	Vantage Point Survey, 4	Wren		RV
16/12/2020	Vantage Point Survey, 4	Goldcrest	feeding around vp	RV
16/12/2020	Vantage Point Survey, 4	Blue Tit		RV
16/12/2020	Vantage Point Survey, 4	Great Tit		RV
16/12/2020	Vantage Point Survey, 4	Coal Tit		RV
16/12/2020	Vantage Point Survey, 4	Meadow Pipit		RV
16/12/2020	Vantage Point Survey, 4	Siskin	flyovers	RV
16/12/2020	Vantage Point Survey, 4	Chaffinch		RV
19/12/2020	Vantage Point Survey, 1	Wren		L. DARK
19/12/2020	Vantage Point Survey, 1	Robin		L. DARK
19/12/2020	Vantage Point Survey, 1	Coal Tit		L. DARK
19/12/2020	Vantage Point Survey, 1	Meadow Pipit		L. DARK
19/12/2020	Vantage Point Survey, 1	Hooded Crow		L. DARK
19/12/2020	Vantage Point Survey, 1	Siskin		L. DARK
19/12/2020	Vantage Point Survey, 1	Mistle Thrush		L. DARK
19/12/2020	Vantage Point Survey, 1	Blue Tit		L. DARK
19/12/2020	Vantage Point Survey, 1	Magpie		L. DARK
19/12/2020	Vantage Point Survey, 1	Jackdaw		L. DARK
19/12/2020	Vantage Point Survey, 1	Raven	regular raven's in flight around their roost.	L. DARK

Date	Survey	Species	Notes	Surveyor
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Raven	several seen, 4 was the highest single count.	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Jay	heard on 3 occasions, not seen	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Hooded Crow	flyovers	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Magpie	flyovers	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Mistle Thrush	feeding along edge of plantation	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Song Thrush	mostly flushed along path side, 1 singing	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Blackbird	flushed along path side brambles	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Coal Tit	several pairs and small flocks	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Blue Tit	mixed flocks	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Great Tit	mixed flocks	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Long-tailed Tit	1 flock	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Goldcrest	mixed flocks	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Robin		RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Wren	several heard	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Dunnock	feeding and calling, mostly singles.	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Chaffinch	mostly flyovers	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Lesser Redpoll	flyovers	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Raven	high count, probably more passing over	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Jay	flyovers	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Hooded Crow	feeding in sheep field	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Magpie	feeding in sheep field	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Mistle Thrush	feeding in sheep field	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Song Thrush	flushed along path side brambles	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Blackbird	flushed along path side	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Coal Tit		RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Blue Tit		RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Great Tit	mixed flock with above	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Goldcrest	mixed flocks	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Robin		RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Wren	some found on mountain top also	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Dunnock		RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Bullfinch	heard only	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Chaffinch	flyovers and small flock feeding roadside	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Siskin	flyovers	RV
06/01/2021	Winter Walkover Survey, 500m Survey Radius	Reed Bunting	flushed from forestry track	RV

Date	Survey	Species	Notes	Surveyor
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Raven	flyovers, lots of calling and displaying	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Jay	flyovers	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Hooded Crow	flyovers	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Magpie	flyover	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Mistle Thrush	along forestry edge	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Song Thrush	singing	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Blackbird	track side	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Coal Tit		RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Great Tit		RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Goldcrest		RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Robin	feeding and singing along road	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Wren	feeding and calling all along route	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Dunnock	feeding and calling all along route	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Bullfinch	trio feeding on brambles	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Chaffinch	flyovers	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Siskin	flyovers	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Lesser Redpoll	feeding on stunted birches	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Raven	flyovers, lots of calling and displaying	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Jay	flyovers	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Hooded Crow	flyover	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Magpie	flyovers	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Blackbird		RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Coal Tit		RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Blue Tit	mixed flock with great and coat tits and goldcrest	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Great Tit		RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Goldcrest		RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Robin	feeding and calling along the track	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Wren	feeding and singing	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Bullfinch	pair feeding	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Chaffinch	flyovers	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Siskin	flyovers	RV
08/01/2021	Winter Walkover Survey, 500m Survey Radius	Lesser Redpoll	flyovers	RV
11/01/2021	Vantage Point Survey, 1	Raven	highest count, small numbers constantly flying around vp, 20+ flew from roost as i drove up to vp.	RV
11/01/2021	Vantage Point Survey, 1	Hooded Crow	highest count	RV

Date	Survey	Species	Notes	Surveyor
11/01/2021	Vantage Point Survey, 1	Magpie	highest count	RV
11/01/2021	Vantage Point Survey, 1	Woodpigeon		RV
11/01/2021	Vantage Point Survey, 1	Mistle Thrush	feeding around vp	RV
11/01/2021	Vantage Point Survey, 1	Meadow Pipit	feeding around vp	RV
13/01/2021	Vantage Point Survey, 3	Raven	high count	RV
13/01/2021	Vantage Point Survey, 3	Hooded Crow	2 flying across site regularly	RV
13/01/2021	Vantage Point Survey, 3	Magpie	flyover	RV
13/01/2021	Vantage Point Survey, 3	Mistle Thrush	flyovers	RV
13/01/2021	Vantage Point Survey, 3	Song Thrush	feeding along road side trees	RV
13/01/2021	Vantage Point Survey, 3	Coal Tit	feeding in plantation	RV
13/01/2021	Vantage Point Survey, 3	Chaffinch	flyovers	RV
13/01/2021	Vantage Point Survey, 3	Siskin	flyovers	RV
13/01/2021	Vantage Point Survey, 3	Lesser Redpoll	flyovers	RV
13/01/2021	Vantage Point Survey, 3	Goldcrest	feeding with coal tit	RV
15/01/2021	Vantage Point Survey, 2	Raven	probably more, count from birds leaving roost	RV
15/01/2021	Vantage Point Survey, 2	Hooded Crow	mostly flying below vp	RV
15/01/2021	Vantage Point Survey, 2	Magpie	feeding around sheep below vp	RV
15/01/2021	Vantage Point Survey, 2	Meadow Pipit	feeding along road by vp	RV
15/01/2021	Vantage Point Survey, 2	Woodpigeon	flying across site, some displaying	RV
15/01/2021	Vantage Point Survey, 2	Mistle Thrush	feeding by vp	RV
15/01/2021	Vantage Point Survey, 2	Fieldfare	feeding in sheep field below vp	RV
15/01/2021	Vantage Point Survey, 2	Red Grouse	female flushed beside vp	RV
15/01/2021	Vantage Point Survey, 2	Golden Plover	feathers found beside fence line at vp, too water logged to determine cause of death.	RV
17/01/2021	Vantage Point Survey, 4	Raven	high count	RV
17/01/2021	Vantage Point Survey, 4	Hooded Crow	high count	RV
17/01/2021	Vantage Point Survey, 4	Magpie	feeding in sheep field	RV
17/01/2021	Vantage Point Survey, 4	Jay	high count	RV
17/01/2021	Vantage Point Survey, 4	Redwing	feeding thrush flock in sheep field	RV
17/01/2021	Vantage Point Survey, 4	Fieldfare	as above	RV
17/01/2021	Vantage Point Survey, 4	Blackbird	as above, some birds singing	RV
17/01/2021	Vantage Point Survey, 4	Mistle Thrush	feeding in sheep field	RV
17/01/2021	Vantage Point Survey, 4	Song Thrush	feeding in sheep field	RV
17/01/2021	Vantage Point Survey, 4	Robin	singing and feeding by vp	RV
17/01/2021	Vantage Point Survey, 4	Great Tit	mixed feeding flock	RV
17/01/2021	Vantage Point Survey, 4	Coal Tit	probably more, mixed feeding flock	RV

Date	Survey	Species	Notes	Surveyor
17/01/2021	Vantage Point Survey, 4	Blue Tit	mixed feeding flock	RV
17/01/2021	Vantage Point Survey, 4	Goldcrest	mixed feeding flock	RV
17/01/2021	Vantage Point Survey, 4	Dunnock	calling around vp	RV
17/01/2021	Vantage Point Survey, 4	Wren	calling around vp	RV
17/01/2021	Vantage Point Survey, 4	Woodpigeon	flyovers and displaying	RV
17/01/2021	Vantage Point Survey, 4	Chaffinch	flock feeding at edge of field	RV
17/01/2021	Vantage Point Survey, 4	Bullfinch	pair feeding in front of vp	RV
17/01/2021	Vantage Point Survey, 4	Siskin	flyovers	RV
17/01/2021	Vantage Point Survey, 4	Lesser Redpoll	flyovers	RV
17/01/2021	Winter Walkover Survey, 500m Survey Radius	Raven	calling and displaying by start of transect, then flying over bog	RV
17/01/2021	Winter Walkover Survey, 500m Survey Radius	Hooded Crow	flyover	RV
17/01/2021	Winter Walkover Survey, 500m Survey Radius	Magpie	flyover	RV
17/01/2021	Winter Walkover Survey, 500m Survey Radius	Mistle Thrush	singing in rain	RV
17/01/2021	Winter Walkover Survey, 500m Survey Radius	Blackbird	2 flushed from isolated pine on hill	RV
17/01/2021	Winter Walkover Survey, 500m Survey Radius	Coal Tit	calling along edge of plantation	RV
17/01/2021	Winter Walkover Survey, 500m Survey Radius	Blue Tit	1 flushed from heather away from any trees or cover near end of transect.	RV
17/01/2021	Winter Walkover Survey, 500m Survey Radius	Robin	along beginning of transect	RV
17/01/2021	Winter Walkover Survey, 500m Survey Radius	Wren		RV
17/01/2021	Winter Walkover Survey, 500m Survey Radius	Goldcrest	feeding along edge of plantation	RV
17/01/2021	Winter Walkover Survey, 500m Survey Radius	Chaffinch	flyovers	RV
17/01/2021	Winter Walkover Survey, 500m Survey Radius	Dunnock	calling from scrub at start of transect	RV
04/02/2021	Vantage Point Survey, VP2	Mistle Thrush	2	RV
04/02/2021	Vantage Point Survey, VP2	Raven	9, highest single count 7	RV
04/02/2021	Vantage Point Survey, VP2	Hooded Crow	2	RV
04/02/2021	Vantage Point Survey, VP2	Meadow Pipit	2	RV
06/02/2021	Vantage Point Survey, VP1	Raven	38 in trees below vp	RV
06/02/2021	Vantage Point Survey, VP1	Hooded Crow	20 with raven	RV
06/02/2021	Vantage Point Survey, VP1	Magpie	3 roving below vp	RV
06/02/2021	Vantage Point Survey, VP1	Mistle Thrush	4	RV
06/02/2021	Vantage Point Survey, VP1	Meadow Pipit	2	RV
06/02/2021	Vantage Point Survey, VP1	Song Thrush	2 singing	RV
06/02/2021	Vantage Point Survey, VP1	Blackbird	1 singing	RV
06/02/2021	Vantage Point Survey, VP1	Rook	7	RV
06/02/2021	Vantage Point Survey, VP1	Starling	23 passing flock	RV
06/02/2021	Vantage Point Survey, VP1	Jay	2 fly overs	RV

Date	Survey	Species	Notes	Surveyor
19/02/2021	Vantage Point Survey, VP3	Raven	3 displaying	RV
19/02/2021	Vantage Point Survey, VP3	Meadow Pipit	8 feeding	RV
19/02/2021	Vantage Point Survey, VP3	Hooded Crow	2 flying over	RV
19/02/2021	Vantage Point Survey, VP3	Mistle Thrush	3 feeding along road	RV
19/02/2021	Vantage Point Survey, VP3	Blackbird	3, 1 singing	RV
19/02/2021	Vantage Point Survey, VP3	Skylark	1 flyover	RV
19/02/2021	Vantage Point Survey, VP3	Reed Bunting	1 flyover	RV
19/02/2021	Vantage Point Survey, VP3	Song Thrush	1singing and feeding on road	RV
19/02/2021	Vantage Point Survey, VP3	Magpie	3 flying around	RV
19/02/2021	Vantage Point Survey, VP3	Goldcrest	4 singing and calling	RV
19/02/2021	Vantage Point Survey, VP3	Coal Tit	7 small flock feeding	RV
19/02/2021	Vantage Point Survey, VP3	Great Tit	3 calling/singing	RV
19/02/2021	Vantage Point Survey, VP3	Wren	2 singing	RV
19/02/2021	Vantage Point Survey, VP3	Robin	2 singing	RV
19/02/2021	Vantage Point Survey, VP3	Chaffinch	9 singing and flyovers	RV
19/02/2021	Vantage Point Survey, VP3	Siskin	2 flyovers	RV
21/02/2021	Vantage Point Survey, VP4	Raven	8	RV
21/02/2021	Vantage Point Survey, VP4	Magpie	3	RV
21/02/2021	Vantage Point Survey, VP4	Jay	2	RV
21/02/2021	Vantage Point Survey, VP4	Hooded Crow	4	RV
21/02/2021	Vantage Point Survey, VP4	Marsh Tit	2	RV
21/02/2021	Vantage Point Survey, VP4	Fieldfare	7 flyover flock	RV
21/02/2021	Vantage Point Survey, VP4	Redwing	2 flying over	RV
21/02/2021	Vantage Point Survey, VP4	Dunnock	3 calling/singing	RV
21/02/2021	Vantage Point Survey, VP4	Siskin	4 flyovers	RV
21/02/2021	Vantage Point Survey, VP4	Lesser Redpoll	3 flyovers	RV
21/02/2021	Vantage Point Survey, VP4	Chaffinch	8 flyovers calling	RV
06/03/2021	Vantage Point Survey, VP1	Raven	9,flying over	RV
06/03/2021	Vantage Point Survey, VP1	Hooded Crow	7,flying over	RV
06/03/2021	Vantage Point Survey, VP1	Magpie	3,feeding in fields	RV
06/03/2021	Vantage Point Survey, VP1	Mistle Thrush	4,flying around fields	RV
06/03/2021	Vantage Point Survey, VP1	Blackbird	2,singing	RV
06/03/2021	Vantage Point Survey, VP1	Song Thrush	2,singing	RV
06/03/2021	Vantage Point Survey, VP1	Skylark	6, singing and displaying	RV
06/03/2021	Vantage Point Survey, VP1	Meadow Pipit	8, singing and displaying	RV
06/03/2021	Vantage Point Survey, VP1	Siskin	3, flyovers	RV

Date	Survey	Species	Notes	Surveyor
06/03/2021	Vantage Point Survey, VP1	Lesser Redpoll	1, flyover	RV
06/03/2021	Vantage Point Survey, VP1	Coal Tit	5, calling from plantation	RV
06/03/2021	Vantage Point Survey, VP1	Chaffinch	8,calling and flying over	RV
08/03/2021	Vantage Point Survey, VP2	Raven	20, minimum count	RV
08/03/2021	Vantage Point Survey, VP2	Hooded Crow	3, flyovers	RV
08/03/2021	Vantage Point Survey, VP2	Magpie	2	RV
08/03/2021	Vantage Point Survey, VP2	Chaffinch	7, calling and singing	RV
08/03/2021	Vantage Point Survey, VP2	Siskin	4, flyovers	RV
08/03/2021	Vantage Point Survey, VP2	Lesser Redpoll	2, flyovers	RV
08/03/2021	Vantage Point Survey, VP2	Coal Tit	2, calling	RV
08/03/2021	Vantage Point Survey, VP2	Meadow Pipit	6, displaying	RV
08/03/2021	Vantage Point Survey, VP2	Skylark	7, displaying	RV
08/03/2021	Vantage Point Survey, VP2	Mistle Thrush	2, feeding by track	RV
08/03/2021	Vantage Point Survey, VP2	Blackbird	2, singing	RV
08/03/2021	Vantage Point Survey, VP2	Dunnock	2, singing	RV
08/03/2021	Vantage Point Survey, VP2	Robin	2, singing	RV
08/03/2021	Vantage Point Survey, VP2	Song Thrush	1, singing	RV
10/03/2021	Vantage Point Survey, VP4	Raven	13, at sheep carcass	RV
10/03/2021	Vantage Point Survey, VP4	Hooded Crow	7, at sheep carcass	RV
10/03/2021	Vantage Point Survey, VP4	Magpie	3, at sheep carcass	RV
10/03/2021	Vantage Point Survey, VP4	Jay	2, flyovers	RV
10/03/2021	Vantage Point Survey, VP4	Coal Tit	7, calling and singing	RV
10/03/2021	Vantage Point Survey, VP4	Blue Tit	3,calling and singing	RV
10/03/2021	Vantage Point Survey, VP4	Great Tit	6, calling and singing	RV
10/03/2021	Vantage Point Survey, VP4	Long-tailed Tit	7, passing flock	RV
10/03/2021	Vantage Point Survey, VP4	Skylark	1,singing	RV
10/03/2021	Vantage Point Survey, VP4	Meadow Pipit	3, flyovers	RV
10/03/2021	Vantage Point Survey, VP4	Redwing	16, flyover, 1 flock	RV
10/03/2021	Vantage Point Survey, VP4	Mistle Thrush	2, singing	RV
10/03/2021	Vantage Point Survey, VP4	Song Thrush	2, singing	RV
10/03/2021	Vantage Point Survey, VP4	Blackbird	6, 2 singing, 4 feeding in field	RV
10/03/2021	Vantage Point Survey, VP4	Woodpigeon	2, flyovers	RV
10/03/2021	Vantage Point Survey, VP4	Siskin	4, flyovers	RV
10/03/2021	Vantage Point Survey, VP4	Lesser Redpoll	2, flyovers	RV
10/03/2021	Vantage Point Survey, VP4	Chaffinch	3, calling and singing	RV
10/03/2021	Vantage Point Survey, VP4	Robin	3, singing	RV

Date	Survey	Species	Notes	Surveyor
10/03/2021	Vantage Point Survey, VP4	Wren	6, calling and singing	RV
10/03/2021	Vantage Point Survey, VP4	Dunnock	2, calling and singing	RV
10/03/2021	Vantage Point Survey, VP4	Goldcrest	3, calling and singing	RV
10/03/2021	Vantage Point Survey, VP4	Bullfinch	2, pair feeding	RV
18/03/2021	Vantage Point Survey, VP3	Raven	2, pair displaying	RV
18/03/2021	Vantage Point Survey, VP3	Hooded Crow	4, mobbing ravens mostly	RV
18/03/2021	Vantage Point Survey, VP3	Magpie	3, flying over	RV
18/03/2021	Vantage Point Survey, VP3	Coal Tit	2, calling and singing	RV
18/03/2021	Vantage Point Survey, VP3	Meadow Pipit	13, displaying	RV
18/03/2021	Vantage Point Survey, VP3	Skylark	8, displaying	RV
18/03/2021	Vantage Point Survey, VP3	Song Thrush	3, singing	RV
18/03/2021	Vantage Point Survey, VP3	Mistle Thrush	2, pair	RV
18/03/2021	Vantage Point Survey, VP3	Blackbird	3, singing	RV
18/03/2021	Vantage Point Survey, VP3	Robin	1, singing	RV
18/03/2021	Vantage Point Survey, VP3	Siskin	8, flyovers	RV
18/03/2021	Vantage Point Survey, VP3	Lesser Redpoll	3, flyovers	RV
18/03/2021	Vantage Point Survey, VP3	Blue Tit	1,calling	RV
18/03/2021	Vantage Point Survey, VP3	Redwing	8, flyovers	RV
18/03/2021	Vantage Point Survey, VP3	Dunnock	1, singing	RV
18/03/2021	Vantage Point Survey, VP3	Wren	3, singing	RV

Appendix 6-4

Bird Survey Report Breeding 2021

Planning and Environmental Consultants

Breeding Bird Survey Report 2021

Lissinagroagh Wind Farm, Co. Leitrim



DOCUMENT DETAILS

Client:	**FuturEnergy Ireland**
Project Title:	**Example Wind Farm**
Project Number:	**200217-e**
Document Title:	**Breeding Bird Survey Report 2021**
Document File Name:	**Lissinagroagh Breeding Season 2021 Report - D2 - 2025.01.08 - 200217-e**
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Planning and Environmental Consultants

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1. SUMMARY

Ornithological surveys have been conducted at the site of Lissinagroagh Wind Farm, Co. Leitrim, since September 2017. This report outlines the findings from surveys completed during the 2021 breeding season. The following surveys were undertaken:

- Vantage Point Surveys
- Breeding Walkover Surveys
- Breeding Raptor Surveys
- Breeding Woodcock Surveys

The key observations during surveys were regarding nesting hen harrier. Three breeding territories were identified during the survey period, two of these were on site and one was approximately 1.6km from the site. A total of five chicks were fledged from the study area.

Breeding territories were also identified for snipe, woodcock and sparrowhawk at, or within 500m of, the wind farm site. A possible red grouse breeding territory was identified within 500m of the site.

2. INTRODUCTION

MKO was appointed to carry out bird surveys at Lissinagroagh Wind Farm, Co. Leitrim for the breeding season 2021. This report describes the ornithological survey methods employed and survey data collected at Lissinagroagh Wind Farm, Co. Leitrim for the period from April 2021 to September 2021 inclusive.

2.1 Site Description

The site is located 3km northeast of Manerhamilton (Grid Ref: G 90949 42157). The dominant habitat onsite is conifer plantation and upland blanket bog with accompanying smaller areas of mixed conifer woodland and heath. The wider surroundings are predominantly improved agricultural grassland and wet grassland.

2.2 Details of the Proposed Development

The total area of the development is approximately 152 hectares. Figure 1 shows the wind farm site boundary and preliminary turbine locations.

2.3 Purpose of this Report

This report describes the ornithological survey methods employed and survey data collected at Lissinagroagh Wind Farm for the period April 2021 to September 2021 inclusive. This report aims to provide robust baseline ornithological survey data for the breeding season. This data will be used to inform a separate ecological impact assessment and appropriate assessment for the proposed development.

2.4 Relevant Legislation

The following key legislative provisions are applicable to wild birds in Ireland: Irish Wildlife Act 1976 (revised).; the Birds Directive (EU Directive 2009/147/EC on the conservation of wild birds); the European Communities (Birds and Natural Habitats) Regulations 2011, as amended (S.I. no. 477 of 2011) and; the International Convention on Wetlands of International Importance (the Ramsar Convention), 1971.

3. METHODS

3.1 Scope

3.1.1 Description of Study Area

The ornithology study area was defined as a 500m radius of the viable area for turbines (Figure 1). This boundary accounts for both detecting birds that use the wind farm site occasionally and spatial inaccuracies in observational data, as well as ancillary structures. The ornithology study area was used for Vantage Point Surveys, following NatureScot formerly SNH (2017) guidance that flight activity surveys encompass an area extending 500m beyond the potential outermost proposed turbines. A 500m radius of the ornithology study area boundary was used for Breeding Walkover Surveys, the methodology followed the Brown and Shepard (1993) and Calladine *et al.* (2009). A 500m radius of the ornithology study area boundary was also used for Breeding Woodcock Surveys, following Gilbert *et al.* (1998). A 5km radius of the ornithology study area boundary was used for Breeding Raptor Surveys, based on Hardy *et al.* (2013).

3.1.2 Ecological Features Considered

Ecological features considered in the scope of the surveys were the habitats present on-site and, in the hinterland, as reviewed by aerial photography and reconnaissance visits, and the Special Protection Areas (SPA) designated under the Birds and Habitats (92/43/EEC) Directives Natura 2000 network within foraging range for Special Conservation Interest (SCI) species and/or 15km of the site. Bird species' ecological importance and nature conservation interest was also considered. Species of conservation concern included those listed on Annex I of the Birds Directive that occur in Ireland, species that are a Special Conservation Interest (SCI) of SPAs within foraging range for SCI species and/or 15km of the site, species on the Red List of Birds of Conservation Concern in Ireland (Gilbert *et al.,* 2021) and all raptor species that occur in Ireland, because these species are particularly sensitive to wind farm developments.

3.1.3 Consultation

MKO undertook a consultation exercise to inform the scope of surveys. Table 3-1 provides a list of the organisations consulted and notes where responses have been received.

Table 3-1 Consultation Response Summary

No.	Consultee	Response to Consultation
1	Birdwatch Ireland	No response
2	National Parks & Wildlife Service	Initial response received 18/06/2018. Confirmation received 30/12/2019 from NPWS that no more recent information was available.

3.2 Desk Study

A comprehensive desk study was undertaken prior to surveys to search for any relevant information on species of conservation concern which potentially use the study area. The assessment included a thorough review of the available ornithological data including:

- Review of online web-mappers from the National Parks and Wildlife Service (NPWS) and National Biodiversity Data Centre (NBDC);
- Review of the Bird Atlas (Balmer *et al.,* 2013);

- Review of specially requested records from the NPWS Rare and Protected Species Database.

3.3 Field Surveys

The approach to breeding bird surveys for the proposed wind farm is based on recommendations given in Scottish Natural Heritage (SNH; now NatureScot) 2017 guidance (SNH, 2017). This guidance is recognized as standard good practice guidance throughout the UK and Ireland for surveying birds to inform impact assessment for onshore wind farms. Field surveys were undertaken from April 2021 to September 2021 inclusive. Individual survey types are described below.

3.3.1 Vantage Point Surveys

Vantage point surveys were undertaken following the guidance of SNH (2017) from four vantage point locations during the 2021 breeding season.

Vantage Point Locations and Viewshed Analysis

Vantage point locations are presented in Table 3-2. Viewshed analysis was carried out to confirm the sufficiency of the chosen vantage point locations. Viewsheds were calculated using Resoft Wind Farm ZTV (Zone of Theoretical Visibility) software in combination with Mapinfo Professional (Version 10.0) using a notional layer suspended at 25m, which is representative of the minimum height considered for the Potential Collision Height (PCH) based on the turbine model at the time the vantage point locations were selected. Note that while the relevance of being able to view as much of the site to ground level is acknowledged, the SNH guidance emphasises the importance of visibility of the 'collision risk volume' when the data is to be used to estimate the risk of collision with turbines by birds. Therefore, the viewshed analysis aims to identify the most suitable locations to site vantage points such that the airspace of the turbine rotor swept area is in view using the fewest possible number of vantage points. The vantage point locations were tested for visibility coverage by creating a viewshed point 1.75m in height (to represent the height of observer) on a map using 10m contours terrain data. The relative height of any surrounding trees and its effects on visibility is also accounted for in the analysis. Using the ZTV software, a viewshed of 360° was produced calculating an area 25 from ground level up to a 2km radius. The resulting viewshed image was then cropped to 180° to give the viewshed.

Survey Effort

A total of 36 hours of watches was undertaken at each of the vantage point locations, equating to a total of six hours per vantage point per month. Survey effort is summarised in Table 3-2 and full details are presented in Appendix 2 of this report, including dates, times, duration and weather conditions. The location of vantage points is shown in Appendix 2.

Table 3-2 Summary of Vantage Point Survey effort

	VP1 ITM [1] X 592930 Y 842236	VP2 ITM X 592615 Y 842428	VP3 ITM X 593496 Y 843692	VP4 ITM X 590407 Y 840997
Month	**Hours**			
April	02/04/2021 6 hrs	09/04/2021 6 hrs	22/04/2021 6 hrs	24/04/2021 6 hrs
May	21/05/2021 6 hrs	23/05/2021 6 hrs	24/05/2021 6 hrs	28/05/2021 6 hrs
June	14/06/2021 6 hrs	16/06/2021 6 hrs	13/06/2021 6 hrs	21/06/2021 6 hrs
July	02/07/2021 6 hrs	08/07/2021 3 hrs	16/07/2021 3 hrs	21/07/2021 6 hrs

[1] Irish Transverse Mercator Co-Ordinates

	VP1 ITM [1] X 592930 Y 842236	VP2 ITM X 592615 Y 842428	VP3 ITM X 593496 Y 843692	VP4 ITM X 590407 Y 840997
Month	**Hours**			
		09/07/2021 3 hrs	20/07/2021 3 hrs	
August	25/08/2021 6 hrs	26/08/2021 6 hrs	11/08/2021 6 hrs	16/08/2021 6 hrs
September	09/09/2021 6 hrs	01/09/2021 3 hrs 03/09/2021 3 hrs	02/09/2021 5 hrs 13/09/2021 1 hr	03/09/2021 2 hrs 13/09/2021 4 hrs
Total Hours	**36:00**	**36:00**	**36:00**	**36:00**

Primary Target Species

The target species for vantage point surveys were defined by legal and/or conservation status, following SNH (2017) guidance, which states that "*in most circumstances the target species will be limited to those species which are afforded a higher level of legislative protection.*" A list of primary target species was drawn from the following sources:

- Species that are SCIs of the SPAs within foraging range for SCI species and/or 15km of the site;
- Species listed on Annex I of the Birds Directive that occur in Ireland;
- Species listed on the Red List of Birds of Conservation Concern in Ireland (Gilbert *et al.*, 2021) with the exception of Red List passerines, as these are generally not significantly impacted by wind energy developments.

Secondary Target Species

SNH (2017) also states that "*local circumstances may indicate that survey information should also be acquired on other species, especially those of regional conservation concern*". A list of secondary target species comprised:

- All other waterbirds that occur in Ireland that are not included as primary target species;
- All raptors that occur in Ireland that are not included as primary target species.

Data Collection

Data on bird observations and flight activity was collected by the surveyor by scanning the arc of 180° and a 2km radius from the fixed location. Surveys were scheduled to provide a spread over the full daylight period including at dawn and dusk (starting or ending an hour before dawn or an hour after dusk on alternate months during April, May and September) to coincide with the highest peaks of bird activity and to record any wildfowl migration or crepuscular species. Breaks of at least 30 minutes were taken every 3 hours to minimise observer fatigue. A 10-minute settling in period was allowed for at the start of each vantage point to allow the surveyor to get into place, and to minimise the impact of surveyor disturbance on flight activity. For each primary target species observation, the following details were recorded:

- Date, time, and location of observation;
- Number of species recorded;
- Total duration of flightline observation;
- Duration at each of flightline at each height band;
- Species age and sex (where determinable);

- Habitat(s);
- Behaviour.

Recording height bands were determined based on the likely turbine specifications under consideration at the time of survey (upper tip height 175m and lower tip height 25m). Flight heights were attributed to four distinct height bands as follows:

- Band 1 = 0 - 10m (below the likely rotor swept area);
- Band 2 = 10 - 25m (potentially within the likely rotor swept area, at least in part);
- Band 3 = 25 - 175m (within the likely rotor swept area, PCH);
- Band 4 = >175m (above the likely rotor swept area).

Although recording of secondary species is subsidiary to recording of primary target species, secondary target species were also recorded to provide an index of flight activity for secondary target species within the site.

3.3.2 Breeding Walkover Surveys

Breeding walkover surveys were undertaken to determine the presence of bird species of conservation concern and identify areas of possible, probable or confirmed breeding territories. The survey methodology followed Brown and Shepherd (1993) and Calladine *et al.* (2009). Transect routes were devised to ensure coverage of different habitat complexes between vantage point locations within the study area and survey all areas of suitable breeding habitat to within 100m, where access allowed. Surveys were carried out during daylight hours during the core breeding season months of April, May, June, and July 2021, with the site being visited four days per month on each occasion. Following all survey visits, the field maps were analysed to determine the number and location of breeding territories. All non-breeding individuals and species encountered were also recorded. Survey effort is provided in Appendix 2 of this report, including dates, times, duration and weather conditions. A map of the breeding walkover transect routes is provided in Appendix 1.

3.3.3 Breeding Raptor Surveys

Breeding raptor surveys (i.e. birds of prey) were undertaken to identify occupied raptor territories and ascertain whether breeding was successful. Methodology followed Hardey *et al.* (2013). Surveys involved a combination of raptor vantage point watches of 3 hours and transects in areas deemed most likely to hold breeding raptors based on habitat and observed movements of raptor species in the study area. Breeding raptor surveys were undertaken out to a 5km survey radius. Once breeding activity was observed, vantage point and transect locations were adjusted with the aim of pinpointing breeding locations. Each breeding raptor survey location was visited four times to complete a full round of breeding season surveys. The purpose of the four visits is (1) to establish occupancy, (2) to establish active nests, (2) to check for chicks and (4) to check for fledglings. Timings of these visits vary by species as set out in Hardey *et al.* (2013). Survey effort is provided in Appendix 2 of this report, including dates, times, duration and weather conditions. A map of the breeding raptor survey area is presented in Appendix 1.

3.3.4 Breeding Woodcock Surveys

Breeding season surveys for woodcock were undertaken to record the presence of roding (displaying) male woodcock and thereby establish the distribution and abundance of the species in the study area. Methodology followed Gilbert *et al.* (1998). Transects were carried out in areas of suitable habitat, i.e. woodland (particularly broadleaf) and dense bracken in upland areas by a surveyor walking slowly (~2km/hr). The same transect routes were followed on successive surveys. When a woodcock was detected, the following details are recorded for each observation: location, time, transect number, number

of birds, breeding activity/behaviour and primary habitat used (and secondary and tertiary habitat if applicable).

Transect surveys were undertaken in May and June 2021. Surveys commenced one hour before sunset and continued for an hour after sunset or until it was too dark to see. Survey effort is provided in Appendix 2 of this report, including dates, times, duration and weather conditions. A map of the survey area is presented in Appendix 1.

3.4 Project Team

This report has been prepared by Zak O'Connor (B.Sc.), Ornithologist of MKO, and reviewed by Thalie Konstantinidis (B.Sc.), Ornithologist, Patrick Manely (B.Sc.), Senior Ornithologist of MKO and Padraig Cregg, Principal Ornithologist of MKO. All are suitably qualified ornithologists with experience in completing avifaunal assessments and competent experts for the purposes of the preparation of this report, following SNH (2017) and CIEEM (2017) ecological reporting guidelines.

3.4.1 Field Team

Field surveys were undertaken by Andrew O'Donoghue, Lee Dark and Robert Vaughan. Surveyors are suitably qualified competent experts in field ornithology.

3.5 Survey Limitations

A comprehensive suite of bird surveys was undertaken at the site between April 2021 and September 2021. Results from breeding season 2021 are derived from a continuous six months of surveying undertaken in accordance with best practice guidance, SNH (2017). The survey duration and scope are considered entirely satisfactory. There were no issues relating to study area access/weather/time of year/Coillte forestry operations.

4. RESULTS

4.1 Desk Review

4.1.1 Sites Designated for Nature Conservation

Using GIS software, sites designated for nature conservation within the potential zone of influence of the proposed wind farm development were identified. Using a precautionary approach, sites within a 15km radius of the proposed wind farm were identified. In addition, and in the absence of any specific European or Irish guidance, SNH (2016) was consulted. This document provides guidance in relation to the identification of connectivity between proposed development proposals and SPAs. It takes into consideration the distances some species may travel beyond the boundary of their SPAs and outlines information on dispersal and foraging ranges of certain bird species. Sites designated for birds are listed below in Table 4-1.

Table 4-1 Special Protection Areas within 15 kilometres of site

Designated site and code	Special Conservation Interest Species[2]	Distance from wind farm site (km)
Sligo/Leitrim Uplands (004187)	› Peregrine › Chough	9.2km

4.1.2 Previous Survey Data

4.1.2.1 Breeding/Wintering Bird Atlas Records

Bird Atlas 2007-11: The breeding and wintering birds of Britain and Ireland' (Balmer *et al.,* 2013) is the most recent comprehensive work on wintering/breeding birds in Ireland. It provides information on species and their wintering/breeding status in 10km hectads. The site lies within hectad G94. Table 4-2 presents a list of nine species of conservation interest recorded within this hectad.

Table 4-2 Bird atlas data for relevant hectads

Species Name	Bird Atlas 2007-2011		Conservation Status
	G94 Breeding	G94 Winter	
Golden Plover	-	Present	BD, RL
Peregrine	Prob	-	BD, SCI
Hen Harrier	Conf	Present	BD
Greenland White-fronted Goose	-	Present	BD
Merlin	Poss	-	BD
Woodcock	-	Present	RL
Red Grouse	Prob	Present	RL
Kestrel	Prob	Present	RL
Meadow Pipit	Conf	Present	RL

BD=Birds Directive; RL = BoCCI Red List; Poss = possible breeding; Prob = probable breeding; Conf= confirmed breeding; Seen = present without evidence of breeding.

[2] *It is noted that a determination will be made on whether there is connectivity between the SPAs and the wind farm site at the appropriate assessment stage*

4.1.2.2 Rare and Protected Species Dataset

An information request was sent to the NPWS requesting records from the Rare and Protected Species Database. The sections below provide records obtained from the NPWS of the rare and protected breeding bird species:

Hen Harrier

Table 4-3 below presents the NPWS records for hen harrier nest sites to defined radii (km) of the development site.

Table 4-3 NPWS Hen Harrier Nest Site Records

Year	Within Site Boundary	0-1km from site boundary	1-3km from site boundary	3-5km from site boundary
2015	No Records	1 confirmed breeding site	No Records	1 confirmed breeding site
2010	No Records	3 confirmed breeding sites	1 sighting	1 confirmed breeding site, 1 additional sighting
2005	No Records	3 sightings	No records	No records
1998-2004	No Records	No Records	No Records	No records

Peregrine

The NPWS identified one confirmed peregrine nest site within 3-5km of the site. The observation was recorded during a survey in 2002.

Red Grouse

The NPWS hold records of red grouse in the area. Between 2000 and 2011, this species was recorded on nine occasions. One observation was recorded on site. There were two records located approximately 500m from the site, one just south of Dough Mountain and the other just north of Kilea. The remainder of the observations were recorded over 3km from the proposed development area. Three of these observations were recorded in the vicinity of Thur Mountain, to the south-east of the proposed development area.

4.2 Field Surveys

4.2.1 Flight Activity Survey

Observations during vantage point surveys, breeding walkover surveys, breeding raptor surveys, breeding woodcock surveys and incidental observations are provided below. Summaries include individual species accounts of primary and secondary target species.

4.2.2 Vantage Point Surveys

4.2.2.1 Primary Target Species

Golden Plover

There were four observations of golden plover during vantage point surveys. All observations occurred during the survey at VP1 in April. Throughout this survey, up to 75 individuals were observed flying and circling on Dough Mountain, within 1km of the site. A total of 1,186 seconds (s) was spent at potential collision height (PCH). Observations are shown in Appendix 1 Figure 1.1.

Hen Harrier

There were 79 observations of hen harrier during vantage point surveys. All but four of these observations occurred on, or within 500m of the site. Most observations were recorded in the site's southern section and relate to a confirmed nest identified at [redacted]. In April, a male and female bird were displaying in this area, followed by a male carrying sticks and nesting material to this area in May. In August, three juvenile birds were then observed at this nest, regularly receiving food from both adult birds. Juvenile birds remained present here into early September. The remainder of hen harrier observations were of birds commuting and hunting. A total of 1,515s was recorded at PCH. Observations are shown in Appendix 3 Figure 1.2.

Kestrel

There were three observations of kestrel during vantage point surveys. All observations were of individual birds at VP3 commuting, hunting or perching on, or within 500m of the site. One of these observations was of a juvenile bird in the northern section of the site near Killea in July. A total of 50s was recorded at PCH. Observations are shown in Appendix 1 Figure 1.3.

Red Grouse

There were two observations of red grouse during vantage point surveys at VP3 in September. These were recorded within 500m of the site, near Killea. One observation involved a single bird calling and the other observation involved a pair of birds calling. This indicates possible breeding for red grouse in this area. No time was spent at PCH. Observations are shown in Appendix 1 Figure 1.4.

Snipe

There were eight observations of snipe during vantage point surveys. All but one of the observations were of individual birds with two birds observed on one occasion. Birds were observed flying and displaying with most observations recorded within 500m of the site, at Killea and Dough Mountain. This behaviour indicates probable breeding for this species. One observation was recorded at PCH for a total of 9s. Observations are shown in Appendix 1 Figure 1.5

4.2.2.2 Secondary Target Species

Buzzard

There were 23 observations of buzzard during the survey period. Most observations were recorded on or within 500m of the site. Birds were observed commuting, hunting and calling. A total of 2,744s was spent at PCH. Observations are shown in Appendix 1 Figure 1.6.

Sparrowhawk

There were four observations of sparrowhawk during vantage point surveys. Observations involved birds commuting and being mobbed with all occurring on, or within 500m of the site. One observation was recorded at PCH for a total of 90s. Observations are shown in Appendix 1 Figure 1.7.

Grey wagtail

One observation of a grey wagtail was made in August at VP4.

Meadow Pipit

There were 20 observations of meadow pipit during vantage point surveys. Observations occurred at all of the four vantage point survey locations.

Swift

There was one observation of a pair of swift at VP4 in July during vantage point surveys.

Lesser Black-backed Gull

There were two observations of lesser black-backed gull in April and in August during vantage point surveys. Observations ranged from 2 to 4 birds commuting through the site.

4.2.3 Breeding Walkover Surveys

Hen Harrier

There were 28 observations of hen harrier during the breeding walkover surveys. All but four of the observations occurred on, or within 500m of the site. In May a male was observed carrying prey into the 2020 nest site in the northern section of the site, between [redacted], confirming the second nest of this season. In July, a food pass was observed at the already confirmed nest at [redacted], and chicks were also observed moving around in the vegetation at the nest here. A third nest was also confirmed in July with a pair of adult birds showing agitated behaviour in the presence of the surveyor, 1.6km northeast of the site, at [redacted]. Other observations were of birds hunting, commuting and perching. Observations are shown in Appendix 3 Figure 2.1.

Merlin

There was one observation of a merlin in April during breeding walkover surveys. This observation was of a male flying west over the northern section of the site towards Saddle Hill. Observations are shown in Appendix 1 Figure 2.2.

Kestrel

There was one observation of a kestrel during breeding walkover surveys. This observation was of an individual bird hunting within 500m of the site near Killea. Observations are shown in Appendix 1 Figure 2.3.

Red Grouse

There were three observations of red grouse during the breeding walkover surveys. All three were recorded within 500m of the site, near Killea. Two observations were of birds calling and the other observation was of a bird flushed by the surveyor. This indicates possible breeding in this area. Observations are shown in Appendix 1 Figure 2.4.

Snipe

There were three observations of snipe during the breeding walkover surveys. All observations were of individual birds and were recorded on, or within 500m of the site. Birds were observed displaying (drumming), flying and calling. This behaviour indicates probable breeding for this species. Observations are shown in Appendix 1 Figure 2.5.

Grey Wagtail

There were two observations of grey wagtail in April and May. On both occasions, two birds were observed.

Meadow Pipit

There were 62 observations of meadow pipits from April to July during breeding walkover surveys. These observations were recorded across the site and flock sizes varied between two to ten birds as well a few individual birds travelling separately.

Buzzard

There were ten observations of buzzard during breeding walkover surveys. All observations were recorded on, or within 500m of the site. Birds were observed commuting, perching and one observation in April involved a pair of birds displaying near the 2020 nest site, near Boleyboy. Observations are shown in Appendix 1 Figure 2.6.

Sparrowhawk

There were five observations of sparrowhawk during breeding walkover surveys. All observations were recorded on, or within 500m of the site. Observations included birds commuting, hunting and calling. One observation involved an adult male carrying prey to a juvenile bird near one of the 2020 nests in the northern section of the site. Observations are shown in Appendix 1 Figure 2.7.

Great Black-backed Gull

There was one observation of a great black-backed gull during breeding walkover surveys. This observation involved an individual bird commuting over the site in July.

Grey Heron

There was one observation of a grey heron during breeding walkover surveys. This observation was of an individual bird commuting within 500m of the site in July.

Lesser Black-backed Gull

There were seven observations of lesser black-backed gull during breeding walkover surveys. Observations ranged from between one and two individuals with birds recorded commuting over the site.

Mallard

There was one observation of a mallard during breeding walkover surveys. This observation was of a female bird flushed from a nest on the ground in the northern section of the site.

Swift

There was one observation of a swift during breeding walkover surveys. This observation involved three birds foraging and feeding within 500m of the site.

4.2.4 Breeding Raptor Surveys

Hen Harrier

There were 97 observations of hen harrier during breeding raptor surveys. Most of these relate to the nest identified in the site's southern section, at [redacted] Adult birds were regularly observed around the nest site here and at the start of August, three fledglings were observed here. In the northern section of the site, a pair was observed around the 2020 nest, between [redacted], with the male observed displaying and carrying nest-building material in April. At the third nest, near [redacted] the male was observed bringing in prey to the nest in July and two fledglings were seen flying over the nest site. Observations are shown in Appendix 3 Figure 3.1.

Merlin

There was one observation of a merlin during breeding raptor surveys. This observation was of a male chasing two hooded crows 2.8km from the site. Observations are shown in Appendix 1 Figure 3.2.

Buzzard

There were twelve observations of buzzard during breeding raptor surveys. Six observations were on, or within 500m of the site. Birds were observed commuting, hunting and calling and ranged between one to two birds. Observations are shown in Appendix 1 Figure 3.3.

Sparrowhawk

There were seven observations of sparrowhawk during the breeding raptor surveys. Birds were observed hunting, commuting and perching. There was one observation of a male carrying prey within 500m of the site in June which confirms breeding in the vicinity of the observation. Observations are shown in Appendix 1 Figure 3.4.

4.2.5 Breeding Woodcock Surveys

There were 11 observations of woodcock during the breeding woodcock surveys. All observations were between one to two birds roding (displaying), indicating probable breeding. Observations were recorded in both the northern and southern sections of the site. Observations are shown in Appendix 1 Figure 4.1

4.2.6 Incidental Observations

Hen Harrier

There were four incidental observations of hen harrier during the survey period. These were recorded on, or within 500m of the site. Observations were of individual birds, hunting, perching and there was one observation of a female carrying prey to the nest at [redacted] in September. Observations are shown in Appendix 3 Figure 5.1.

Kestrel

There was one incidental observation of a kestrel during the survey period. This observation was of an individual bird hunting within 500m of the site. Observations are shown in Appendix 1 Figure 5.2.

Red Grouse

There were four incidental observations of red grouse during the survey period. Three of these observations were of individual birds and there was one observation of two birds. In May, a male was recorded displaying at Killea, 900m from the site. This behaviour indicates probable breeding in this area. Observations are shown in Appendix 1 Figure 5.3.

Snipe

There were six incidental observations of snipe during the survey period. There were two observations of birds drumming within 500m of the site near Killea and there was another bird observed drumming on Dough Mountain. This behaviour likely indicates probable breeding for this species. Observations are shown in Appendix 1 Figure 5.4.

Grey wagtail

There was one incidental record of grey wagtail in April during breeding raptor surveys. It was of a male singing.

Buzzard

There were two incidental observations of buzzard during the survey period. Both observations were of birds flying over a conifer plantation 1km from the site, near Faughary. Observations are shown in Appendix 1 Figure 5.5.

Sparrowhawk

There was one incidental observation of sparrowhawk during the survey period. This observation was of an individual bird carrying prey near Lisdarush, 650m from the site. Observations are shown in Appendix 1 Figure 5.6.

Lesser Black-backed Gull

There was one incidental observation of lesser black-backed gull during the survey period. This observation was of three birds commuting and circling overhead.

5. DISCUSSION

Ornithological surveys were conducted at the Lissinagroagh wind farm site from April 2021 to September 2021. The key observations during surveys are outlined below.

Three breeding territories were identified for hen harrier within the survey area, two of these territories were located on the site. One nest was identified in the same location as the 2018 nest at [redacted], in the southern section of the site. This nest was successful and fledged three chicks. A second nest was identified in the northern section of the site, at the 2020 nest location, southeast of [redacted] Given the lack of observations here beyond May, this nest likely failed. A third nest was identified 1.6km from the site, near [redacted], and was successful with at least two fledged chicks.

There were breeding territories identified for snipe, woodcock and sparrowhawk at, or within 500m of the wind farm site. There is a resident population of red grouse within 500m of the wind farm site. Given the level of activity and the suitable breeding habitat in which they were observed, it is possible that breeding took place within 500m of the site, near Kilea.

Golden plover and merlin were recorded infrequently and in low numbers at the wind farm site.

REFERENCES

Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. & Fuller, R.J. (2013) *Bird Atlas 2007-11: The breeding and wintering birds of Britain and Ireland*. BTO Books, Thetford.

Brown, A. F., & Shepherd, K. B. (1993). A method for censusing upland breeding waders. Bird study, 40(3), 189-195. https://doi.org/10.1080/00063659309477182

Calladine, J., Garner, G., Wernham, C., & Thiel, A. (2009). The influence of survey frequency on population estimates of moorland breeding birds. Bird Study, 56(3), 381-388. https://doi.org/10.1080/00063650902984604

Council Directive 92/43/EEC 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31992L0043

Council Directive 2009/147/EC 30 November 2009 on the conservation of wild birds. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32009L0147

Gilbert, G., Gibbons, D.W. and Evans, J. (1998) *Bird Monitoring Methods.* Bedfordshire, England: Pelagic Publishing, Royal Society for the protection of Birds.

Gilbert, G., Stanbury, A. and Lewis, A. (2021). Birds of Conservation Concern in Ireland 4: 2020-2026. *Irish Birds,* 43:1-22. Available at: https://birdwatchireland.ie/birds-of-conservation-concern-in-ireland/

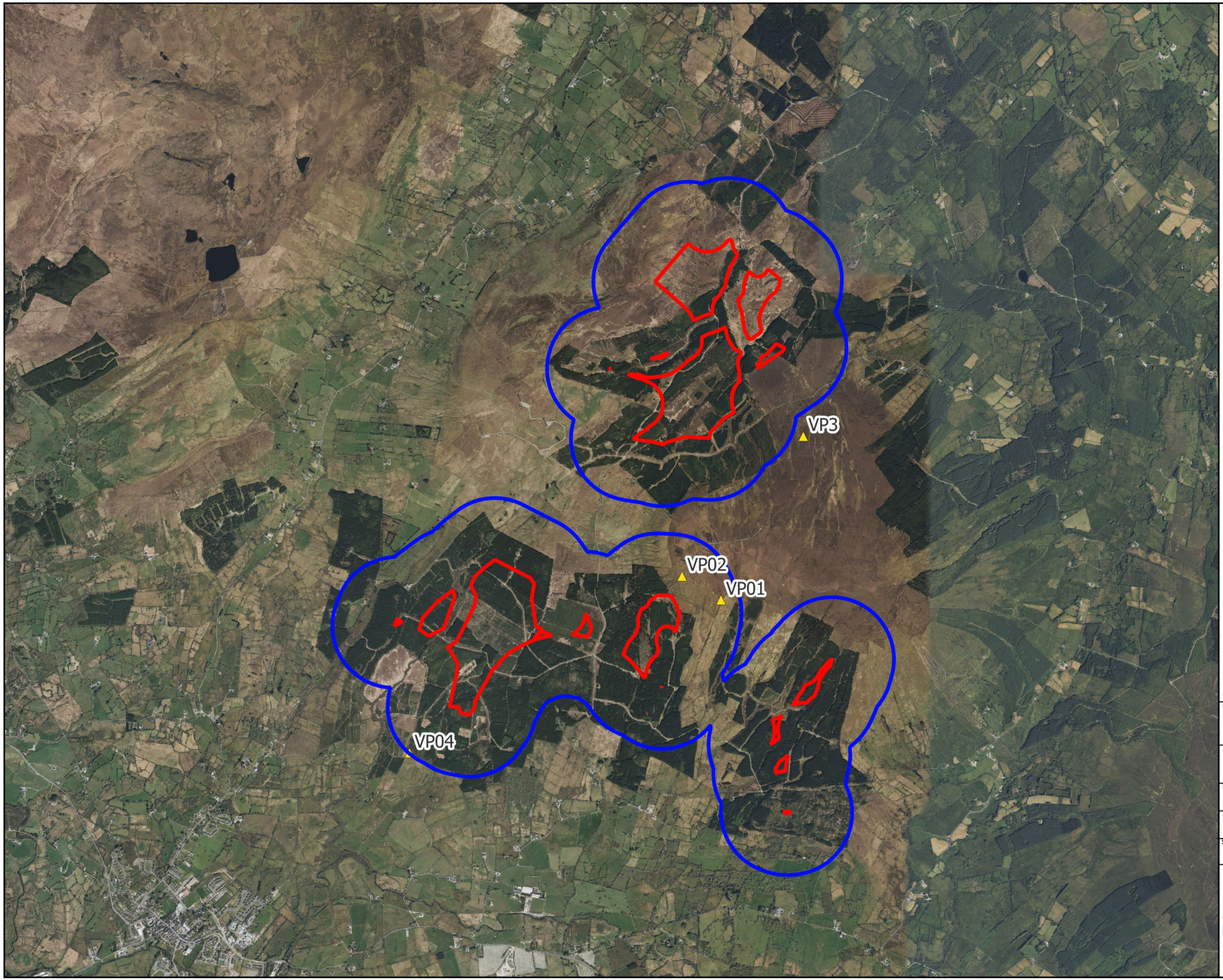
Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. and Thompson, D. (2013) *Raptors. A field Guide for Surveys and Monitoring.* The Stationary Office, Edinburgh.

SNH (2016). Assessing connectivity with Special Protection Areas (SPAs). Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2018-08/Assessing%20connectivity%20with%20special%20protection%20areas.pdf

SNH (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms. Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2018-06/Guidance%20Note%20-%20Recommended%20bird%20survey%20methods%20to%20inform%20impact%20assessment%20of%20onshore%20windfarms.pdf

APPENDIX 1

FIGURES



Map Legend

- Wind Farm Site
- 500m Survey Radius
- Vantage Point Location

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Vantage Point Survey Locations

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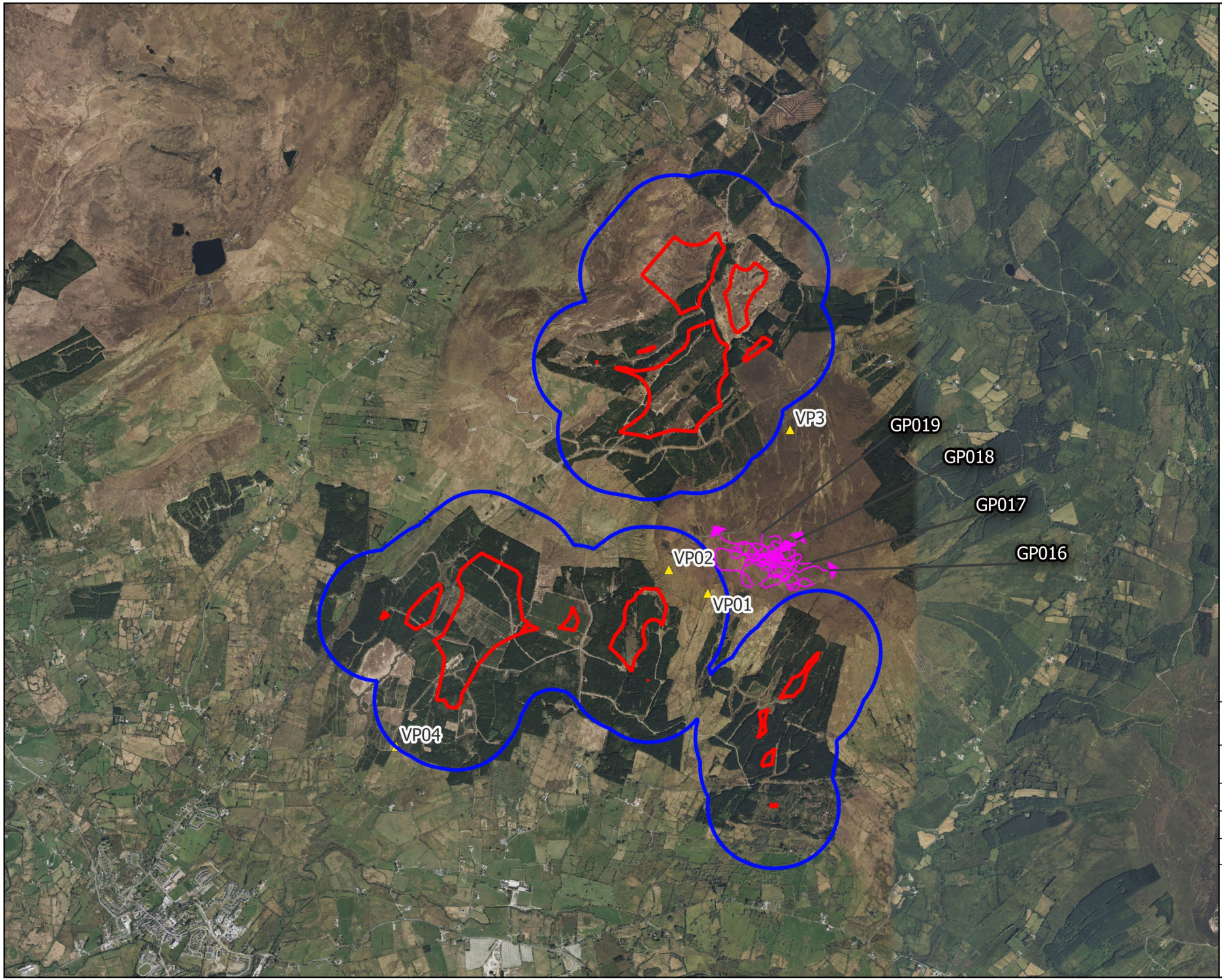

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- Vantage Point Location
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Vantage Point Survey
Golden Plover Observations

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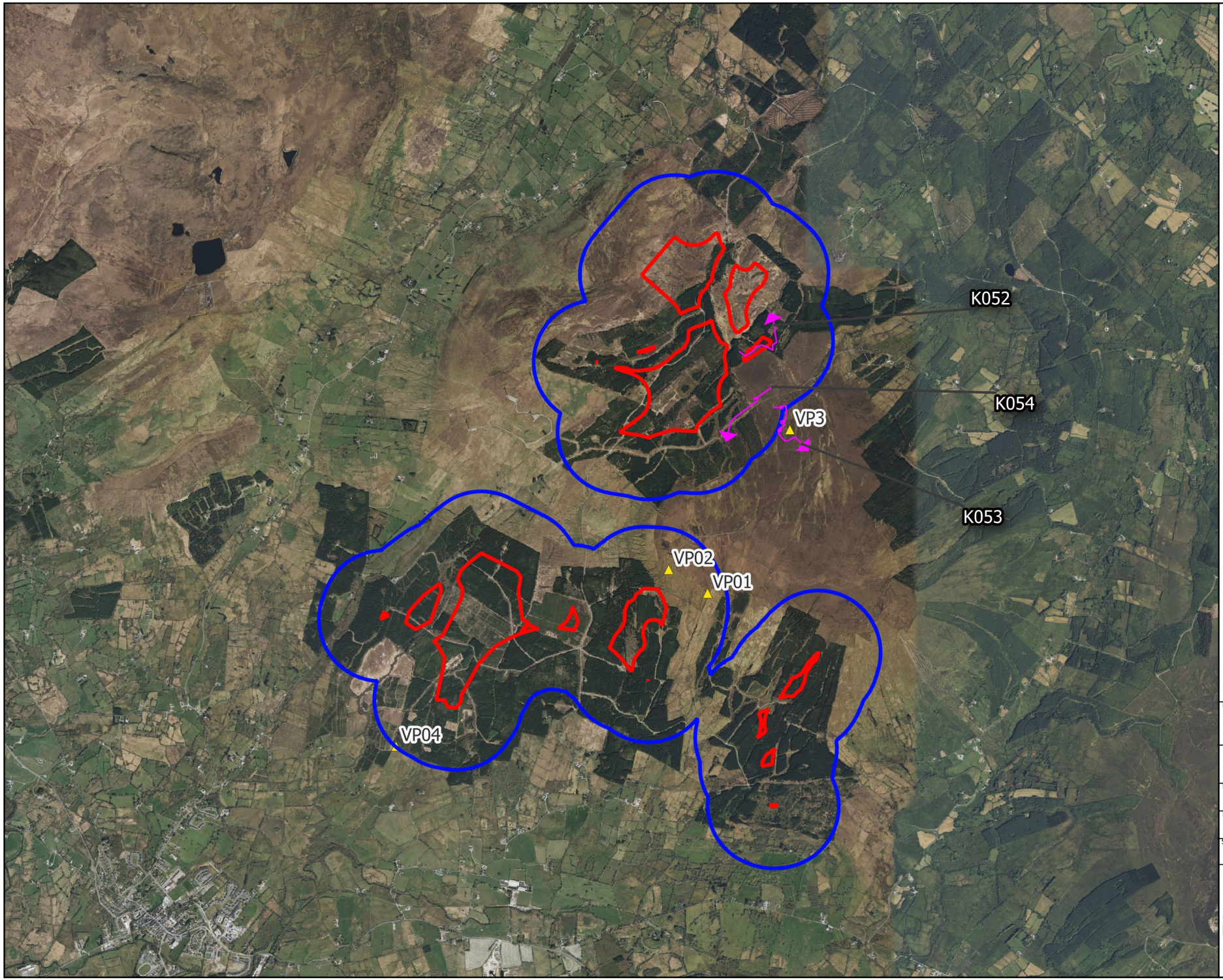

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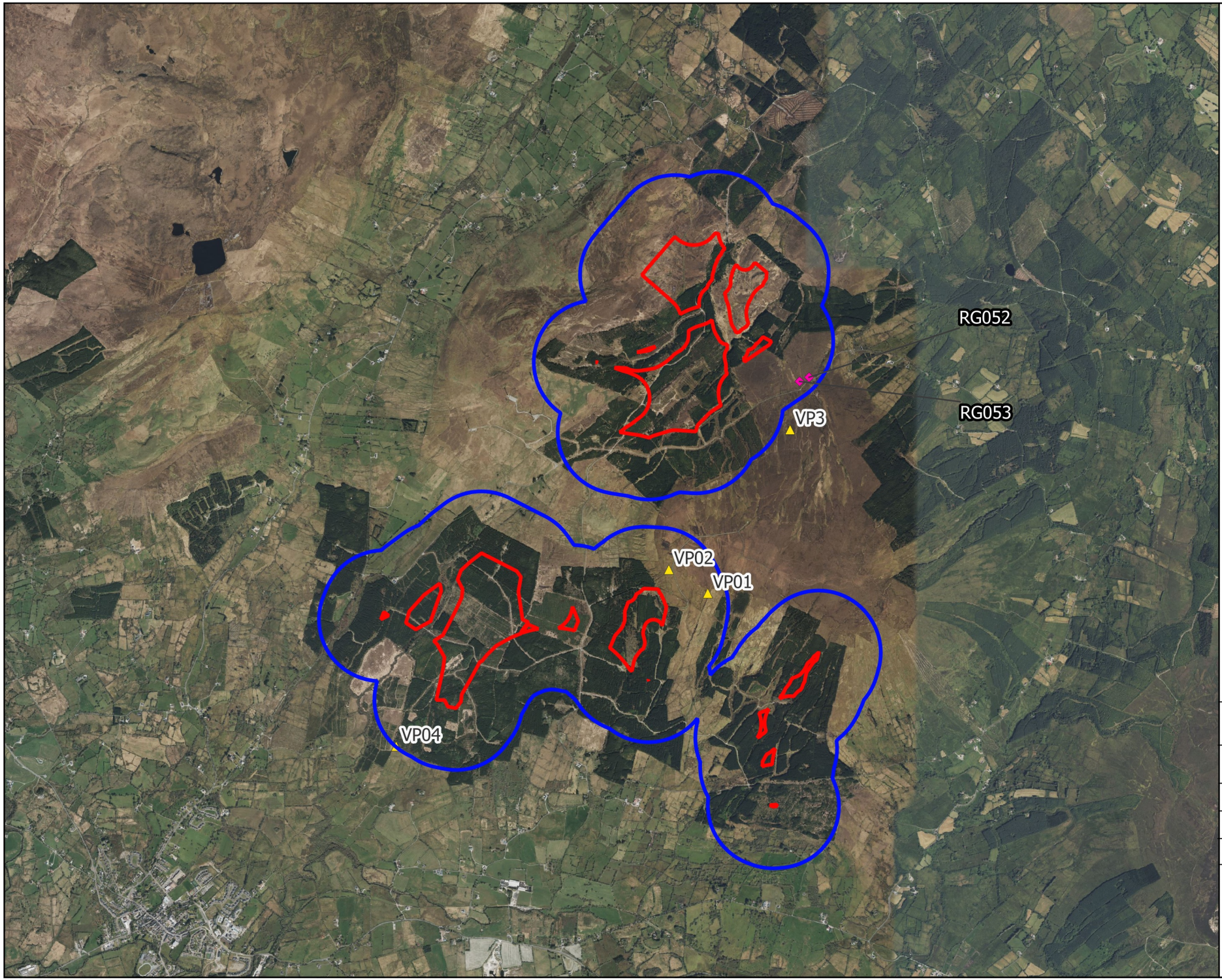

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- Vantage Point Location
- Observation

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Vantage Point Survey
Red Grouse Observations

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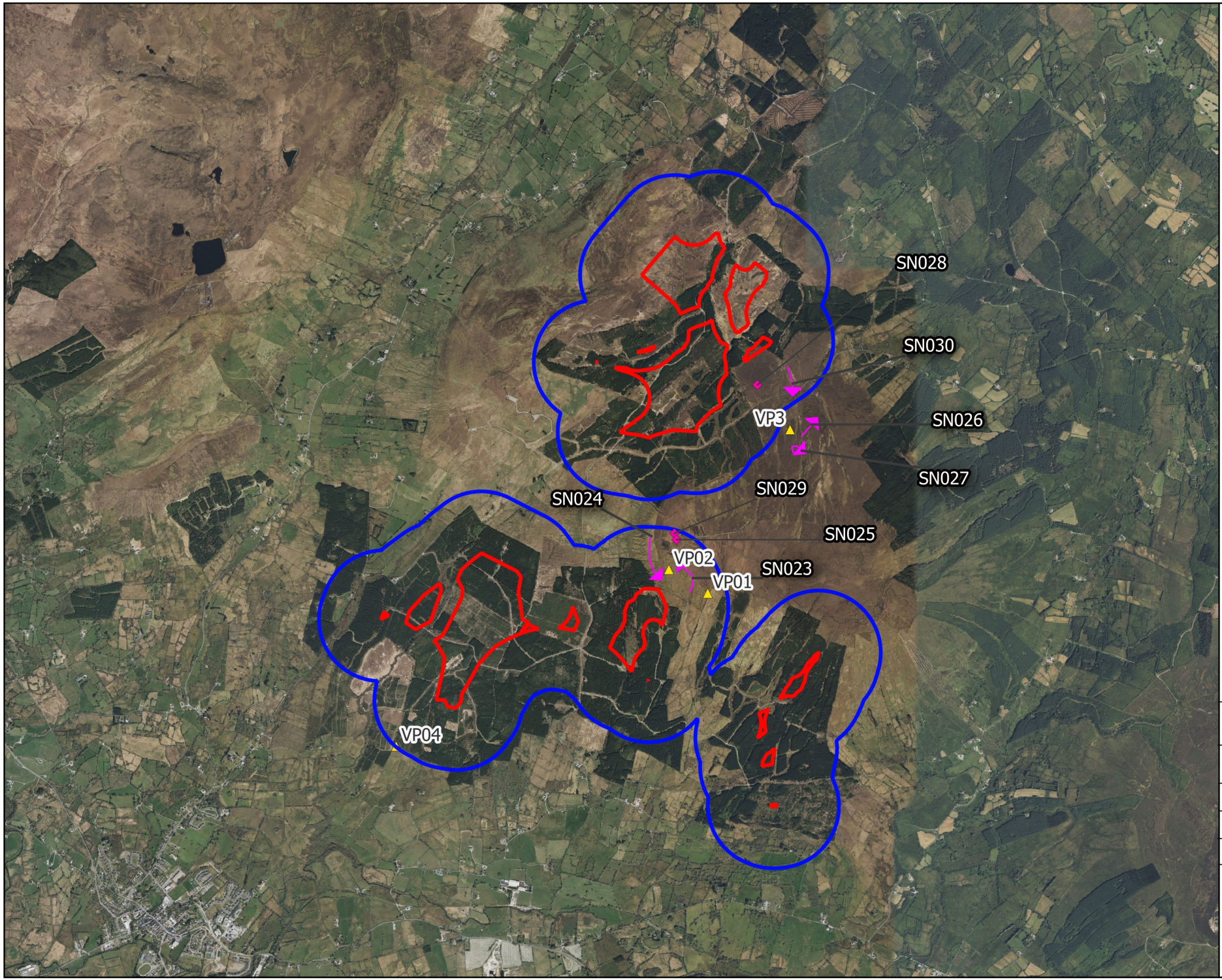

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- Vantage Point Location
- Flightline
- Observation

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Vantage Point Survey
Snipe Observations

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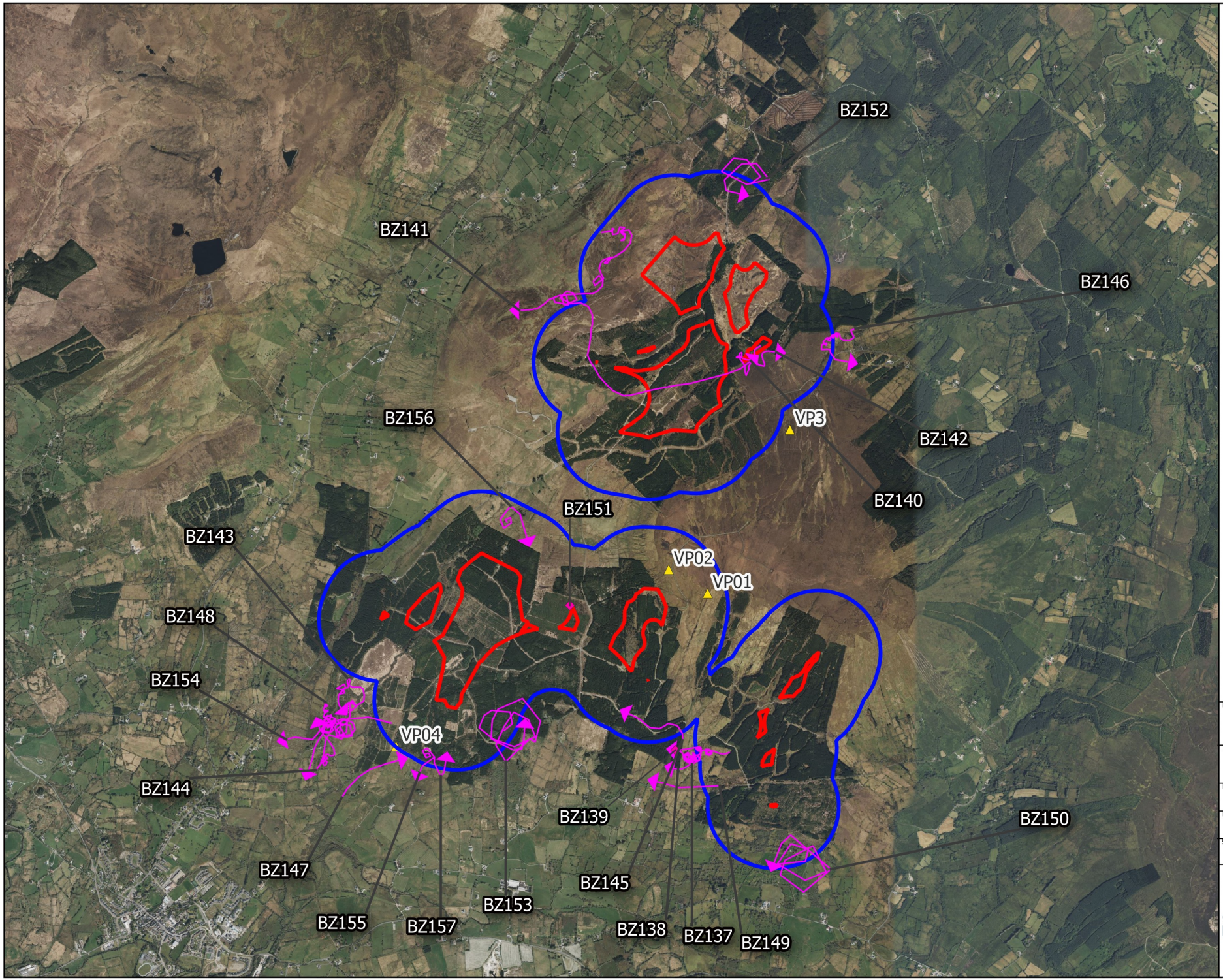

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- Vantage Point Location
- Flightline
- Observation

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Buzzard Observations

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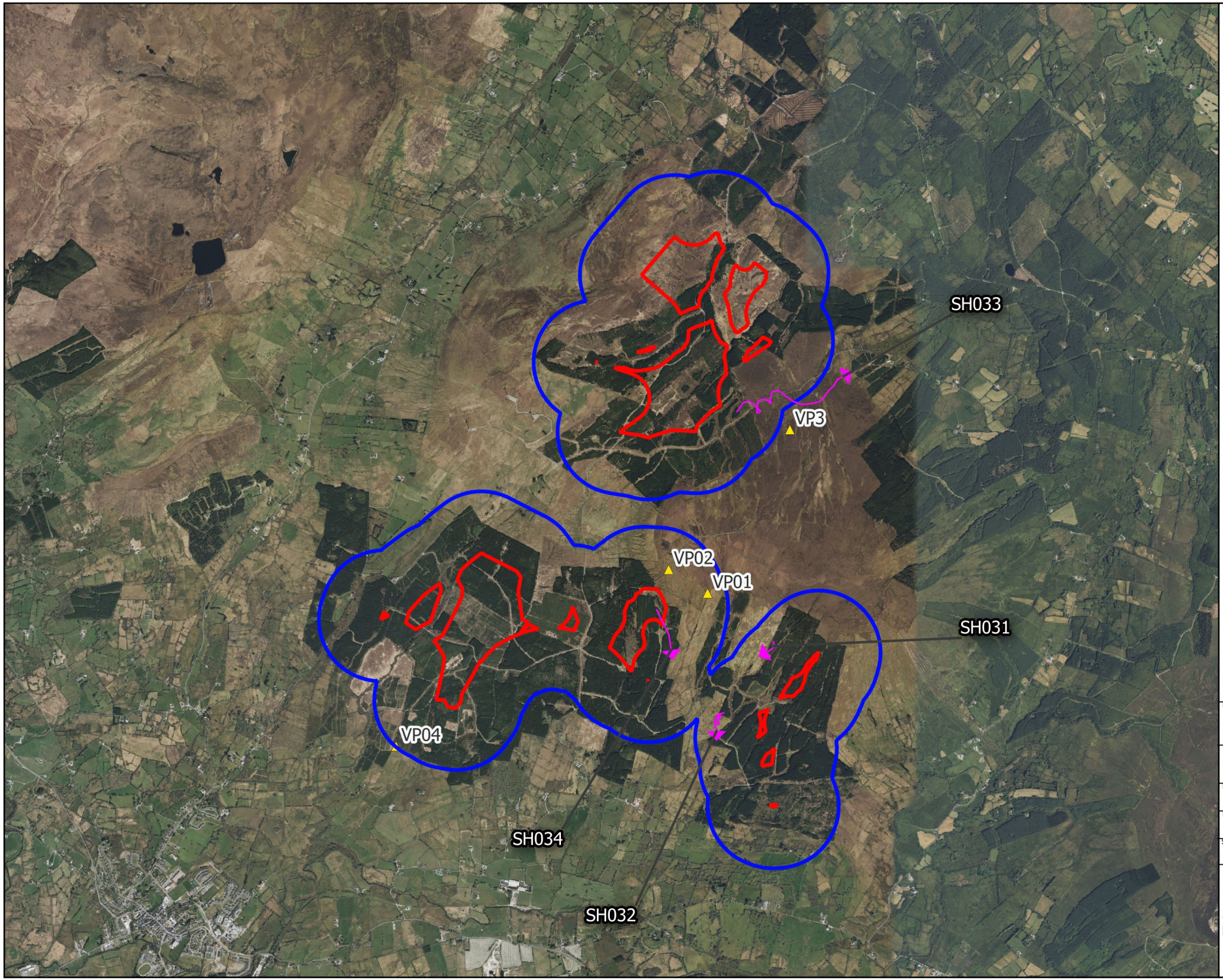

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Vantage Point Survey
Sparrowhawk Observations

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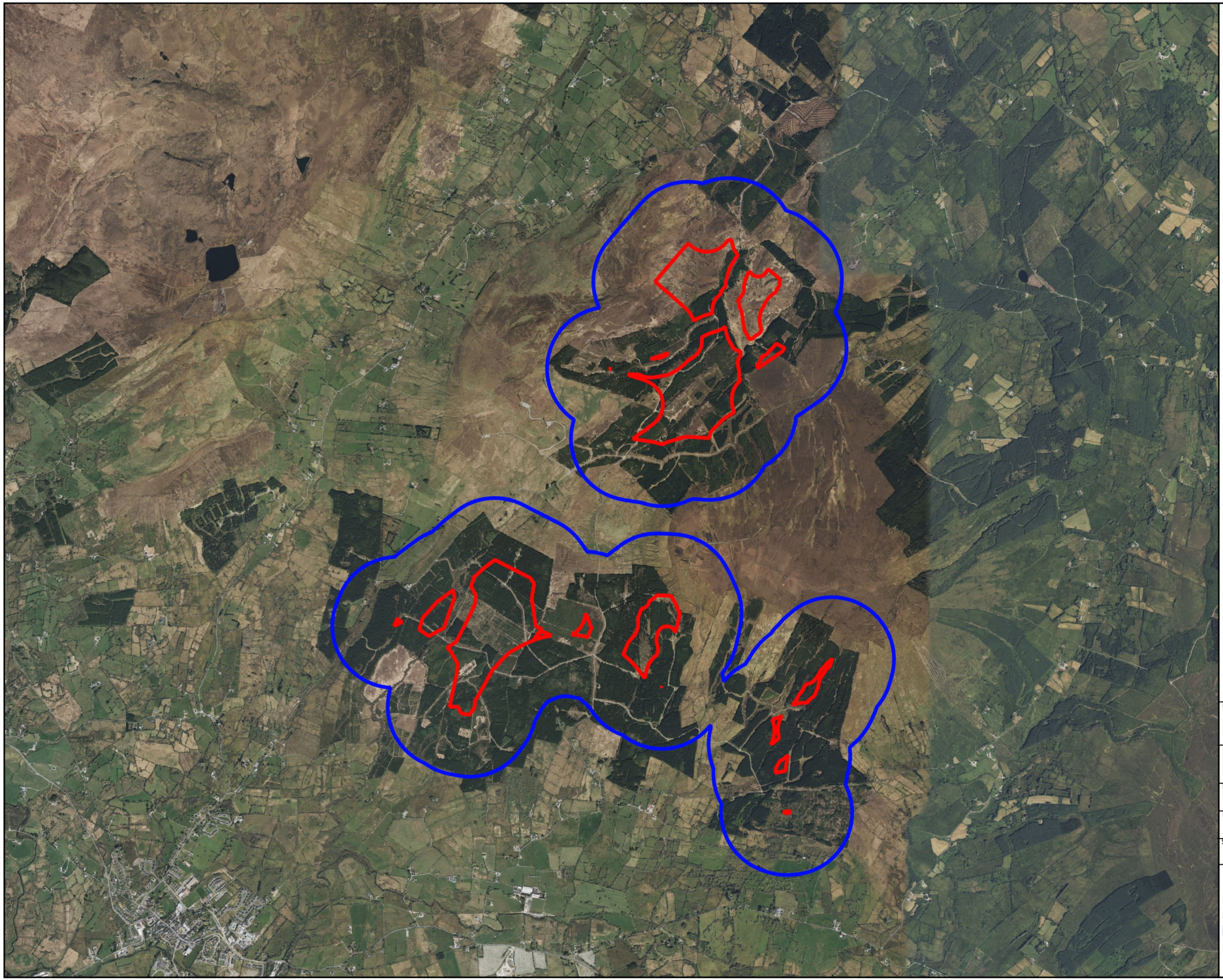

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Breeding Walkover Survey Area

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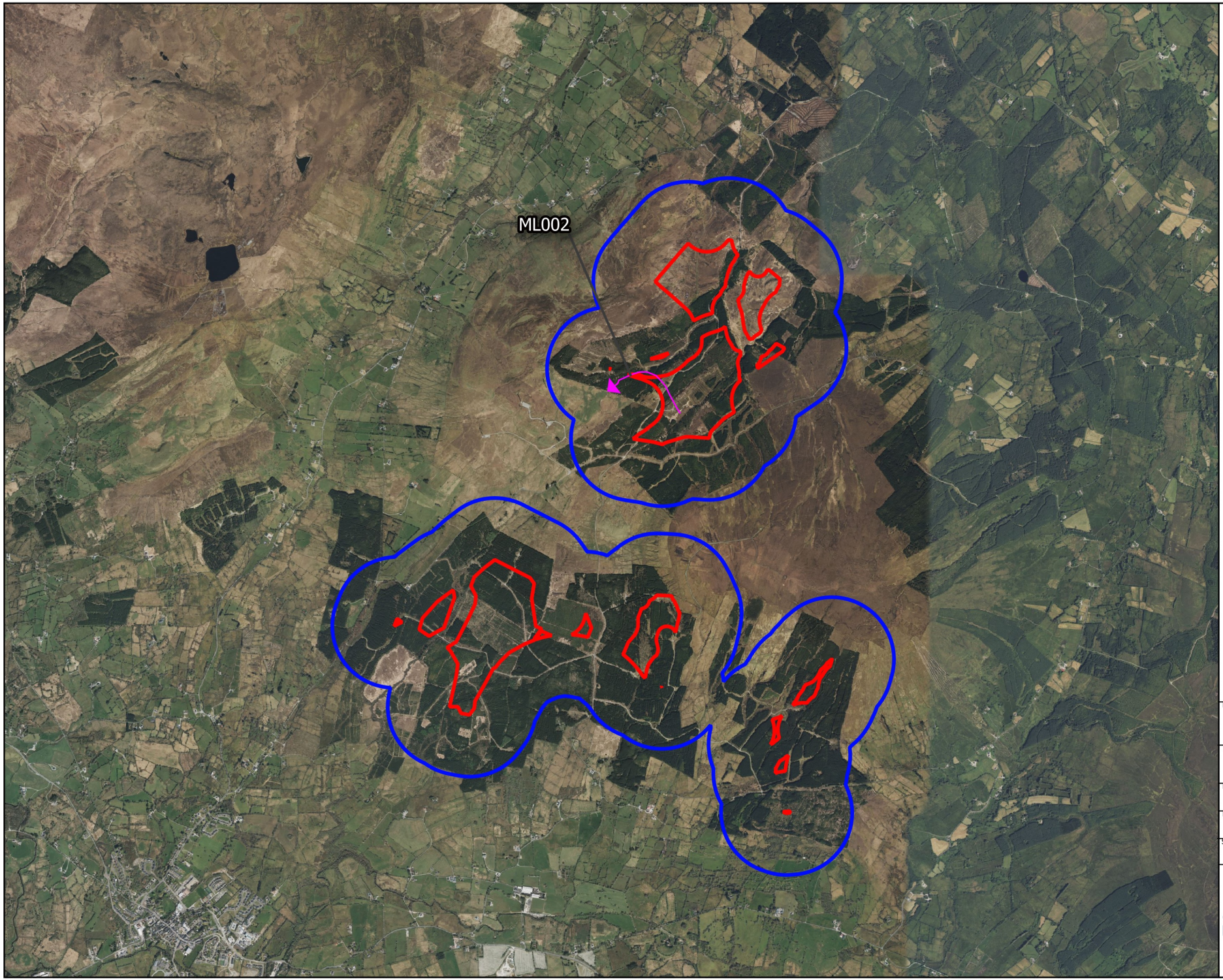

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Breeding Walkover Survey
Merlin Observations

Project Title

Lissinagroagh Wind Farm

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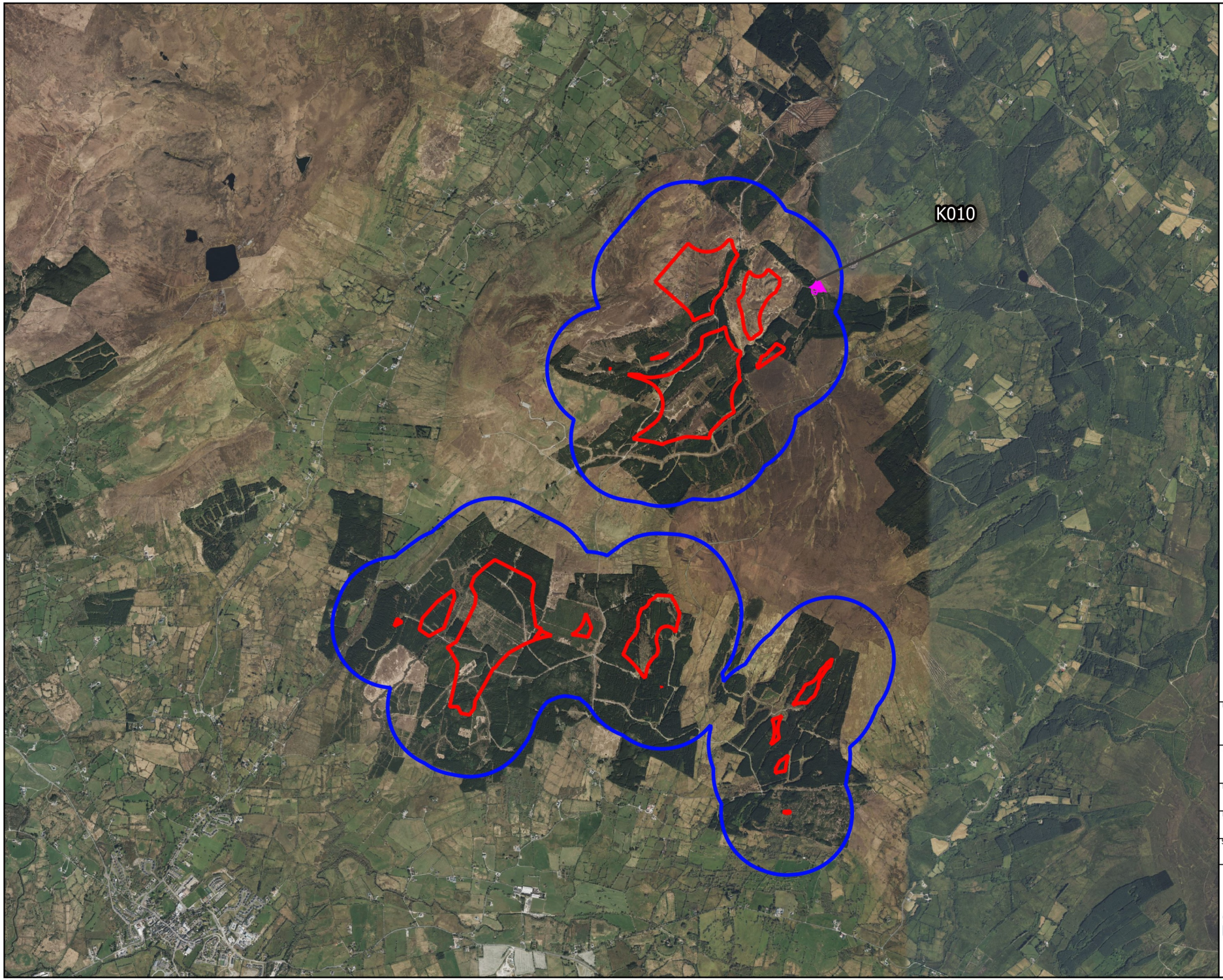

Map Legend

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- 500m Survey Radius
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Breeding Walkover Survey
Kestrel Observations

Project Title
Lissinagroagh Wind Farm

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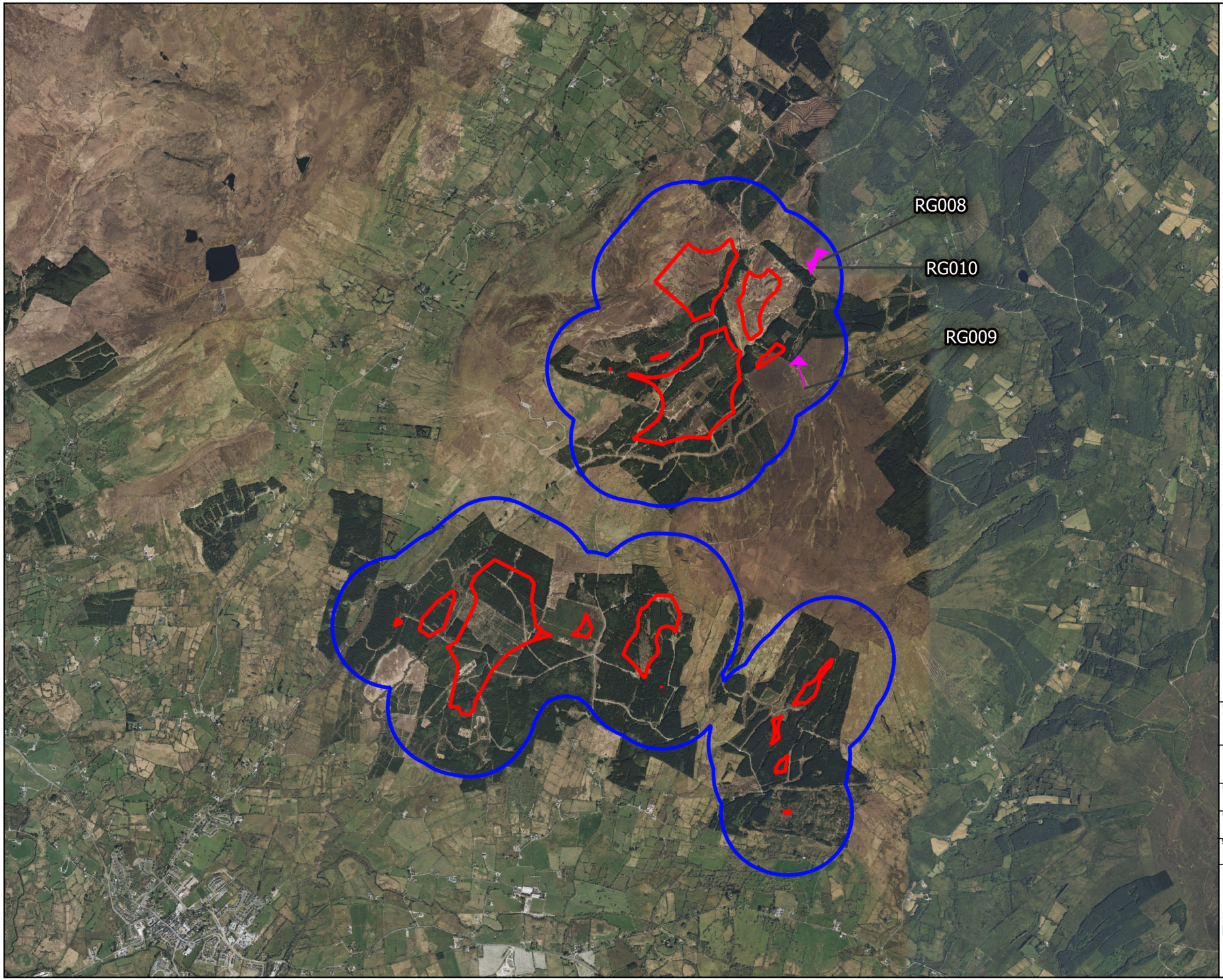

Map Legend

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- 500m Survey Radius
- Flightline

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Drawing Title
Breeding Walkover Survey
Red Grouse Observations

Project Title
Lissinagroagh Wind Farm

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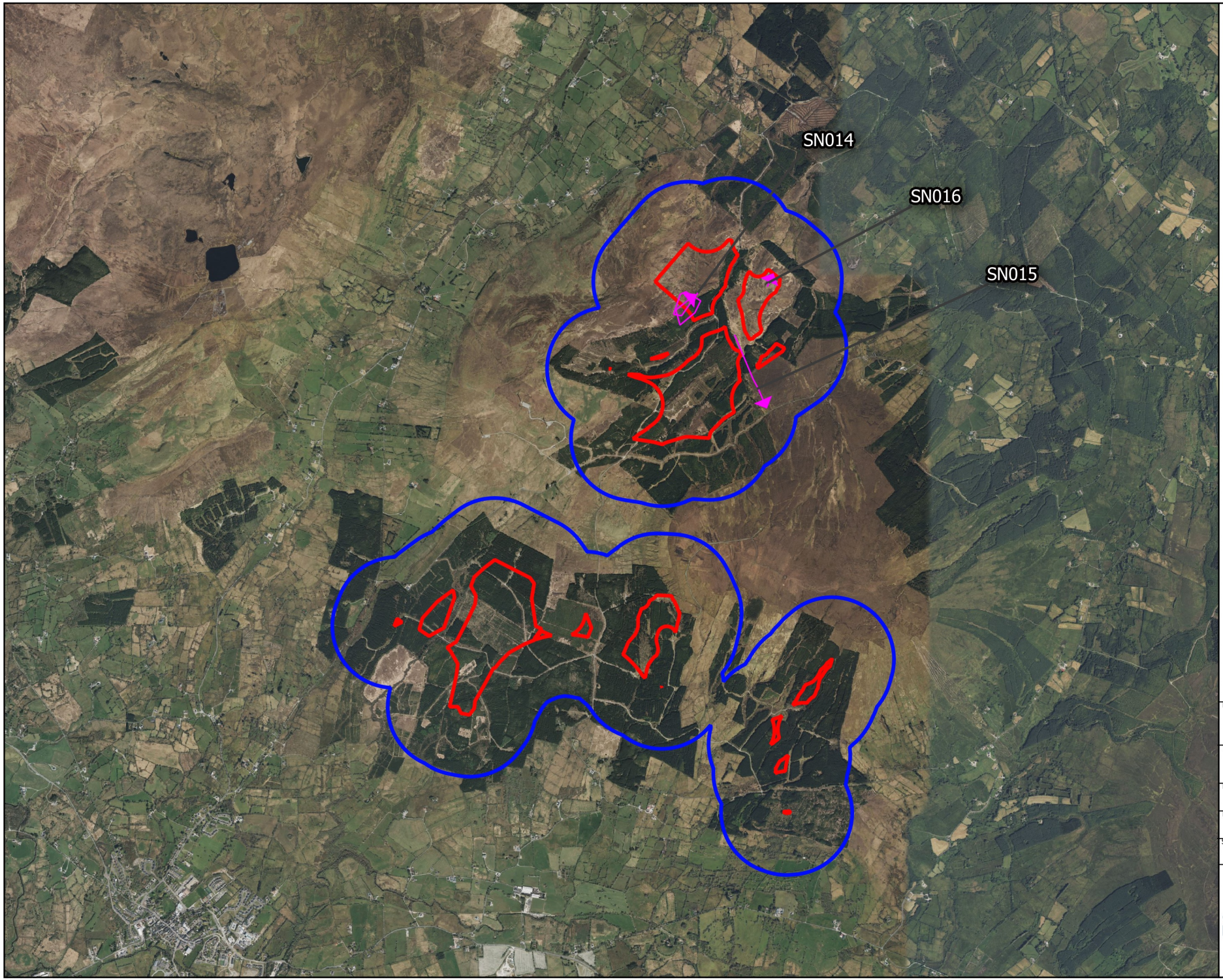

Map Legend

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- 500m Survey Radius
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Drawing Title
Breeding Walkover Survey
Snipe Observations

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Lissinagroagh Wind Farm

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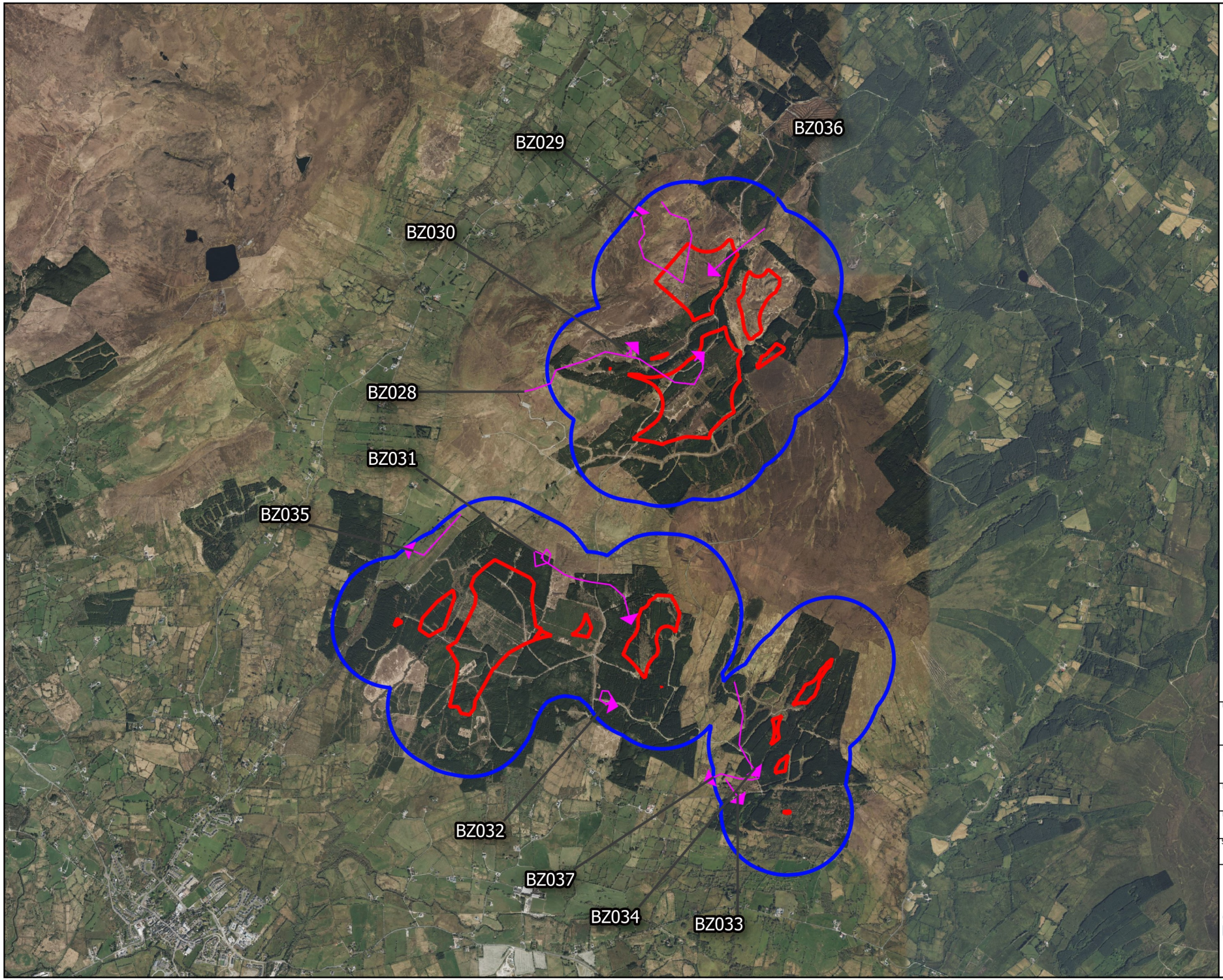

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- Wind Farm Site
- 500m Survey Radius
- Flightline

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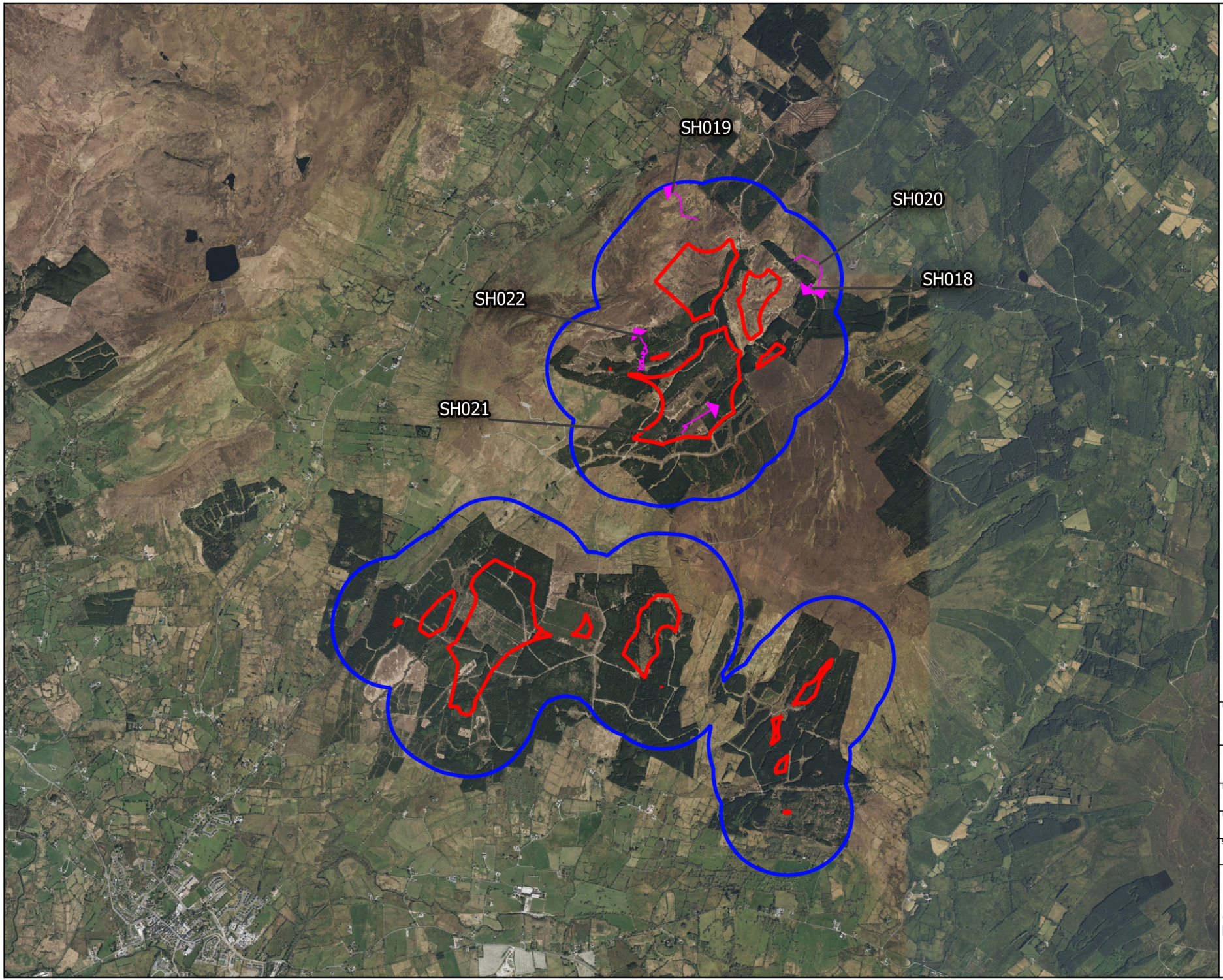

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Flightline

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Drawing Title
Breeding Walkover Survey
Sparrowhawk Observations

Project Title
Lissinagroagh Wind Farm

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Map Legend

- Wind Farm Site
- 500m Survey Radius
- 5km Survey Radius

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Drawing Title

Breeding Raptor Survey Area

Project Title

Lissinagroagh Wind Farm

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Map Legend

- Wind Farm Site
- 500m Survey Radius
- 5km Survey Radius
- Flightline

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Drawing Title

Breeding Raptor Survey
Merlin Observations

Project Title

Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-e	Fig. 3.2
Scale	Date
1:80,000	30.09.2024

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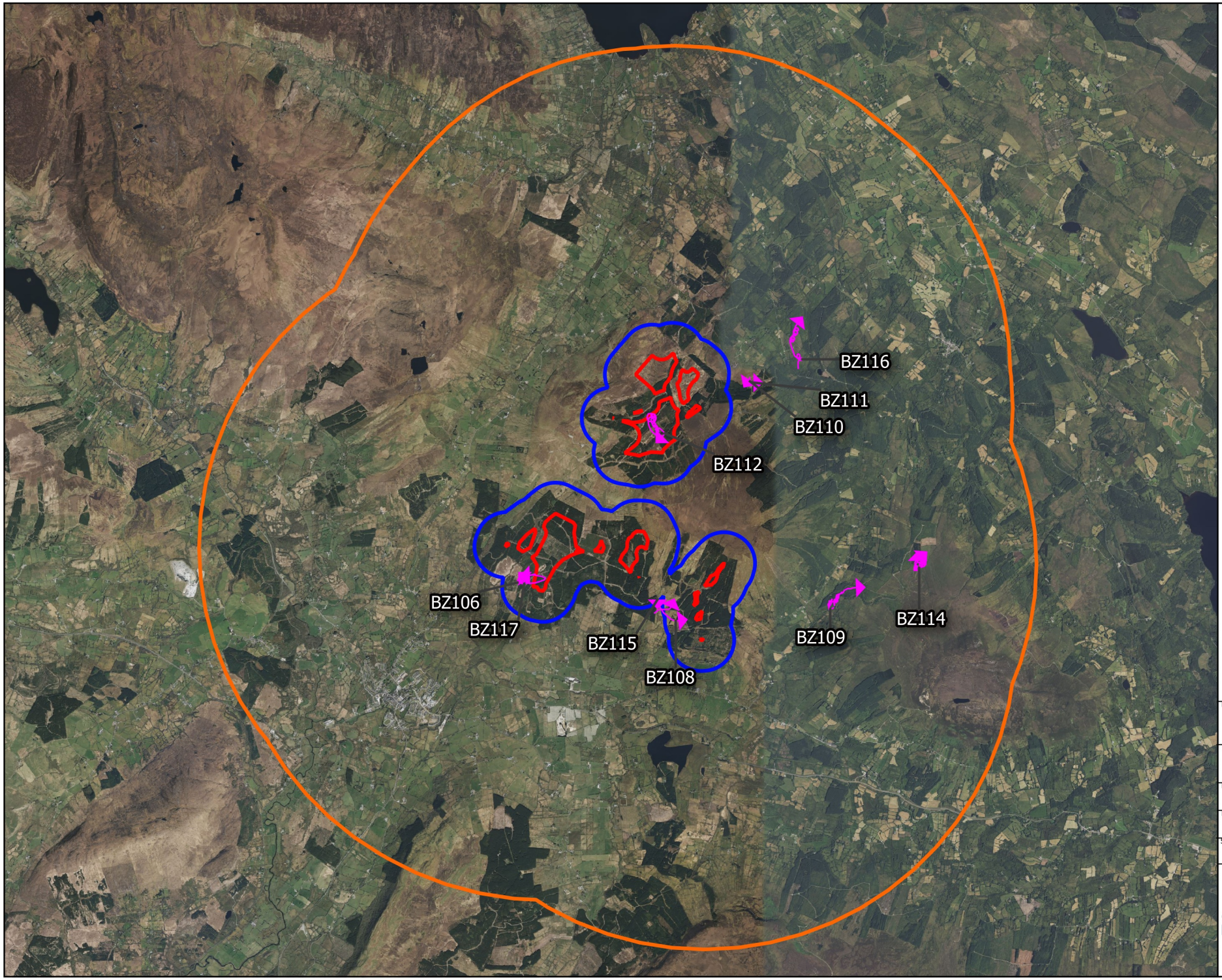

Map Legend

- Wind Farm Site
- 500m Survey Radius
- 5km Survey Radius
- Flightline

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N

Drawing Title
Breeding Raptor Survey
Buzzard Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-e	Fig. 3.3
Scale	Date
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Map Legend

- Wind Farm Site
- 500m Survey Radius
- 5km Survey Radius
- Flightline

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Drawing Title
Breeding Raptor Survey
Sparrowhawk Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-e	Fig. 3.4
Scale	Date
1:80,000	30.09.2024

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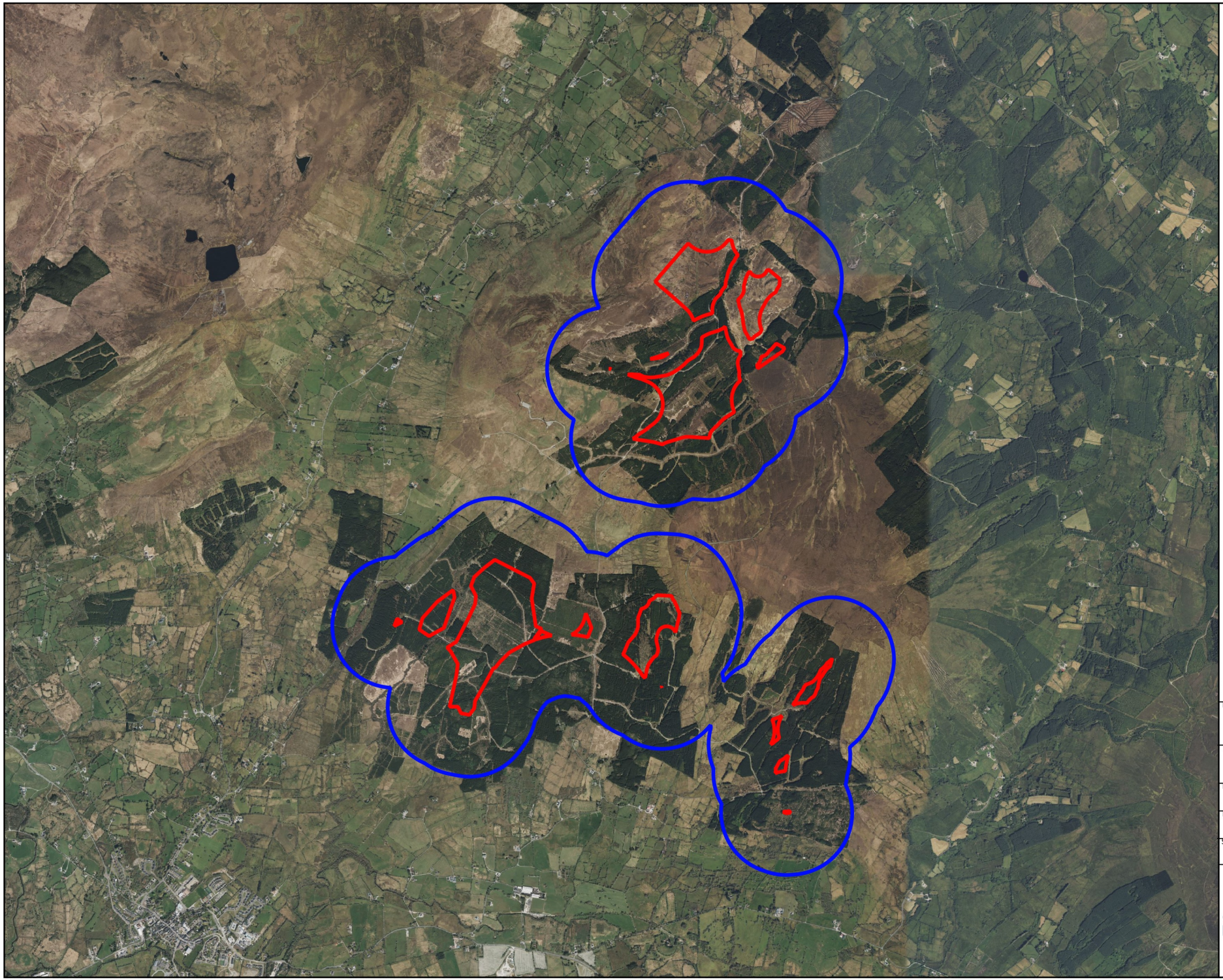

Map Legend

- Wind Farm Site
- 500m Survey Radius

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Drawing Title

Breeding Woodcock Survey Area

Project Title

Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-e	Fig. 4
Scale	Date
1:40,000	30.09.2024

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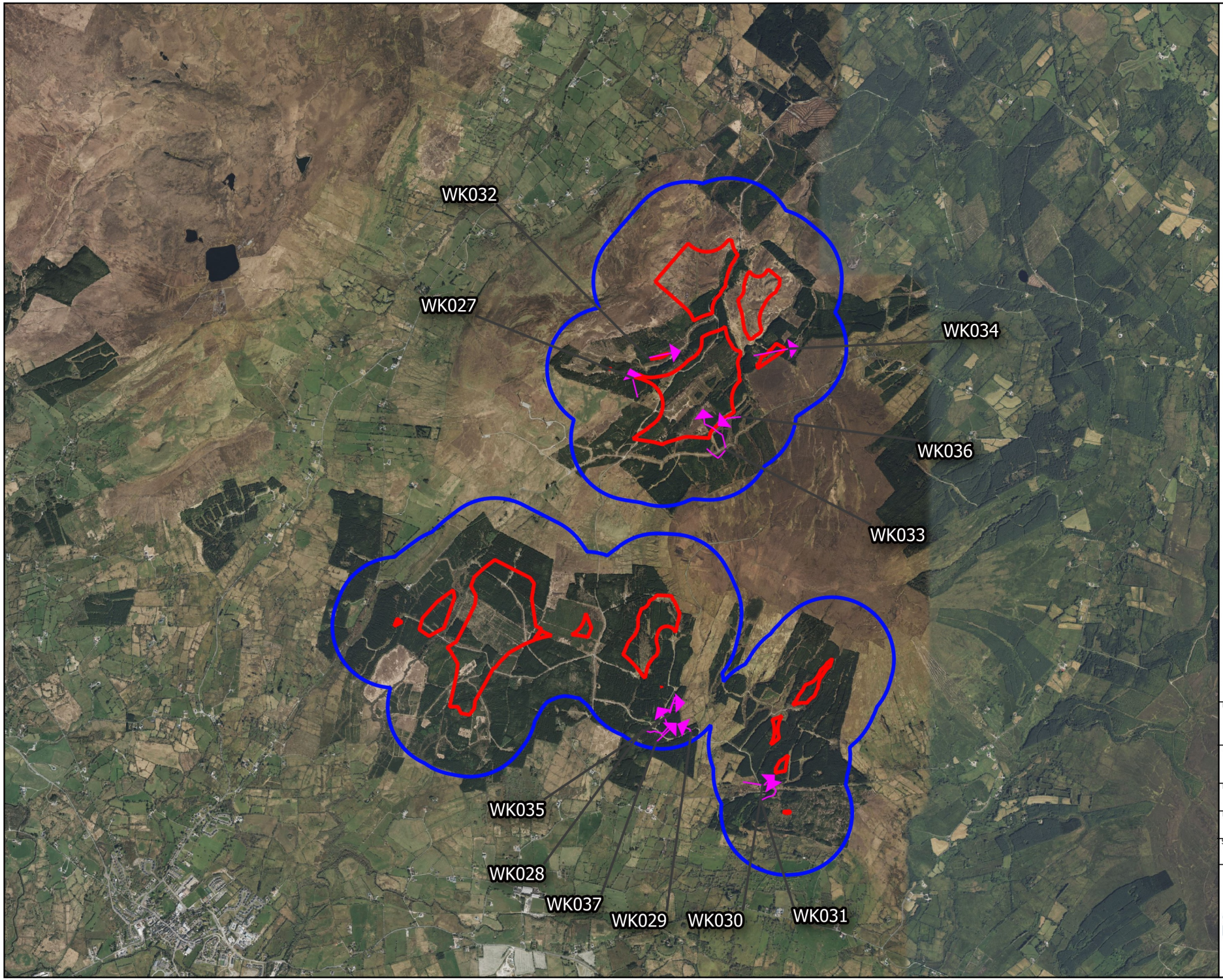

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Flightline

N

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Drawing Title
Breeding Woodcock Survey
Woodcock Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-e	Fig. 4.1
Scale	Date
1:40,000	30.09.2024

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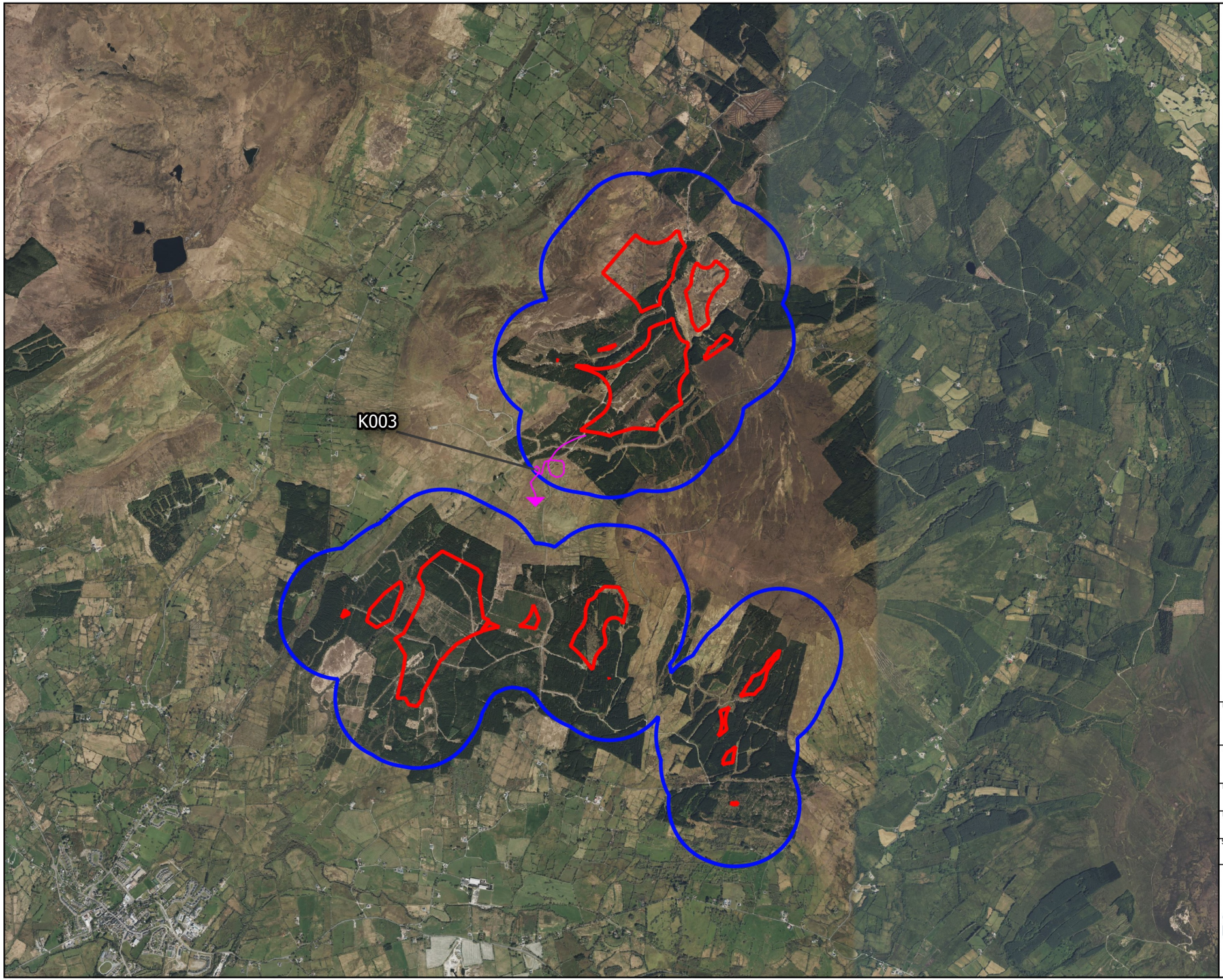

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Flightline

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Drawing Title

Incidental Kestrel Observations

Project Title

Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-e	Fig. 5.2
Scale	Date
1:40,000	30.09.2024

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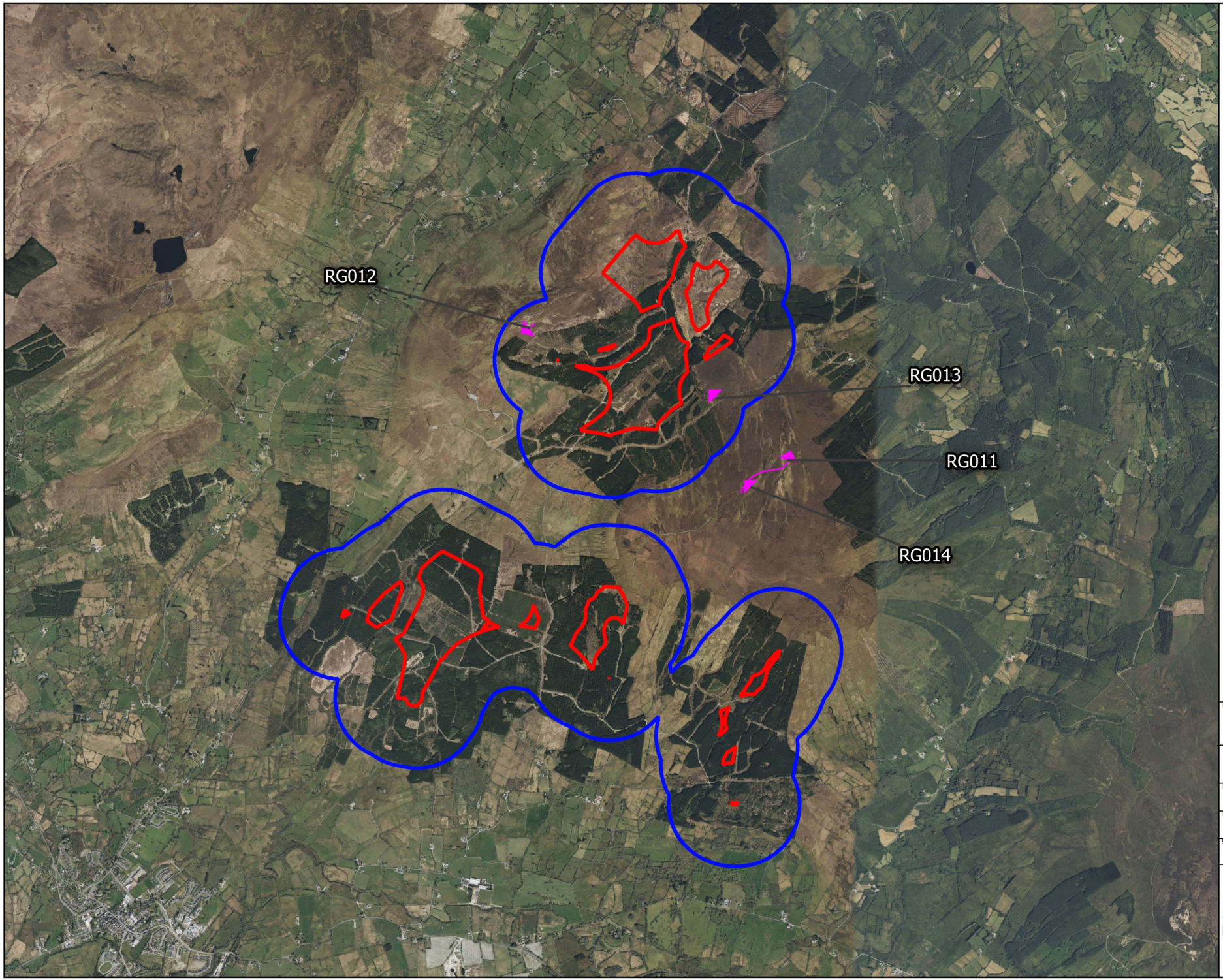

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Flightline

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Drawing Title
Incidental Red Grouse Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-e	Fig. 5.3
Scale	Date
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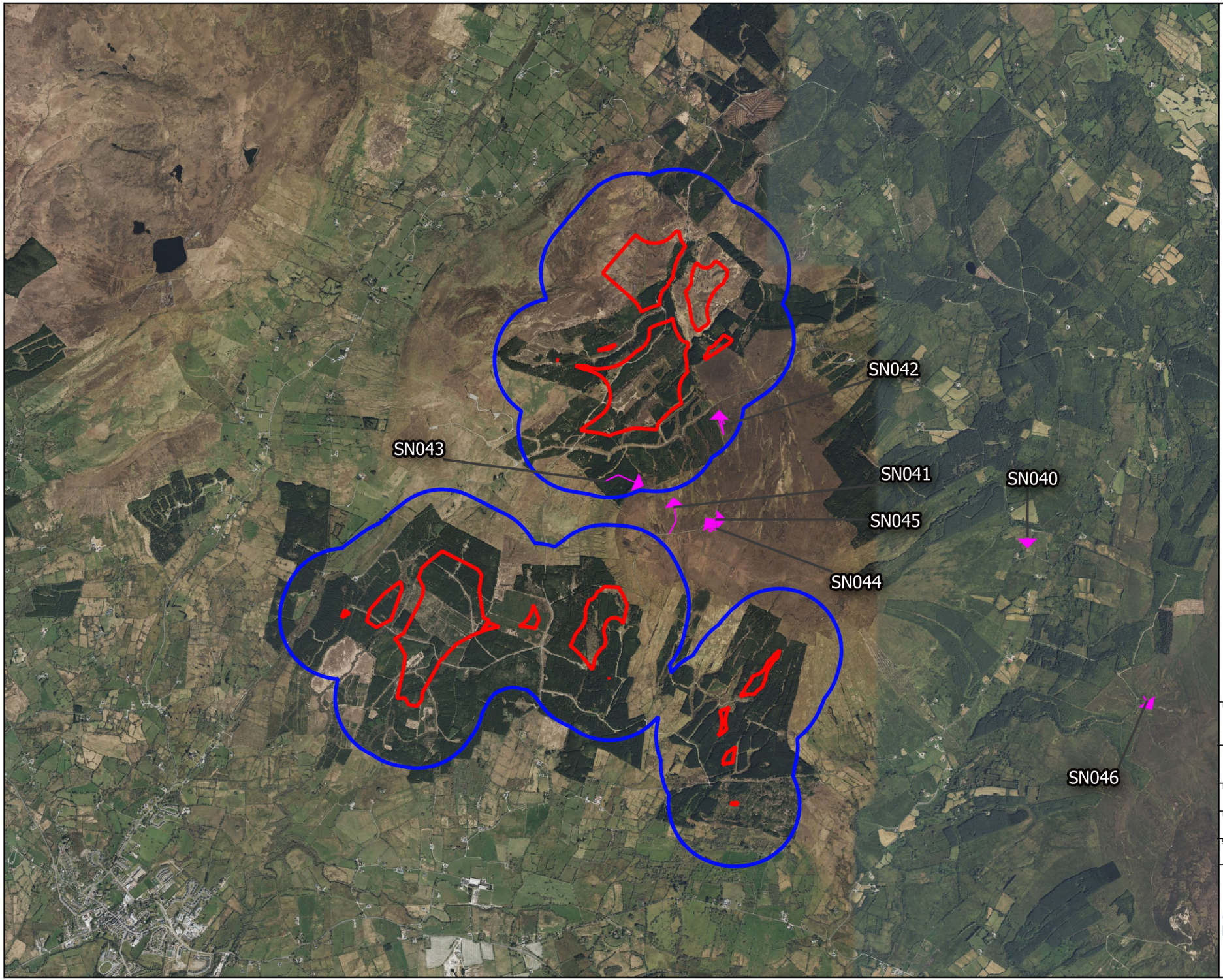

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Flightline

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Drawing Title

Incidental Snipe Observations

Project Title

Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-e	Fig. 5.4
Scale	Date
1:40,000	30.09.2024

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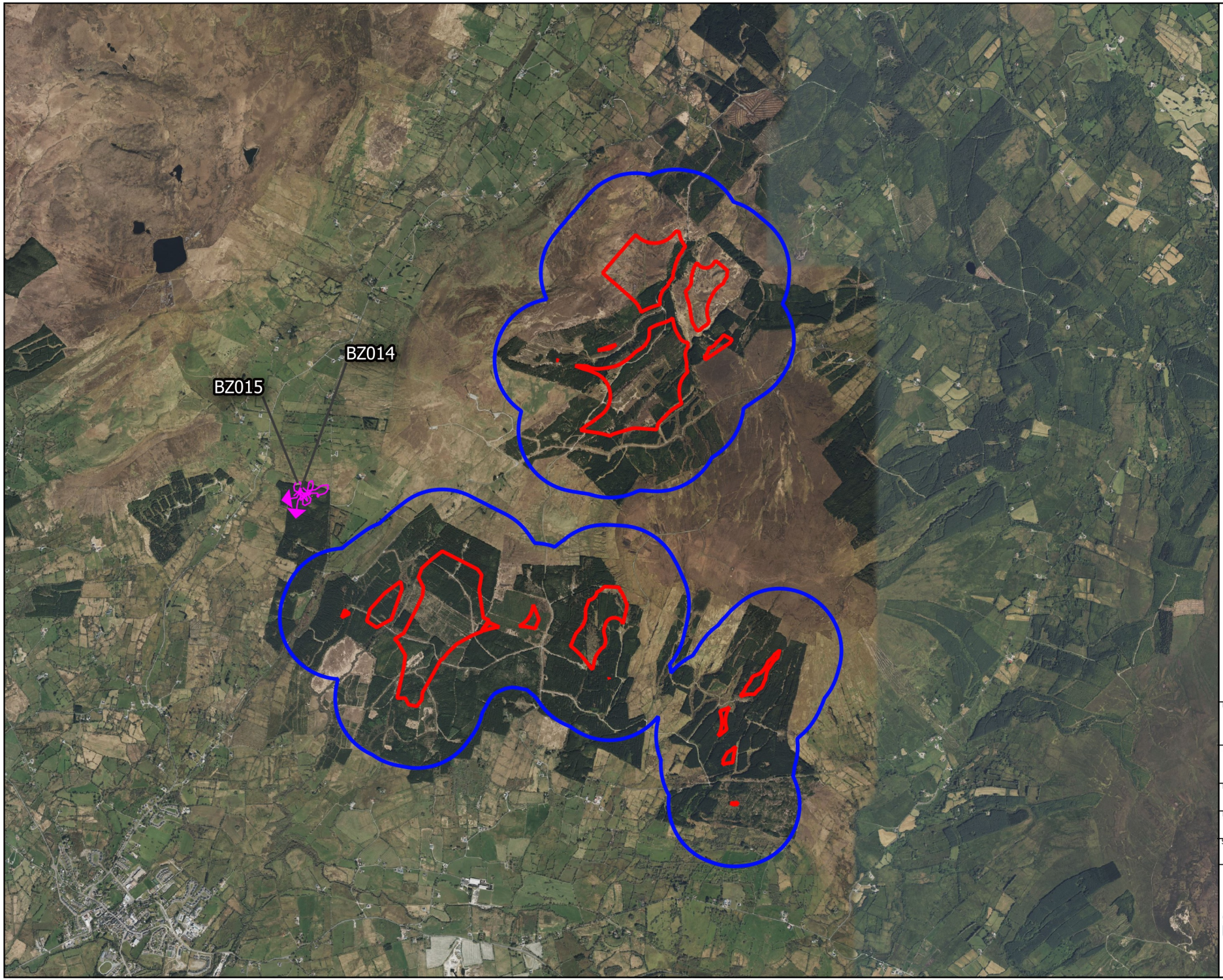

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Flightline

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Drawing Title

Incidental Buzzard Observations

Project Title

Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-e	Fig. 5.5
Scale	Date
1:40,000	30.09.2024

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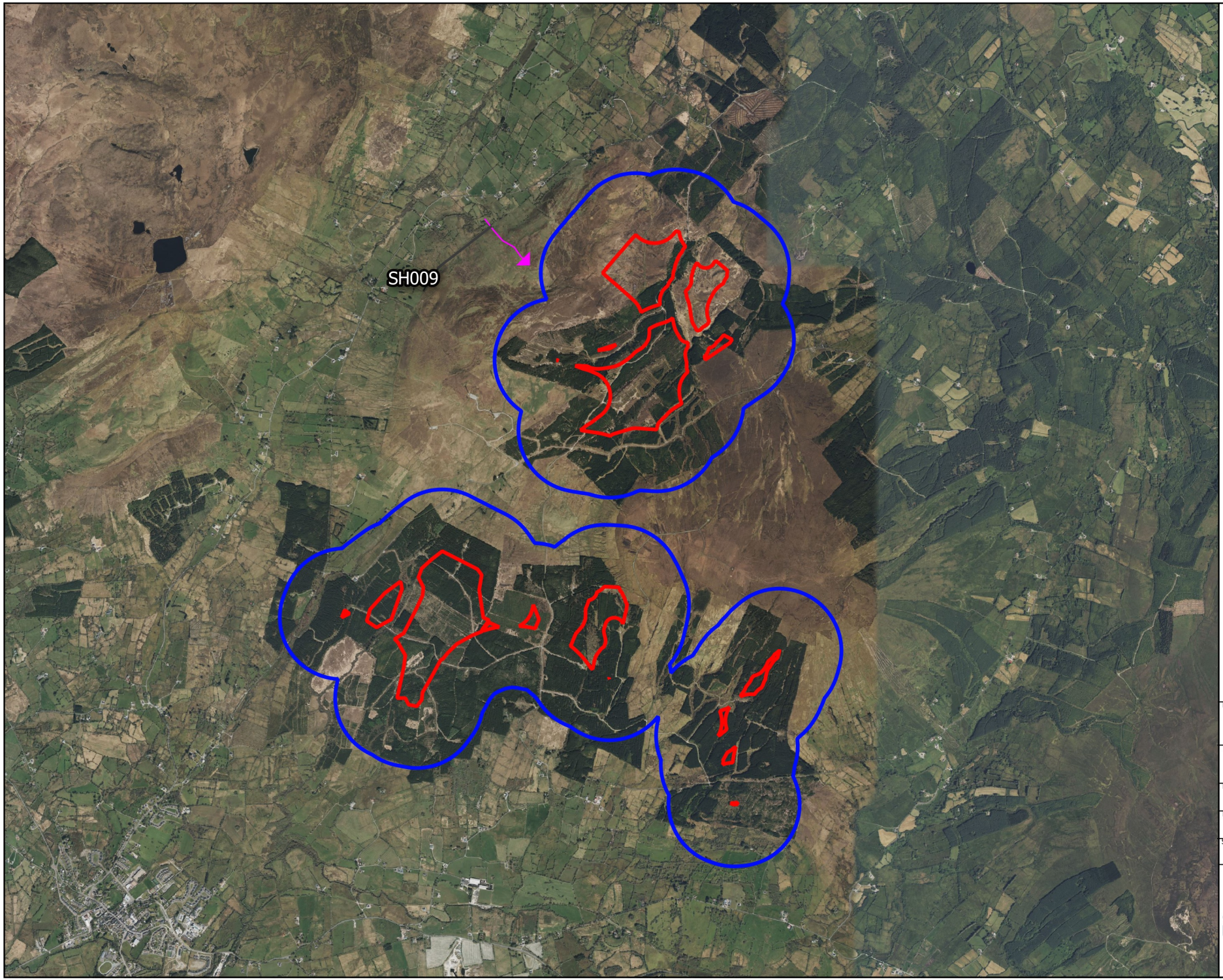

Map Legend

- Wind Farm Site
- 500m Survey Radius
- Flightline

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N

Drawing Title
Incidental Sparrowhawk Observations

Project Title
Lissinagroagh Wind Farm

Drawn By	Checked By
ZOC	AOD
Project No.	Drawing No.
200217-e	Fig. 5.6
Scale	Date
1:40,000	30.09.2024

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APPENDIX 2

SURVEY DATA

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Table 1 Vantage Point Survey Effort

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
02/04/2021	Vantage Point Survey	VP1	6:30 starting at 14:40	Visibility: good; Wind speed and direction: gentle breeze N; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	GP, BZ, SN	RV
09/04/2021	Vantage Point Survey	VP2	6:30 starting at 14:55	Visibility: good; Wind speed and direction: moderate breeze N; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Male HH	RV
22/04/2021	Vantage Point Survey	VP3	6:30 starting at 15:15	Visibility: good; Wind speed and direction: light breeze E-SE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Male HH, BZ	RV
24/04/2021	Vantage Point Survey	VP4	6:30 starting at 15:20	Visibility: good; Wind speed and direction: gentle breeze E; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	2 maps, busy day	RV
21/05/2021	Vantage Point Survey	VP1	6:30 starting at 04:15	Visibility: poor; Wind speed and direction: moderate breeze N; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none	SH and BZ, regular showers	RV
23/05/2021	Vantage Point Survey	VP2	6:30 starting at 04:10	Visibility: poor; Wind speed and direction: moderate breeze S; Cloud cover and height: 3% 150-500m; Rain: light showers; Frost: none; Snow: none	Poor conditions, male HH seen carrying nest material.	RV
24/05/2021	Vantage Point Survey	VP3	6:30 starting at 04:10	Visibility: good; Wind speed and direction: light breeze W-NW; Cloud cover and height: 1% >500m; Rain: none; Frost: none; Snow: none	SN,HH and BZ all seen	RV
28/05/2021	Vantage Point Survey	VP4	6:30 starting at 04:05	Visibility: good; Wind speed and direction: light breeze N-NW; Cloud cover and height: 3% 150-500m; Rain: drizzle; Frost: none; Snow: none	Male HH seen, Fox, Hare and cuckoos also.	RV
13/06/2021	Vantage Point Survey	VP3	6:30 starting at 11:35	Visibility: good; Wind speed and direction: moderate breeze S-SW; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none	3 fires lit E of VP, HH briefly	RV
14/06/2021	Vantage Point Survey	VP1	6:30 starting at 05:45	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none	Male HH seen 3 times	RV
16/06/2021	Vantage Point Survey	VP2	6:30 starting at 05:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 3% >500m; Rain: none; Frost: none; Snow: none	Snipe, hen harrier pair seen	RV
21/06/2021	Vantage Point Survey	VP4	6:30 starting at 05:30	Visibility: good; Wind speed and direction: gentle breeze N; Cloud cover and height: 1% >500m; Rain: none; Frost: none; Snow: none	HH and BZ seen	RV
02/07/2021	Vantage Point Survey	VP1	3:00 starting at 11:30	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
02/07/2021	Vantage Point Survey	VP1	3:00 starting at 15:00	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
08/07/2021	Vantage Point Survey	VP2	3:00 starting at 17:30	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
09/07/2021	Vantage Point Survey	VP2	3:00 starting at 13:00	Visibility: poor; Wind speed and direction: light breeze E; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
16/07/2021	Vantage Point Survey	VP3	3:00 starting at 13:30	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
20/07/2021	Vantage Point Survey	VP3	3:00 starting at 08:00	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
21/07/2021	Vantage Point Survey	VP4	3:00 starting at 11:00	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
21/07/2021	Vantage Point Survey	VP4	3:00 starting at 14:30	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
11/08/2021	Vantage Point Survey	VP3	3:00 starting at 12:58	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none	A bright day, with a moderate to gentle breeze. A male and brief view of a female Hen Harrier were seen a hood distance away below the VP, alongside a Kestrel foraging at close quarters and two LBB Gull's travelling near the lower lough.	LD
11/08/2021	Vantage Point Survey	VP3	3:00 starting at 16:28	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		LD
16/08/2021	Vantage Point Survey	VP4	2:00 starting at 07:20	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none	Light rain or drizzle at times, but plenty of activity this morning, including a female Hen Harrier seen on three occasions, and at least one, if not two Buzzards. See VP flight for more details.	LD
16/08/2021	Vantage Point Survey	VP4	1:00 starting at 09:20	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		LD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
16/08/2021	Vantage Point Survey	VP4	1:00 starting at 10:50	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		LD
16/08/2021	Vantage Point Survey	VP4	2:00 starting at 11:50	Visibility: good; Wind speed and direction: fresh breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		LD
25/08/2021	Vantage Point Survey	VP1	3:00 starting at 11:40	Visibility: good; Wind speed and direction: moderate breeze NE; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none	A warm, sunny day on the elevated VP, but very quiet with few birds seen in flight. A Great Spotted Woodpecker was however, heard calling from conifers.	LD
25/08/2021	Vantage Point Survey	VP1	3:00 starting at 15:10	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		LD
26/08/2021	Vantage Point Survey	VP2	3:00 starting at 12:20	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: 0-33% 150-500m; Rain: none; Frost: none; Snow: none	A calm and very warm day again down in Leitrim, with a female hen Harrier and three fledged juvenile's in flight. Buzzard heard calling and seen hunting too.	LD
26/08/2021	Vantage Point Survey	VP2	3:00 starting at 15:50	Visibility: good; Wind speed and direction: light breeze NE; Cloud cover and height: 0-33% 150-500m; Rain: none; Frost: none; Snow: none		LD
01/09/2021	Vantage Point Survey	VP2	3:00 starting at 15:15	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
01/09/2021	Vantage Point Survey	VP2	2:00 starting at 19:25	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
02/09/2021	Vantage Point Survey	VP3	3:00 starting at 15:50	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
02/09/2021	Vantage Point Survey	VP3	2:00 starting at 19:20	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
03/09/2021	Vantage Point Survey	VP2	1:00 starting at 17:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
03/09/2021	Vantage Point Survey	VP4	2:00 starting at 19:20	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
09/09/2021	Vantage Point Survey	VP1	3:00 starting at 14:30	Visibility: moderate; Wind speed and direction: light air S; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
09/09/2021	Vantage Point Survey	VP1	3:00 starting at 18:00	Visibility: moderate; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
13/09/2021	Vantage Point Survey	VP3	1:00 starting at 14:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD
13/09/2021	Vantage Point Survey	VP4	3:00 starting at 16:00	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD
13/09/2021	Vantage Point Survey	VP4	1:00 starting at 19:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD

Table 2 Breeding Walkover Survey Effort

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
02/04/2021	Breeding Walkover Survey	500m buffer	6:00 starting at 11:45	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
06/04/2021	Breeding Walkover Survey	500m buffer	6:00 starting at 09:00	Visibility: good; Wind speed and direction: fresh breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: falling		AOD
07/04/2021	Breeding Walkover Survey	500m buffer	6:00 starting at 09:30	Visibility: moderate; Wind speed and direction: gentle breeze NW; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD
08/04/2021	Breeding Walkover Survey	500m buffer	6:00 starting at 11:30	Visibility: good; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none		AOD
06/05/2021	Breeding Walkover Survey	500m buffer	3:00 starting at 12:00	Visibility: good; Wind speed and direction: fresh breeze NW; Cloud cover and height: 33-66% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
06/05/2021	Breeding Walkover Survey	500m buffer	3:00 starting at 16:00	Visibility: good; Wind speed and direction: fresh breeze NW; Cloud cover and height: 33-66% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
10/05/2021	Breeding Walkover Survey	500m buffer	3:00 starting at 14:45	Visibility: moderate; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none		AOD
10/05/2021	Breeding Walkover Survey	500m buffer	2:00 starting at 17:45	Visibility: moderate; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none		AOD
11/05/2021	Breeding Walkover Survey	500m buffer	4:00 starting at 14:30	Visibility: good; Wind speed and direction: fresh breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
12/05/2021	Breeding Walkover Survey	500m buffer	5:00 starting at 15:30	Visibility: good; Wind speed and direction: light air W; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
17/05/2021	Breeding Walkover Survey	500m buffer	4:00 starting at 15:00	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
02/06/2021	Breeding Walkover Survey	500m Buffer	2:00 starting at 15:00	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
02/06/2021	Breeding Walkover Survey	500m Buffer	2:00 starting at 17:30	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
04/06/2021	Breeding Walkover Survey	500m Buffer	2:30 starting at 18:00	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
08/06/2021	Breeding Walkover Survey	500m Buffer	3:00 starting at 14:00	Visibility: good; Wind speed and direction: light air W; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
08/06/2021	Breeding Walkover Survey	500m Buffer	3:00 starting at 17:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
14/06/2021	Breeding Walkover Survey	500m Buffer	1:00 starting at 15:00	Visibility: good; Wind speed and direction: fresh breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
14/06/2021	Breeding Walkover Survey	500m Buffer	4:00 starting at 17:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
15/06/2021	Breeding Walkover Survey	500m Buffer	4:00 starting at 15:00	Visibility: moderate; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
16/06/2021	Breeding Walkover Survey	500m Buffer	3:00 starting at 17:00	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
08/07/2021	Breeding Walkover Survey	500m buffer	3:00 starting at 14:00	Visibility: moderate; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
09/07/2021	Breeding Walkover Survey	500m buffer	2:00 starting at 16:00	Visibility: poor; Wind speed and direction: light breeze E; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
13/07/2021	Breeding Walkover Survey	500m buffer	6:00 starting at 13:00	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
14/07/2021	Breeding Walkover Survey	500m buffer	6:00 starting at 12:15	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		AOD
15/07/2021	Breeding Walkover Survey	500m buffer	4:00 starting at 13:00	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
16/07/2021	Breeding Walkover Survey	500m buffer	3:00 starting at 16:30	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD

Table 3 Breeding Raptor Survey Effort

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
09/04/2021	Breeding Raptor Survey	BRVP1	3:00 starting at 10:50	Visibility: good; Wind speed and direction: light breeze N; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none	HH pair, skydancing	RV
12/04/2021	Breeding Raptor Survey	BRVP10	3:00 starting at 14:30	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	SH, BZ	RV
12/04/2021	Breeding Raptor Survey	BRVP2	3:00 starting at 07:30	Visibility: poor; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none	Male HH	RV
12/04/2021	Breeding Raptor Survey	BRVP6	3:00 starting at 11:00	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none	BZ	RV
20/04/2021	Breeding Raptor Survey	BR_HHVP4	3:00 starting at 08:05	Visibility: good; Wind speed and direction: gentle breeze N; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none	SH, BZ I used the HHVP4 as a breeding VP as it gave a good view over a wide area where I thought I would see the comings and goings of Buzzard, Harriers etc.	RV
20/04/2021	Breeding Raptor Survey	BRVP9	2:10 starting at 15:05	Visibility: good; Wind speed and direction: gentle breeze N; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none	Chipping SN	RV
20/04/2021	Breeding Raptor Survey	T1	3:00 starting at 11:35	Visibility: poor; Wind speed and direction: moderate breeze N-NE; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none	Increasing Rain. It was just one transect, I included a map of it where I broke down the locations for all sightings, including meadow pipits.	RV
28/04/2021	Breeding Raptor Survey	BRVP1	6:30 starting at 13:10	Visibility: good; Wind speed and direction: gentle breeze N; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none	Imm and ad Male HH	RV
28/04/2021	Breeding Raptor Survey	5KM Wider Area Survey	3:00 starting at 09:30	Visibility: good; Wind speed and direction: gentle breeze N-NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		RV
29/04/2021	Breeding Raptor Survey	BRVP2	6:45 starting at 08:45	Visibility: good; Wind speed and direction: gentle breeze N-NE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none	Male and Female HH	RV

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
29/04/2021	Breeding Raptor Survey	5KM Wider Area Survey	3:00 starting at 16:15	Visibility: moderate; Wind speed and direction: gentle breeze N-NE; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none	Some heavy showers	RV
17/05/2021	Breeding Raptor Survey	BRVP1	3:00 starting at 13:45	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 3% >500m; Rain: none; Frost: none; Snow: none	Male and female HH	RV
17/05/2021	Breeding Raptor Survey	BRVP5	3:00 starting at 17:15	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none	RG, heavy shower towards end	RV
21/05/2021	Breeding Raptor Survey	Thur MT	3:00 starting at 11:15	Visibility: good; Wind speed and direction: moderate breeze N; Cloud cover and height: 3% 150-500m; Rain: light showers; Frost: none; Snow: none	HH, ML and 2 BZ seen	RV
23/05/2021	Breeding Raptor Survey	Wider area	3:00 starting at 11:20	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 2% >500m; Rain: drizzle; Frost: none; Snow: none	SE of site.	RV
25/05/2021	Breeding Raptor Survey	Wider area	3:00 starting at 10:15	Visibility: good; Wind speed and direction: light breeze N-NW; Cloud cover and height: 2% >500m; Rain: drizzle; Frost: none; Snow: none	NE of site, male HH seen	RV
25/05/2021	Breeding Raptor Survey	Nest 2	6:30 starting at 14:00	Visibility: good; Wind speed and direction: moderate breeze N-NW; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none	Male and female HH seen, no fixed nest location found	RV
28/05/2021	Breeding Raptor Survey	Wider area	3:00 starting at 11:10	Visibility: good; Wind speed and direction: light air W; Cloud cover and height: 3% >500m; Rain: none; Frost: none; Snow: none	BZ, male and female HH at nest 1	RV
30/05/2021	Breeding Raptor Survey	Nest 1	6:30 starting at 05:20	Visibility: good; Wind speed and direction: light breeze S-SE; Cloud cover and height: 1% >500m; Rain: none; Frost: none; Snow: none	Male HH seen, preening by nest for long period	RV
30/05/2021	Breeding Raptor Survey	Nest 2	3:00 starting at 12:20	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none	Walked 2020 nest valley searched from various Vps	RV
31/05/2021	Breeding Raptor Survey	Nest 2	3:00 starting at 08:20	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none	RG latrine found, no HH sightings	RV
13/06/2021	Breeding Raptor Survey	BRVP5	3:00 starting at 08:05	Visibility: good; Wind speed and direction: moderate breeze S-SW; Cloud cover and height: 1% >500m; Rain: none; Frost: none; Snow: none	Snipe displaying	RV
13/06/2021	Breeding Raptor Survey	RVP5	3:00 starting at 08:05	Visibility: good; Wind speed and direction: moderate breeze S-SW; Cloud cover and height: 1% >500m; Rain: none; Frost: none; Snow: none	Snipe displaying	RV
14/06/2021	Breeding Raptor Survey	Thur Mt.	3:00 starting at 12:45	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 3% >500m; Rain: none; Frost: none; Snow: none	Snipe displaying	RV

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
16/06/2021	Breeding Raptor Survey	Wider area	3:00 starting at 12:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 3% >500m; Rain: none; Frost: none; Snow: none	Buzzard	RV
21/06/2021	Breeding Raptor Survey	Wider area	3:00 starting at 12:30	Visibility: good; Wind speed and direction: moderate breeze N; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none	HH pair at nest 1, SH with prey	RV
24/06/2021	Breeding Raptor Survey	Wider area	3:00 starting at 06:00	Visibility: good; Wind speed and direction: light breeze W-SW; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none	Gull search around town	RV
24/06/2021	Breeding Raptor Survey	VP3/RVP5 area	3:00 starting at 09:30	Visibility: poor; Wind speed and direction: gentle breeze W-NW; Cloud cover and height: 3% 150-500m; Rain: light showers; Frost: none; Snow: none	Miserable conditions	RV
24/06/2021	Breeding Raptor Survey	RVP1	3:00 starting at 13:00	Visibility: moderate; Wind speed and direction: gentle breeze W-NW; Cloud cover and height: 3% 150-500m; Rain: heavy showers; Frost: none; Snow: none	Miserable conditions	RV
28/06/2021	Breeding Raptor Survey	Nest1	6:30 starting at 05:00	Visibility: good; Wind speed and direction: gentle breeze N; Cloud cover and height: 3% >500m; Rain: none; Frost: none; Snow: none	Male HH delivered food during break	RV
28/06/2021	Breeding Raptor Survey	Transect	3:00 starting at 12:00	Visibility: good; Wind speed and direction: gentle breeze N; Cloud cover and height: 3% 150-500m; Rain: drizzle; Frost: none; Snow: none	Walked around nest 2 area	RV
29/06/2021	Breeding Raptor Survey	Nest 2	6:30 starting at 07:45	Visibility: good; Wind speed and direction: light breeze N; Cloud cover and height: 3% >500m; Rain: none; Frost: none; Snow: none	Overlooked nest 2 valley	RV
21/07/2021	Breeding Raptor Survey	Nest 2	6:30 starting at 05:45	Visibility: good; Wind speed and direction: light breeze E-NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	SH and Female HH seen	RV
21/07/2021	Breeding Raptor Survey	Nest 2	3:00 starting at 12:55	Visibility: good; Wind speed and direction: light breeze E-NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	SH and Pine Marten seen	RV
23/07/2021	Breeding Raptor Survey	Nest 1	6:30 starting at 05:30	Visibility: good; Wind speed and direction: light breeze E-SE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Male and Female HH on site.	RV
23/07/2021	Breeding Raptor Survey	Nest 1 area	3:00 starting at 12:30	Visibility: good; Wind speed and direction: light breeze E-SE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Female HH seen twice	RV
29/07/2021	Breeding Raptor Survey	Nest 3	3:00 starting at 05:45	Visibility: good; Wind speed and direction: gentle breeze W-NW; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none	Juv HH seen twice	RV
29/07/2021	Breeding Raptor Survey	RVP5	2:00 starting at 09:15	Visibility: good; Wind speed and direction: gentle breeze W-NW; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none	Male HH seen distantly near nest 3	RV
29/07/2021	Breeding Raptor Survey	Nest 1	2:30 starting at 11:20	Visibility: good; Wind speed and direction: gentle breeze W-NW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none	Male and Female HH on site.	RV

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
29/07/2021	Breeding Raptor Survey	Nest 3	2:00 starting at 14:10	Visibility: good; Wind speed and direction: gentle breeze W-NW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none	Male and Female seen,1+ juvenile heard,	RV
03/08/2021	Breeding Raptor Survey	Nest 3	0:30 starting at 06:15	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	2 Juveniles flying around nest area	RV
03/08/2021	Breeding Raptor Survey	Nest 1	5:20 starting at 07:00	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none	Male and Female HH on site.	RV
03/08/2021	Breeding Raptor Survey	Nest 3	4:30 starting at 12:35	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Male, Female and 2 Juveniles seen	RV
16/08/2021	Breeding Raptor Survey	HHBVP1	1:00 starting at 15:00	Visibility: good; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
16/08/2021	Breeding Raptor Survey	HHBVP2	2:00 starting at 16:00	Visibility: good; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
18/08/2021	Breeding Raptor Survey	HHBVP1	3:00 starting at 13:00	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD
18/08/2021	Breeding Raptor Survey	HHBVP2	3:00 starting at 16:00	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		AOD
19/08/2021	Breeding Raptor Survey	HHBVP1	3:00 starting at 09:30	Visibility: moderate; Wind speed and direction: light air W; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD

Table 4 Breeding Woodcock Survey Effort

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
12/05/2021	Breeding Woodcock Survey	2km buffer	2:00 starting at 20:30	Visibility: good; Wind speed and direction: light air W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
13/05/2021	Breeding Woodcock Survey	2km buffer	2:00 starting at 20:30	Visibility: good; Wind speed and direction: light air SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
04/06/2021	Breeding Woodcock Survey	2km Buffer	2:00 starting at 20:30	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
08/06/2021	Breeding Woodcock Survey	2km Buffer	2:00 starting at 20:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
14/06/2021	Breeding Woodcock Survey	2km Buffer	2:00 starting at 21:05	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
16/06/2021	Breeding Woodcock Survey	2km Buffer	2:00 starting at 21:05	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD

Table 5 Vantage Point Survey Data

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
GP016	VP01	02/04/2021	15:02	Golden Plover	22	143	0	55	88	0	upland blanket bog; flying, calling and circling	RV
GP017	VP01	02/04/2021	15:29	Golden Plover	22	63	0	0	63	0	upland blanket bog; flying, calling and circling	RV
BZ137	VP01	02/04/2021	15:52	Buzzard	1	216	0	45	171	0	improved agricultural grassland; circling, circling	RV
BZ138	VP01	02/04/2021	16:21	Buzzard	1	18	0	18	0	0	improved agricultural grassland; flying, flying, landed, flying	RV
GP018	VP01	02/04/2021	19:05	Golden Plover	75	1260	0	575	685	0	upland blanket bog; flying, circling and calling	RV
GP019	VP01	02/04/2021	19:32	Golden Plover	75	435	0	85	350	0	upland blanket bog; flying, circling and calling	RV
BZ139	VP01	02/04/2021	16:21	Buzzard	1	-	-	-	-	-	improved agricultural grassland and eroding/upland rivers; perched, 1440 s, landed in tree over stream	RV
MP001	VP1	02/04/2021		Meadow Pipit	8	-	-	-	-	-	upland blanket bog; displaying and singing within 100 metres of VP, most sighting close to VP	RV
SN023	VP01	02/04/2021	18:08	Snipe	1	7	7	0	0	0	upland blanket bog; flying, flushed on walk to VP	RV
MP002	VP2	09/04/2021		Meadow Pipit	7	-	-	-	-	-	raised bog; displaying and singing within 100 metres of vp, most sighting close to vp	RV
SN024	VP02	09/04/2021	20:58	Snipe	1	9	0	0	9	0	upland blanket bog; flying, flying	RV
BZ140	VP03	22/04/2021	15:57	Buzzard	2	524	0	0	524	0	upland blanket bog; circling, circling, adult and immature, immature flew low across site from 1605	RV
BZ141	VP03	22/04/2021	16:55	Buzzard	1	420	0	0	420	0	upland blanket bog; circling, circling	RV
BZ142	VP03	22/04/2021	19:24	Buzzard	1	240	0	240	0	0	upland blanket bog and conifer plantation; hunting, hunting	RV
MP003	VP3	22/04/2021		Meadow Pipit	7	-	-	-	-	-	raised bog; displaying and singing within 100 metres of vp, most sighting close to vp	RV
BZ143	VP04	24/04/2021	16:09	Buzzard	1	580	0	0	580	0	conifer plantation; hunting, hunting, lost when hen harrier arrived	RV
LB019	VP04	24/04/2021	18:56	Lesser Black-backed Gull	4	51	0	0	51	0	upland blanket bog and conifer plantation; flying, flying	RV

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
BZ144	VP04	24/04/2021	19:11	Buzzard	1	375	0	0	375	0	improved agricultural grassland and conifer plantation; hunting, hunting and circling	RV
MP004	VP4	24/04/2021		Meadow Pipit	7	-	-	-	-	-	raised bog and conifer plantation; displaying and singing within 100 metres of vp, most sighting close to vp	RV
SH031	VP1	21/05/2021	08:34	Sparrowhawk	1	19	0	19	0	0	conifer plantation and scrub; circling, male circling stream and flew down hill	RV
SH032	VP1	21/05/2021	09:57	Sparrowhawk	1	26	0	26	0	0	conifer plantation; circling, male circling quickly low over plantation	RV
BZ145	VP1	21/05/2021	10:21	Buzzard	1	17	5	12	0	0	conifer plantation and semi-natural grassland; flying, flew from plantation out of view along road	RV
MP005	VP1	21/05/2021	04:15	Meadow Pipit	7	-	-	-	-	-	upland blanket bog; 4 pairs close to vp, singing and displaying	RV
MP006	VP2	23/05/2021	04:10	Meadow Pipit	13	-	-	-	-	-	upland blanket bog and scrub; 5 pairs close to vp, another mobbing hen harrier, singing and displaying	RV
SN025	VP2	23/05/2021	08:42	Snipe	1	-	-	-	-	-	upland blanket bog; displaying, heard not seen	RV
BZ146	VP3	24/05/2021	09:46	Buzzard	1	134	0	44	90	0	cutover bog; circling, circling along plantation edge	RV
MP007	VP3	24/05/2021	04:10	Meadow Pipit	11	-	-	-	-	-	upland blanket bog; 5 pairs close to vp, singing and displaying	RV
SN026	VP3	24/05/2021	04:24	Snipe	1	5	0	5	0	0	upland blanket bog; displaying, displaying, silhouetted briefly over vp	RV
SN027	VP3	24/05/2021	05:06	Snipe	1	10	0	10	0	0	upland blanket bog; displaying, displaying, flew over and landed, also heard 05:11, 05:19, 06:25, 06:29 but not seen.	RV
SN028	VP3	24/05/2021	04:20	Snipe	1	-	-	-	-	-	upland blanket bog; displaying, heard not seen	RV
MP008	VP4	28/05/2021	04:05	Meadow Pipit	6	-	-	-	-	-	conifer plantation, scrub and semi-natural grassland; at least 4 pairs close to vp, singing and displaying	RV
MP009	3	13/06/2021	11:35	Meadow Pipit	4	-	-	-	-	-	upland blanket bog; 4 pairs close to vp, singing and displaying	RV
MP010	1	14/06/2021	05:45	Meadow Pipit	9	-	-	-	-	-	upland blanket bog; 4-5 pairs close to vp, singing and displaying- not mapped	RV

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
MP011	2	16/06/2021	05:30	Meadow Pipit	8	-	-	-	-	-	upland blanket bog; 4 pairs close to vp, singing and displaying	RV
SN029	VP2	16/06/2021	05:45	Snipe	1	-	-	-	-	-	present	RV
BZ147	VP4	21/06/2021	09:14	Buzzard	1	14		14			semi-natural grassland and scrub; flying, flew across rough area behind vp	RV
BZ148	VP4	21/06/2021	11:20	Buzzard	1	149		15	134		conifer plantation and semi-natural grassland; circling, circling and hovering	RV
MP012	4	21/06/2021	05:30	Meadow Pipit	5	-	-	-	-	-	conifer plantation, scrub and semi-natural grassland; 5 birds singing and displaying close to vp, singing and displaying	RV
BZ149	VP1	02/07/2021	13:40	Buzzard	1	70	0	70	0	0	conifer plantation; travelling	AOD
BZ150	VP1	02/07/2021	13:20	Buzzard	2	280	0	100	180	0	improved agricultural grassland; soaring	AOD
MP013	VP2	09/07/2021	14:21	Meadow Pipit	12	-	-	-	-	-	wet grassland; fly/display, across area high count	AOD
BZ151	VP2	09/07/2021	15:34	Buzzard	1	-	-	-	-	-	conifer plantation; call, call unseen	AOD
SH033	VP3	16/07/2021	15:45	Sparrowhawk	1	190	0	0	90	100	conifer plantation and montane heath; soaring, female soaring from site. mobbed by sand martin	AOD
MP014	VP3	16/07/2021	14:12	Meadow Pipit	7	-	-	-	-	-	montane heath; fly	AOD
K.053	VP3	20/07/2021	08:38	Kestrel	1	200	0	150	50	0	conifer plantation; foraging/perched, juvenile bird. foraging flying perch to perch	AOD
BZ152	VP3	20/07/2021	09:41	Buzzard	1	80	0	0	80	0	conifer plantation; soaring, soaring	AOD
BZ153	VP4	21/07/2021	13:50	Buzzard	1	360	0	100	100	160	conifer plantation; soaring, soaring	AOD
BZ154	VP4	21/07/2021	17:00	Buzzard	1	90	0	0	90	0	conifer plantation and montane heath; soaring/calling, adult soaring and calling	AOD
SI001	VP4	21/07/2021	16:35	Swift	2	-	-	-	-	-	conifer plantation; feeding, over site at pch and above	AOD
K.054	VP3	11/08/2021	14:28	Kestrel	1	380	380	-	-	-	wet grassland and dry siliceous heath; hunting and travelling, female kestrel seen hunting over the moor, which flew in and hovered very close to the vp.	LD
K.055	VP3	11/08/2021	14:58	Kestrel	1	50	50	-	-	-	wet grassland and dry siliceous heath; hunting and travelling, kestrel hunting again over the moor, flying west out of view.	LD
LB020	VP3	11/08/2021	18:20	Lesser Black-backed Gull	2	28	3	25	-	-	wet grassland, conifer plantation and lakes and ponds; travelling, two lesser black-	LD

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
											backed gull's flying along way off, heading towards the lough.	
MP015	VP3	11/08/2021	18:30	Meadow Pipit	4	10	10	-	-	-	wet grassland, dry siliceous heath and lakes and ponds; travelling, pipit's on site.	LD
BZ155	VP4	16/08/2021	08:08	Buzzard	1	34	4	30			wet grassland and conifer plantation; hunting and travelling, buzzard seen hunting and travelling behind the vp.	LD
BZ156	VP4	16/08/2021	10:12	Buzzard	1	50	2	48			wet grassland and conifer plantation; hunting, probable second buzzard hunting high, and further afield to the north.	LD
GL001	VP4	16/08/2021	10:29	Grey Wagtail	1	15	15				wet grassland, conifer plantation and lakes and ponds; travelling, grey wag travelling in flight.	LD
MP016	VP3	16/08/2021	12:00	Meadow Pipit	4	10	10	-	-	-	wet grassland, and lakes and ponds; travelling, mipit's on site.	LD
MP017	VP1	25/08/2021	16:00	Meadow Pipit	4	10	10	-	-	-	wet grassland, and lakes and ponds; travelling, pipit's on site.	LD
BZ157	VP2	26/08/2021	13:49	Buzzard	1	64	6	58			wet grassland and conifer plantation; hunting, buzzard seen hunting around the edge of farmland and forestry.	LD
MP018	VP1	26/08/2021		Meadow Pipit	4	10	10	-	-	-	wet grassland; travelling, pipit's on site.	LD
BZ158	VP2	26/08/2021	13:47	Buzzard	1	-	-	-	-	-	wet grassland and conifer plantation; calling, buzzard heard calling from farmland and conifers.	LD
BZ159	VP2	26/08/2021	13:48	Buzzard	1	-	-	-	-	-	wet grassland and conifer plantation; calling, buzzard heard calling from farmland and conifers.	LD
MP019	VP2	01/09/2021	16:25	Meadow Pipit	28	-	-	-	-	-	montane heath; fly, flock max	AOD
MP020	VP3	02/09/2021	18:38	Meadow Pipit	10	-	-	-	-	-	montane heath; fly, max flock	AOD
RG052	VP3	02/09/2021	20:37	Red Grouse	1	-	-	-	-	-	montane heath; call, call unseen	AOD
SN030	VP3	02/09/2021	21:15	Snipe	2	5	5	0	0	0	montane heath; fly, 2 flew over	AOD
RG053	VP3	02/09/2021	21:11	Red Grouse	2	-	-	-	-	-	montane heath; call, call	AOD
SH034	VP1	09/09/2021	17:03	Sparrowhawk	1	15	0	15	0	0	conifer plantation; flying, immature male	AOD

Table 6 Breeding Walkover Survey Data

Ref.	Date	Time	Transect	Species	Number	Habitat and activity	Surveyor
MP123	02/04/2021	12:16		Meadow Pipit	5	montane heath; f (distraction display; confirmed breeding)	AOD
BZ028	02/04/2021	12:34		Buzzard	1	montane heath and conifer plantation; f, soaring over site (flyover; non-breeding)	AOD
LB010	02/04/2021	12:22		Lesser Black-backed Gull	1	montane heath; f, adult flying over (flyover; non-breeding)	AOD
MP124	02/04/2021	13:20		Meadow Pipit	6	montane heath; f (flyover; non-breeding)	AOD
MP125	02/04/2021	13:21		Meadow Pipit	2	montane heath; f (flyover; non-breeding)	AOD
LB011	02/04/2021	13:49		Lesser Black-backed Gull	2	conifer plantation; f, adult pair travelling low (flyover; non-breeding)	AOD
BZ029	02/04/2021	15:28		Buzzard	3	montane heath and conifer plantation; f, 3 soaring one bird displaying (distraction display; confirmed breeding)	AOD
MP126	02/04/2021	15:29		Meadow Pipit	4	montane heath; f (flyover; non-breeding)	AOD
MP127	02/04/2021	15:46		Meadow Pipit	2	montane heath; d (courtship and display; probable breeding)	AOD
MP128	02/04/2021	16:30		Meadow Pipit	2	montane heath; f (suitable nesting habitat; possible breeder)	AOD
MP129	02/04/2021	16:31		Meadow Pipit	1	montane heath; f (courtship and display; probable breeding)	AOD
MP130	06/04/2021	09:49		Meadow Pipit	2	upland blanket bog; f (suitable nesting habitat; possible breeder)	AOD
MP131	06/04/2021	09:57		Meadow Pipit	1	montane heath; f (suitable nesting habitat; possible breeder)	AOD
MP132	06/04/2021	10:06		Meadow Pipit	1	montane heath; f (suitable nesting habitat; possible breeder)	AOD
MP133	06/04/2021	10:48		Meadow Pipit	3	montane heath; f (suitable nesting habitat; possible breeder)	AOD
SH018	06/04/2021	11:08		Sparrowhawk	1	conifer plantation; f, female quick flight (suitable nesting habitat; possible breeder)	AOD
K010	06/04/2021	11:48		Kestrel	1	conifer plantation; f, hovering over.no age/sex (suitable nesting habitat; possible breeder)	AOD
MP134	06/04/2021	12:29		Meadow Pipit	4	montane heath; f (suitable nesting habitat; possible breeder)	AOD
MP135	06/04/2021	12:29		Meadow Pipit	3	montane heath; f, spread across area (suitable nesting habitat; possible breeder)	AOD
BZ030	06/04/2021	13:06		Buzzard	1	conifer plantation; r, perched then flew (suitable nesting habitat; possible breeder)	AOD
ML002	06/04/2021	13:59		Merlin	1	conifer plantation; flying, male in flight high on wind. rare for site. flew west (suitable nesting habitat; possible breeder)	AOD
MP136	06/04/2021	14:00		Meadow Pipit	1	conifer plantation; f (suitable nesting habitat; possible breeder)	AOD
MP137	07/04/2021	10:48		Meadow Pipit	7	montane heath; f, across area (suitable nesting habitat; possible breeder)	AOD
MP138	07/04/2021	10:49		Meadow Pipit	9	montane heath; f, across area (suitable nesting habitat; possible breeder)	AOD
MP139	07/04/2021	10:50		Meadow Pipit	4	montane heath; f, across area (suitable nesting habitat; possible breeder)	AOD
MP140	07/04/2021	11:03		Meadow Pipit	2	montane heath; f (suitable nesting habitat; possible breeder)	AOD

Ref.	Date	Time	Transect	Species	Number	Habitat and activity	Surveyor
MP141	07/04/2021	11:42		Meadow Pipit	4	montane heath; f (suitable nesting habitat; possible breeder)	AOD
MP142	07/04/2021	11:42		Meadow Pipit	3	montane heath; f (suitable nesting habitat; possible breeder)	AOD
MP143	07/04/2021	11:42		Meadow Pipit	2	montane heath; f (suitable nesting habitat; possible breeder)	AOD
MP144	07/04/2021	12:57		Meadow Pipit	6	wet grassland; f, across area (suitable nesting habitat; possible breeder)	AOD
LB012	07/04/2021	13:03		Lesser Black-backed Gull	2	wet grassland; r, two adults perched in sheep field (flyover; non-breeding)	AOD
BZ031	07/04/2021	13:09		Buzzard	1	conifer plantation; f, soaring and calling several mins. (suitable nesting habitat; possible breeder)	AOD
MP145	07/04/2021	13:10		Meadow Pipit	5	wet grassland; f, across area (suitable nesting habitat; possible breeder)	AOD
BZ032	08/04/2021	11:42		Buzzard	2	conifer plantation; display, pair display flight/calling near 2020 nest site (courtship and display; probable breeding)	AOD
GL009	08/04/2021	13:28		Grey Wagtail	2	wet grassland; f, pair (suitable nesting habitat; possible breeder)	AOD
MP146	08/04/2021	13:54		Meadow Pipit	5	wet grassland; f, across area (suitable nesting habitat; possible breeder)	AOD
RN003	08/04/2021	14:16		Raven	26	wet grassland; f, large flock on dead sheep (suitable nesting habitat; possible breeder)	AOD
MP147	08/04/2021	14:17		Meadow Pipit	3	wet grassland; f (suitable nesting habitat; possible breeder)	AOD
BZ033	08/04/2021	14:17		Buzzard	1	mixed broadleaved/conifer woodland and wet grassland; f, mobbed by raven (suitable nesting habitat; possible breeder)	AOD
LB013	08/04/2021	14:56		Lesser Black-backed Gull	2	wet grassland; f, 2 immature flying over (flyover; non-breeding)	AOD
MP148	08/04/2021	14:57		Meadow Pipit	1	montane heath; f (suitable nesting habitat; possible breeder)	AOD
MP149	08/04/2021	17:43		Meadow Pipit	3	montane heath; f (suitable nesting habitat; possible breeder)	AOD
MP150	08/04/2021	17:43		Meadow Pipit	1	montane heath; d (courtship and display; probable breeding)	AOD
MA001	10/05/2021	16:14		Mallard	1	conifer plantation and upland blanket bog; on nest flushed, female on eggs in heather in forestry (nest with eggs; confirmed breeding)	AOD
SH019	11/05/2021	15:15		Sparrowhawk	1	conifer plantation and upland blanket bog; flew, male flew from suitable nest area.no nest found (suitable nesting habitat; possible breeder)	AOD
RG008	11/05/2021	16:32		Red Grouse	1	upland blanket bog; call, call (suitable nesting habitat; possible breeder)	AOD
MP151	12/05/2021	17:05		Meadow Pipit	7	wet grassland; fly, across area (suitable nesting habitat; possible breeder)	AOD
LB014	12/05/2021	17:13		Lesser Black-backed Gull	1	conifer plantation; flying over, adult (flyover; non-breeding)	AOD
MP152	12/05/2021	17:18		Meadow Pipit	3	wet grassland; fly (suitable nesting habitat; possible breeder)	AOD
MP153	17/05/2021	15:54		Meadow Pipit	4	montane heath; fly (suitable nesting habitat; possible breeder)	AOD
GL010	17/05/2021	16:26		Grey Wagtail	2	wet grassland; feeding (adult carrying food/faecal sac; confirmed breeding)	AOD

Ref.	Date	Time	Transect	Species	Number	Habitat and activity	Surveyor
MP154	17/05/2021	16:34		Meadow Pipit	2	wet grassland; fly (adult carrying food/faecal sac; confirmed breeding)	AOD
SH020	06/05/2021	13:41		Sparrowhawk	1	upland blanket bog; foraging, female foraging (suitable nesting habitat; possible breeder)	AOD
MP155	06/05/2021	13:42		Meadow Pipit	8	upland blanket bog; fly, across area (suitable nesting habitat; possible breeder)	AOD
MP156	06/05/2021	14:43		Meadow Pipit	6	upland blanket bog; fly, across area (suitable nesting habitat; possible breeder)	AOD
MP157	06/05/2021	15:45		Meadow Pipit	6	wet grassland and conifer plantation; fly (suitable nesting habitat; possible breeder)	AOD
MP158	10/05/2021	15:14		Meadow Pipit	8	upland blanket bog; fly (suitable nesting habitat; possible breeder)	AOD
MP159	10/05/2021	15:15		Meadow Pipit	6	upland blanket bog; fly (suitable nesting habitat; possible breeder)	AOD
MP160	11/05/2021	16:16		Meadow Pipit	8	upland blanket bog; fly (suitable nesting habitat; possible breeder)	AOD
MP161	11/05/2021	16:22		Meadow Pipit	4	upland blanket bog; fly (suitable nesting habitat; possible breeder)	AOD
LB015	11/05/2021	17:06		Lesser Black-backed Gull	1	conifer plantation; fly, adult (flyover; non-breeding)	AOD
MP162	17/05/2021	18:33		Meadow Pipit	5	upland blanket bog; fly (suitable nesting habitat; possible breeder)	AOD
MP163	02/06/2021	18:16		Meadow Pipit	7	montane heath; fly (suitable nesting habitat; possible breeder)	AOD
MP164	02/06/2021	17:56		Meadow Pipit	6	montane heath; fly (suitable nesting habitat; possible breeder)	AOD
MP165	02/06/2021	17:17		Meadow Pipit	5	wet grassland; fly (courtship and display; probable breeding)	AOD
LB016	08/06/2021	20:11		Lesser Black-backed Gull	2	conifer plantation; flying, adults flying over (flyover; non-breeding)	AOD
BZ034	08/06/2021	20:28		Buzzard	1	conifer plantation; flying, soaring low over wd4 (suitable nesting habitat; possible breeder)	AOD
BZ035	14/06/2021	16:14		Buzzard	1	wet grassland; flying, flying low (suitable nesting habitat; possible breeder)	AOD
SN014	14/06/2021	20:32		Snipe	1	conifer plantation and cutover bog; drumming, drumming (courtship and display; probable breeding)	AOD
MP166	15/06/2021	17:25		Meadow Pipit	4	wet grassland; fly, across area (suitable nesting habitat; possible breeder)	AOD
MP167	15/06/2021	17:26		Meadow Pipit	3	wet grassland; fly (suitable nesting habitat; possible breeder)	AOD
MP168	16/06/2021	17:23		Meadow Pipit	4	montane heath; fly (courtship and display; probable breeding)	AOD
MP169	16/06/2021	19:58		Meadow Pipit	10	montane heath; f (suitable nesting habitat; possible breeder)	AOD
MP170	04/06/2021	18:11		Meadow Pipit	3	upland blanket bog; fly (suitable nesting habitat; possible breeder)	AOD
MP171	08/06/2021	17:31		Meadow Pipit	9	upland blanket bog; fly (suitable nesting habitat; possible breeder)	AOD
MP172	02/06/2021	18:32		Meadow Pipit	10	upland blanket bog; fly (suitable nesting habitat; possible breeder)	AOD
MP173	16/06/2021	17:33		Meadow Pipit	10	montane heath; fly (suitable nesting habitat; possible breeder)	AOD
RG009	08/06/2021	17:34		Red Grouse	1	montane heath; flushed, flushed (suitable nesting habitat; possible breeder)	AOD

Ref.	Date	Time	Transect	Species	Number	Habitat and activity	Surveyor
SH021	21/07/2021	13:04		Sparrowhawk	1	eroding/upland rivers, conifer plantation and recently-felled woodland; circling, male singing, circling 13:04 ()	RV
MP174	21/07/2021	12:55		Meadow Pipit	10	upland blanket bog and scrub; displaying and feeding at 6 locations, rough numbers and locations mapped (agitated behaviour; probable breeding)	RV
MP175	23/07/2021	15:00		Meadow Pipit	3	semi-natural grassland; feeding, 3 feeding along roadside ()	RV
SN015	08/07/2021	17:12		Snipe	1	conifer plantation; fly, fly over high (suitable nesting habitat; possible breeder)	AOD
MP176	08/07/2021	17:13		Meadow Pipit	6	conifer plantation; fly (suitable nesting habitat; possible breeder)	AOD
WH003	08/07/2021	17:13		Whitethroat	3	wet grassland; fly, wheatears inc fledglings (fledged young; confirmed breeding)	AOD
BZ036	13/07/2021	15:12		Buzzard	1	conifer plantation; flying, flying low over wd4 (suitable nesting habitat; possible breeder)	AOD
SN016	13/07/2021	15:51		Snipe	1	montane heath; call, calling unseen (suitable nesting habitat; possible breeder)	AOD
RG010	13/07/2021	17:10		Red Grouse	1	montane heath; call, call unseen (suitable nesting habitat; possible breeder)	AOD
SI001	13/07/2021	17:12		Swift	3	conifer plantation; foraging, feeding high (flyover; non-breeding)	AOD
MP177	13/07/2021	16:13		Meadow Pipit	7	montane heath; f (suitable nesting habitat; possible breeder)	AOD
MP178	13/07/2021	17:13		Meadow Pipit	6	montane heath; fly (suitable nesting habitat; possible breeder)	AOD
H.001	13/07/2021	17:28		Grey Heron	1	conifer plantation; flying over, adult travelling high (flyover; non-breeding)	AOD
SH022	14/07/2021	13:49		Sparrowhawk	2	conifer plantation and scrub; carrying prey/juv, male flew in with prey. fledgling flew from 2020 nest area to follow male ne. (fledged young; confirmed breeding)	AOD
MP179	14/07/2021	15:29		Meadow Pipit	8	montane heath; fly/display (courtship and display; probable breeding)	AOD
MP180	14/07/2021	15:30		Meadow Pipit	4	montane heath; fly (suitable nesting habitat; possible breeder)	AOD
GB001	15/07/2021	13:56		Great Black-backed Gull	1	montane heath; fly, adult flying over (flyover; non-breeding)	AOD
MP181	15/07/2021	14:44		Meadow Pipit	8	montane heath; fly (courtship and display; probable breeding)	AOD
MP182	15/07/2021	16:43		Meadow Pipit	3	montane heath; fly (suitable nesting habitat; possible breeder)	AOD
MP183	16/07/2021	16:43		Meadow Pipit	3	wet grassland; fly (suitable nesting habitat; possible breeder)	AOD
BZ037	16/07/2021	16:46		Buzzard	1	improved agricultural grassland and conifer plantation; soaring, soaring (suitable nesting habitat; possible breeder)	AOD
MP184	16/07/2021	17:36		Meadow Pipit	4	montane heath; fly (suitable nesting habitat; possible breeder)	AOD

Table 7 Breeding Raptor Survey Data

Ref.	BR	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
BZ106	BRVP1	09/04/2021	12:22	Buzzard	2	upland blanket bog and conifer plantation, circling, pair circling behind hen harrier	pair; probable breeding	RV
BZ107	BRVP6	12/04/2021	11:43	Buzzard	1	improved agricultural grassland, flying, flew across field	suitable nesting habitat; possible breeder	RV
SH028	BRVP10	12/04/2021	14:58	Sparrowhawk	1	scrub and improved agricultural grassland, preening and hunting, preening then chased meadow pipit	suitable nesting habitat; possible breeder	RV
BZ108	BRVP10	12/04/2021	15:55	Buzzard	1	improved agricultural grassland and conifer plantation, flying, flew across field	suitable nesting habitat; possible breeder	RV
BZ109	BRVP10	12/04/2021	16:45	Buzzard	2	improved agricultural grassland and conifer plantation, circling, pair circling together	pair; probable breeding	RV
SH029	BRVP10	12/04/2021	14:58	Sparrowhawk	1	scrub, male preening, in tree preening 1200s		RV
SH030	BRHHVP4	20/04/2021	10:54	Sparrowhawk	1	improved agricultural grassland and scrub, flying, flying across field	suitable nesting habitat; possible breeder	RV
BZ110	BRHHVP4	20/04/2021	11:02	Buzzard	1	scrub, calling, calling from plantation	suitable nesting habitat; possible breeder	RV
BZ111	BRHHVP4	20/04/2021	11:02	Buzzard	1	conifer plantation, heard, heard calling		RV
BZ112	BRHHN2	29/04/2021	10:45	Buzzard	2	conifer plantation, circling, adult and immature	permanent territory; probable breeding	RV
SH031	BRHHN2	29/04/2021	15:24	Sparrowhawk	1	conifer plantation and scrub, flying, male flew over	suitable nesting habitat; possible breeder	RV
ML001		21/05/2021	11:36	Merlin	1	upland blanket bog and conifer plantation, flying, male chasing 2 hooded crow		RV
BZ113		21/05/2021	12:10	Buzzard	2	upland blanket bog and conifer plantation, circling, 2 buzzard circling together		RV
BZ114		21/05/2021	14:04	Buzzard	2	upland blanket bog and conifer plantation, circling, 2 buzzard circling together		RV
BZ115		28/05/2021	11:55	Buzzard	1	semi-natural grassland and conifer plantation, flying, buzzard flew from tree to plantation		RV
BZ116	BRVP	16/06/2021	15:14	Buzzard	1	scrub, hunting, hunting over scrub		RV
SH032	BRVP	21/06/2021	13:32	Sparrowhawk	1	conifer plantation, with prey, male circling with prey		RV

Ref.	BR	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
SH033	BRVP	28/06/2021	00:00	Sparrowhawk	1	scrub, flying, female low along road		RV
SH034	BRHH2	21/07/2021	07:11	Sparrowhawk	1	conifer plantation, circling, circling north of vp lissinagroagh	permanent territory; probable breeding	RV
BZ117	BRHH1	23/07/2021	10:58	Buzzard	1	conifer plantation and semi-natural grassland, circling, circling high up distantly	permanent territory; probable breeding	RV

Table 8 Breeding Woodcock Survey Data

Ref.	Transect	Date	Time	Species	Number	Habitat and activity	Surveyor
WK027	1	12/05/2021	21:56	Woodcock	1	conifer plantation, roding, roding	AOD
WK028	2	13/05/2021	21:55	Woodcock	1	conifer plantation, roding	AOD
WK029	2	13/05/2021	22:02	Woodcock	1	conifer plantation, roding	AOD
WK030	2	13/05/2021	22:12	Woodcock	1	conifer plantation, roding	AOD
WK031	2	13/05/2021	22:18	Woodcock	1	conifer plantation, roding	AOD
WK032	1	04/06/2021	22:10	Woodcock	1	conifer plantation, roding, heard, unseen	AOD
WK033	1	04/06/2021	22:41	Woodcock	1	conifer plantation, roding	AOD
WK034	1	04/06/2021	22:48	Woodcock	1	conifer plantation, roding	AOD
WK035	2	08/06/2021	21:41	Woodcock	1	conifer plantation, roding, heard. unseen	AOD
WK036	1	14/06/2021	22:41	Woodcock	1	conifer plantation, roding, roding	AOD
WK037	2	16/06/2021	22:48	Woodcock	1	conifer plantation, roding, roding	AOD

Table 9 Incidental Survey Data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
MP007	Breeding Raptor Survey; T1	20/04/2021	11:00	Meadow Pipit	36	improved agricultural grassland and upland blanket bog; feeding along transect route, rough numbers and locations mapped	RV
GL001	Breeding Raptor Survey; T2	20/04/2021	12:15	Grey Wagtail	2	eroding/upland rivers; pair on stream, male singing	RV
RG011	Breeding Raptor Survey; T4	20/04/2021	14:10	Red Grouse	1	upland blanket bog; flushed, male flushed	RV
SN040	Breeding Raptor Survey; RVP9	20/04/2021	15:58	Snipe	1	improved agricultural grassland; chipping, heard chipping	RV
SN041	Breeding Raptor Survey; T3	20/04/2021	13:45	Snipe	1	upland blanket bog; flushed, flushed from trackside ditch	RV
HARE011	Breeding Walkover Survey; BOLEYBOY	12/05/2021	17:16	Hare	1	conifer plantation; feeding	AOD
RED DEER002	Breeding Walkover Survey; LISDARUSH	12/05/2021	17:17	Red Deer	2	conifer plantation; f	AOD
RG012	Breeding Woodcock Survey; SADDLE HILL	12/05/2021	21:57	Red Grouse	1	montane heath; call, calling	AOD
RG013	Breeding Woodcock Survey; KILLEA	12/05/2021	22:22	Red Grouse	2	montane heath; call, call	AOD
SN042	Breeding Woodcock Survey; KILLEA	12/05/2021	22:15	Snipe	1	conifer plantation; flying over a conifer plantation 1km from the site, at , drumming	AOD
SN043	Breeding Woodcock Survey; killea	12/05/2021	22:22	Snipe	1	montane heath; drumming	AOD
BZ014	Breeding Raptor Survey;	17/05/2021	13:31	Buzzard		semi-natural grassland; flying	RV
RG014	Breeding Raptor Survey; BRVP5	17/05/2021	19:10	Red Grouse	1	upland blanket bog; displaying, male heard then seen a few mins later	RV
LB029	Breeding Raptor Survey; BRVP1	17/05/2021	14:42	Lesser Black-backed Gull	3	upland blanket bog and semi-natural grassland; circling, 3 circling high over wide area	RV
SN044	Breeding Raptor Survey;	13/06/2021	09:07	Snipe	1	upland blanket bog; displaying, displayed several times, seen once	RV
SN045	Breeding Raptor Survey;	13/06/2021	08:37	Snipe	1	upland blanket bog;	RV
SN046	Breeding Raptor Survey;	14/06/2021	15:17	Snipe	1	upland blanket bog; displaying, displayed several times, seen once	RV
BZ015	Breeding Raptor Survey; G 90142 43093	23/07/2021	15:40	Buzzard	1	semi-natural grassland and conifer plantation; circling, circling along plantation edge	RV
K003	Breeding Raptor Survey; RVP1	29/07/2021	13:53	Kestrel	1	semi-natural grassland; hunting, hunting along roadside	RV
SH009	Breeding Raptor Survey; G 90142 45414	29/07/2021	08:49	Sparrowhawk	1	semi-natural grassland; with prey, flew over with prey	RV
GREAT SPOTTED WOODPECKER005	Vantage Point Survey; VP1	25/08/2021	17:10	Great Spotted Woodpecker	1	conifer plantation; calling, a great spotted woodpecker was heard calling from conifers below the vp, but not seen. approximate grid ref: 9280 4211.	LD

Table 10 Non-target Species

Date	Survey	Species	Notes	Surveyor
02/04/2021	Vantage Point Survey, VP1	Skylark	9, displaying and singing	RV
02/04/2021	Vantage Point Survey, VP1	Sand Martin	11	RV
02/04/2021	Vantage Point Survey, VP1	Hooded Crow	4	RV
02/04/2021	Vantage Point Survey, VP1	Raven	13, roost flock	RV
02/04/2021	Vantage Point Survey, VP1	Magpie	2	RV
02/04/2021	Vantage Point Survey, VP1	Barn Swallow	2	RV
02/04/2021	Vantage Point Survey, VP1	Blackbird	2	RV
02/04/2021	Vantage Point Survey, VP1	Mistle Thrush	2	RV
02/04/2021	Vantage Point Survey, VP1	Woodpigeon	3	RV
02/04/2021	Vantage Point Survey, VP1	Chaffinch	7	RV
02/04/2021	Vantage Point Survey, VP1	Reed Bunting	2	RV
09/04/2021	Vantage Point Survey, VP2	Sand Martin	2	RV
09/04/2021	Vantage Point Survey, VP2	Skylark	6, displaying	RV
09/04/2021	Vantage Point Survey, VP2	Mistle Thrush	2	RV
09/04/2021	Vantage Point Survey, VP2	Blackbird	2	RV
09/04/2021	Vantage Point Survey, VP2	Wren	2	RV
09/04/2021	Vantage Point Survey, VP2	Woodpigeon	3	RV
09/04/2021	Vantage Point Survey, VP2	Raven	18, roost flock	RV
09/04/2021	Vantage Point Survey, VP2	Magpie	2	RV
09/04/2021	Vantage Point Survey, VP2	Hooded Crow	3	RV
09/04/2021	Vantage Point Survey, VP2	Chaffinch	7	RV
22/04/2021	Vantage Point Survey, VP3	Cuckoo	2 males singing	RV
22/04/2021	Vantage Point Survey, VP3	Woodpigeon	7	RV
22/04/2021	Vantage Point Survey, VP3	Blue Tit	2	RV
22/04/2021	Vantage Point Survey, VP3	Great Tit	4	RV
22/04/2021	Vantage Point Survey, VP3	Robin	3	RV
22/04/2021	Vantage Point Survey, VP3	Wren	3	RV
22/04/2021	Vantage Point Survey, VP3	Song Thrush	3	RV
22/04/2021	Vantage Point Survey, VP3	Blackbird	3	RV
22/04/2021	Vantage Point Survey, VP3	Mistle Thrush	2	RV
22/04/2021	Vantage Point Survey, VP3	Skylark	3 singing	RV

Date	Survey	Species	Notes	Surveyor
22/04/2021	Vantage Point Survey, VP3	Lesser Redpoll	2 flyovers	RV
22/04/2021	Vantage Point Survey, VP3	Siskin	6 flyovers	RV
22/04/2021	Vantage Point Survey, VP3	Hooded Crow	3	RV
22/04/2021	Vantage Point Survey, VP3	Raven	3	RV
22/04/2021	Vantage Point Survey, VP3	Magpie	2 flyovers	RV
22/04/2021	Vantage Point Survey, VP3	Willow Warbler	3 singing	RV
22/04/2021	Vantage Point Survey, VP3	Whitethroat	1 singing	RV
22/04/2021	Vantage Point Survey, VP3	Chiffchaff	2 singing	RV
24/04/2021	Vantage Point Survey, VP4	Cuckoo	2, pair	RV
24/04/2021	Vantage Point Survey, VP4	Woodpigeon	8	RV
24/04/2021	Vantage Point Survey, VP4	Hooded Crow	3	RV
24/04/2021	Vantage Point Survey, VP4	Blackbird	2	RV
24/04/2021	Vantage Point Survey, VP4	Song Thrush	3	RV
24/04/2021	Vantage Point Survey, VP4	Siskin	7	RV
24/04/2021	Vantage Point Survey, VP4	Lesser Redpoll	3, flyovers	RV
24/04/2021	Vantage Point Survey, VP4	Chaffinch	8	RV
24/04/2021	Vantage Point Survey, VP4	Coal Tit	3 singing	RV
24/04/2021	Vantage Point Survey, VP4	Blue Tit	3 singing	RV
24/04/2021	Vantage Point Survey, VP4	Great Tit	2	RV
24/04/2021	Vantage Point Survey, VP4	Magpie	2	RV
24/04/2021	Vantage Point Survey, VP4	Grasshopper Warbler	4, reeling around sunset	RV
24/04/2021	Vantage Point Survey, VP4	Willow Warbler	6, singing	RV
24/04/2021	Vantage Point Survey, VP4	Chiffchaff	2 singing	RV
24/04/2021	Vantage Point Survey, VP4	Blackcap	3 singing	RV
21/05/2021	Vantage Point Survey, VP1	Skylark	6 singing and displaying	RV
21/05/2021	Vantage Point Survey, VP1	Magpie	3	RV
21/05/2021	Vantage Point Survey, VP1	Hooded Crow	3	RV
21/05/2021	Vantage Point Survey, VP1	Raven	12, mostly at dawn leaving roost	RV
21/05/2021	Vantage Point Survey, VP1	Jay	2	RV
21/05/2021	Vantage Point Survey, VP1	Mistle Thrush	2	RV
21/05/2021	Vantage Point Survey, VP1	Blackbird	2	RV

Date	Survey	Species	Notes	Surveyor
21/05/2021	Vantage Point Survey, VP1	Song Thrush	1	RV
21/05/2021	Vantage Point Survey, VP1	Reed Bunting	2 pair	RV
21/05/2021	Vantage Point Survey, VP1	Siskin	3	RV
21/05/2021	Vantage Point Survey, VP1	Lesser Redpoll	1, flyover	RV
21/05/2021	Vantage Point Survey, VP1	Chaffinch	8, mostly flyovers	RV
21/05/2021	Vantage Point Survey, VP1	Coal Tit	2	RV
21/05/2021	Vantage Point Survey, VP1	Woodpigeon	7	RV
21/05/2021	Vantage Point Survey, VP1	Wren	4	RV
21/05/2021	Vantage Point Survey, VP1	Dunnock	2	RV
21/05/2021	Vantage Point Survey, VP1	Barn Swallow	3	RV
21/05/2021	Vantage Point Survey, VP1	Sand Martin	4	RV
21/05/2021	Vantage Point Survey, VP1	Goldcrest	3	RV
23/05/2021	Vantage Point Survey, VP2	Skylark	6 singing and displaying	RV
23/05/2021	Vantage Point Survey, VP2	Wren	3	RV
23/05/2021	Vantage Point Survey, VP2	Raven	6	RV
23/05/2021	Vantage Point Survey, VP2	Hooded Crow	3	RV
23/05/2021	Vantage Point Survey, VP2	Magpie	4	RV
23/05/2021	Vantage Point Survey, VP2	Mistle Thrush	2 pair	RV
23/05/2021	Vantage Point Survey, VP2	Song Thrush	2	RV
23/05/2021	Vantage Point Survey, VP2	Blackbird	1	RV
23/05/2021	Vantage Point Survey, VP2	Siskin	2	RV
23/05/2021	Vantage Point Survey, VP2	Lesser Redpoll	2 pair	RV
23/05/2021	Vantage Point Survey, VP2	Chaffinch	7	RV
23/05/2021	Vantage Point Survey, VP2	Woodpigeon	8, mostly flyovers	RV
23/05/2021	Vantage Point Survey, VP2	Collared Dove	2 flybys	RV
23/05/2021	Vantage Point Survey, VP2	Dunnock	2	RV
23/05/2021	Vantage Point Survey, VP2	Blackcap	2 singing	RV
23/05/2021	Vantage Point Survey, VP2	Goldcrest	4	RV
23/05/2021	Vantage Point Survey, VP2	Chiffchaff	1 singing	RV
23/05/2021	Vantage Point Survey, VP2	Coal Tit	6	RV
24/05/2021	Vantage Point Survey, VP3	Cuckoo	2singing males	RV

Date	Survey	Species	Notes	Surveyor
24/05/2021	Vantage Point Survey, VP3	Willow Warbler	3 singing	RV
24/05/2021	Vantage Point Survey, VP3	Blackcap	2 singing	RV
24/05/2021	Vantage Point Survey, VP3	Coal Tit	3	RV
24/05/2021	Vantage Point Survey, VP3	Blue Tit	1	RV
24/05/2021	Vantage Point Survey, VP3	Skylark	7 singing and displaying	RV
24/05/2021	Vantage Point Survey, VP3	Mistle Thrush	2 pair	RV
24/05/2021	Vantage Point Survey, VP3	Song Thrush	2 singing	RV
24/05/2021	Vantage Point Survey, VP3	Blackbird	3	RV
24/05/2021	Vantage Point Survey, VP3	Robin	2 singing	RV
24/05/2021	Vantage Point Survey, VP3	Wren	6 singing	RV
24/05/2021	Vantage Point Survey, VP3	Siskin	3	RV
24/05/2021	Vantage Point Survey, VP3	Lesser Redpoll	2 flyovers	RV
24/05/2021	Vantage Point Survey, VP3	Raven	3	RV
24/05/2021	Vantage Point Survey, VP3	Hooded Crow	4	RV
24/05/2021	Vantage Point Survey, VP3	Magpie	2	RV
28/05/2021	Vantage Point Survey, VP4	Blackbird	6	RV
28/05/2021	Vantage Point Survey, VP4	Song Thrush	2	RV
28/05/2021	Vantage Point Survey, VP4	Mistle Thrush	2	RV
28/05/2021	Vantage Point Survey, VP4	Cuckoo	3, 2 male and 1 female	RV
28/05/2021	Vantage Point Survey, VP4	Robin	5	RV
28/05/2021	Vantage Point Survey, VP4	Wren	3	RV
28/05/2021	Vantage Point Survey, VP4	Grasshopper Warbler	1 singing	RV
28/05/2021	Vantage Point Survey, VP4	Willow Warbler	3 singing	RV
28/05/2021	Vantage Point Survey, VP4	Chiffchaff	1 singing	RV
28/05/2021	Vantage Point Survey, VP4	Blackcap	2singing	RV
28/05/2021	Vantage Point Survey, VP4	Goldcrest	3	RV
28/05/2021	Vantage Point Survey, VP4	Chaffinch	8	RV
28/05/2021	Vantage Point Survey, VP4	Siskin	4 flyovers	RV
28/05/2021	Vantage Point Survey, VP4	Barn Swallow	4	RV
28/05/2021	Vantage Point Survey, VP4	Sand Martin	2	RV
28/05/2021	Vantage Point Survey, VP4	Pheasant	1 male heard	RV

Date	Survey	Species	Notes	Surveyor
28/05/2021	Vantage Point Survey, VP4	Starling	7	RV
28/05/2021	Vantage Point Survey, VP4	Woodpigeon	6	RV
28/05/2021	Vantage Point Survey, VP4	Collared Dove	2 flybys	RV
28/05/2021	Vantage Point Survey, VP4	Hooded Crow	3	RV
28/05/2021	Vantage Point Survey, VP4	Magpie	4	RV
28/05/2021	Vantage Point Survey, VP4	Raven	2	RV
28/05/2021	Vantage Point Survey, VP4	Great Tit	3	RV
28/05/2021	Vantage Point Survey, VP4	Coal Tit	6	RV
28/05/2021	Vantage Point Survey, VP4	Blue Tit	2	RV
13/06/2021	Vantage Point Survey, VP3	Skylark	6	RV
13/06/2021	Vantage Point Survey, VP3	Cuckoo	1 singing briefly	RV
13/06/2021	Vantage Point Survey, VP3	Woodpigeon	3	RV
13/06/2021	Vantage Point Survey, VP3	Raven	2 pair	RV
13/06/2021	Vantage Point Survey, VP3	Hooded Crow	3	RV
13/06/2021	Vantage Point Survey, VP3	Magpie	2	RV
13/06/2021	Vantage Point Survey, VP3	Mistle Thrush	2 pair	RV
13/06/2021	Vantage Point Survey, VP3	Blackbird	2 singing	RV
13/06/2021	Vantage Point Survey, VP3	Siskin	3 flyovers	RV
13/06/2021	Vantage Point Survey, VP3	Lesser Redpoll	2 flyovers, singing	RV
13/06/2021	Vantage Point Survey, VP3	Coal Tit	4 singing	RV
13/06/2021	Vantage Point Survey, VP3	Blue Tit	2	RV
13/06/2021	Vantage Point Survey, VP3	Song Thrush	1 singing	RV
13/06/2021	Vantage Point Survey, VP3	Wren	3 singing	RV
13/06/2021	Vantage Point Survey, VP3	Dunnock	1 singing	RV
13/06/2021	Vantage Point Survey, VP3	Chaffinch	3	RV
13/06/2021	Vantage Point Survey, VP3	Willow Warbler	2 singing	RV
13/06/2021	Vantage Point Survey, VP3	Barn Swallow	2 flyovers	RV
13/06/2021	Vantage Point Survey, VP3	Stonechat	2 pair	RV
14/06/2021	Vantage Point Survey, VP1	Skylark	8 displaying and singing	RV
14/06/2021	Vantage Point Survey, VP1	Hooded Crow	3	RV
14/06/2021	Vantage Point Survey, VP1	Raven	4	RV

Date	Survey	Species	Notes	Surveyor
14/06/2021	Vantage Point Survey, VP1	Magpie	3	RV
14/06/2021	Vantage Point Survey, VP1	Starling	12	RV
14/06/2021	Vantage Point Survey, VP1	Jay	1	RV
14/06/2021	Vantage Point Survey, VP1	Jackdaw	3	RV
14/06/2021	Vantage Point Survey, VP1	Robin	1	RV
14/06/2021	Vantage Point Survey, VP1	Blackbird	3	RV
14/06/2021	Vantage Point Survey, VP1	Song Thrush	1	RV
14/06/2021	Vantage Point Survey, VP1	Barn Swallow	2	RV
14/06/2021	Vantage Point Survey, VP1	Sand Martin	10 around colony	RV
14/06/2021	Vantage Point Survey, VP1	Woodpigeon	3	RV
14/06/2021	Vantage Point Survey, VP1	Siskin	4	RV
14/06/2021	Vantage Point Survey, VP1	Lesser Redpoll	2	RV
14/06/2021	Vantage Point Survey, VP1	Chaffinch	3	RV
14/06/2021	Vantage Point Survey, VP1	Stonechat	2 pair	RV
14/06/2021	Vantage Point Survey, VP1	Reed Bunting	1 male	RV
16/06/2021	Vantage Point Survey, VP2	Raven	7	RV
16/06/2021	Vantage Point Survey, VP2	Hooded Crow	4	RV
16/06/2021	Vantage Point Survey, VP2	Magpie	3	RV
16/06/2021	Vantage Point Survey, VP2	Blackcap	3 singing	RV
16/06/2021	Vantage Point Survey, VP2	Goldcrest	2 singing	RV
16/06/2021	Vantage Point Survey, VP2	Blackbird	3	RV
16/06/2021	Vantage Point Survey, VP2	Mistle Thrush	2 pair	RV
16/06/2021	Vantage Point Survey, VP2	Song Thrush	2	RV
16/06/2021	Vantage Point Survey, VP2	Skylark	7 singing and displaying	RV
16/06/2021	Vantage Point Survey, VP2	Sand Martin	7	RV
16/06/2021	Vantage Point Survey, VP2	Crossbill	13 flyover flock	RV
16/06/2021	Vantage Point Survey, VP2	Barn Swallow	3	RV
16/06/2021	Vantage Point Survey, VP2	Chiffchaff	1 singing	RV
16/06/2021	Vantage Point Survey, VP2	Willow Warbler	3 singing	RV
16/06/2021	Vantage Point Survey, VP2	Coal Tit	4	RV
16/06/2021	Vantage Point Survey, VP2	Woodpigeon	6	RV

Date	Survey	Species	Notes	Surveyor
16/06/2021	Vantage Point Survey, VP2	Feral Pigeon	3 white pigeons flew over	RV
16/06/2021	Vantage Point Survey, VP2	Siskin	3	RV
16/06/2021	Vantage Point Survey, VP2	Chaffinch	3	RV
21/06/2021	Vantage Point Survey, VP4	Woodpigeon	3	RV
21/06/2021	Vantage Point Survey, VP4	Feral Pigeon	2	RV
21/06/2021	Vantage Point Survey, VP4	Magpie	2	RV
21/06/2021	Vantage Point Survey, VP4	Raven	4	RV
21/06/2021	Vantage Point Survey, VP4	Hooded Crow	6	RV
21/06/2021	Vantage Point Survey, VP4	Jay	2	RV
21/06/2021	Vantage Point Survey, VP4	Starling	23 in one flock	RV
21/06/2021	Vantage Point Survey, VP4	Grasshopper Warbler	2 singing	RV
21/06/2021	Vantage Point Survey, VP4	Chiffchaff	3 singing	RV
21/06/2021	Vantage Point Survey, VP4	Willow Warbler	6 singing and feeding	RV
21/06/2021	Vantage Point Survey, VP4	Blackcap	4 singing	RV
21/06/2021	Vantage Point Survey, VP4	Goldcrest	5	RV
21/06/2021	Vantage Point Survey, VP4	Coal Tit	3	RV
21/06/2021	Vantage Point Survey, VP4	Great Tit	2	RV
21/06/2021	Vantage Point Survey, VP4	Bullfinch	2	RV
21/06/2021	Vantage Point Survey, VP4	Chaffinch	7	RV
21/06/2021	Vantage Point Survey, VP4	Siskin	4	RV
21/06/2021	Vantage Point Survey, VP4	Lesser Redpoll	4	RV
21/06/2021	Vantage Point Survey, VP4	Goldfinch	3	RV
21/06/2021	Vantage Point Survey, VP4	Mistle Thrush	2 pair	RV
21/06/2021	Vantage Point Survey, VP4	Blackbird	2 singing	RV
21/06/2021	Vantage Point Survey, VP4	Song Thrush	3singing	RV
21/06/2021	Vantage Point Survey, VP4	Barn Swallow	7	RV
21/06/2021	Vantage Point Survey, VP4	House Martin	2	RV
21/06/2021	Vantage Point Survey, VP4	Wren	3 singing	RV
21/06/2021	Vantage Point Survey, VP4	Dunnock	3 singing	RV
21/06/2021	Vantage Point Survey, VP4	Cuckoo	4, 1 female and 3 males	RV
21/06/2021	Vantage Point Survey, VP4	Pheasant	1 male heard distantly	RV

Date	Survey	Species	Notes	Surveyor
02/07/2021	Vantage Point Survey, VP1	Mistle Thrush		AOD
02/07/2021	Vantage Point Survey, VP1	Raven		AOD
02/07/2021	Vantage Point Survey, VP1	Skylark		AOD
02/07/2021	Vantage Point Survey, VP1	Sand Martin		AOD
02/07/2021	Vantage Point Survey, VP1	Barn Swallow		AOD
08/07/2021	Vantage Point Survey, VP2	Sand Martin		AOD
08/07/2021	Vantage Point Survey, VP2	Skylark		AOD
08/07/2021	Vantage Point Survey, VP2	Raven	12 at roost	AOD
08/07/2021	Vantage Point Survey, VP2	Hooded Crow		AOD
09/07/2021	Vantage Point Survey, VP2	Sand Martin		AOD
09/07/2021	Vantage Point Survey, VP2	Barn Swallow		AOD
09/07/2021	Vantage Point Survey, VP2	Raven		AOD
16/07/2021	Vantage Point Survey, VP3	Barn Swallow		AOD
16/07/2021	Vantage Point Survey, VP3	Sand Martin		AOD
16/07/2021	Vantage Point Survey, VP3	Skylark		AOD
16/07/2021	Vantage Point Survey, VP3	Stonechat		AOD
16/07/2021	Vantage Point Survey, VP3	Pied Wagtail		AOD
20/07/2021	Vantage Point Survey, VP3	Stonechat		AOD
20/07/2021	Vantage Point Survey, VP3	Magpie		AOD
20/07/2021	Vantage Point Survey, VP3	Woodpigeon		AOD
20/07/2021	Vantage Point Survey, VP3	Raven		AOD
21/07/2021	Vantage Point Survey, VP4	Blackcap		AOD
21/07/2021	Vantage Point Survey, VP4	Willow Warbler		AOD
21/07/2021	Vantage Point Survey, VP4	Woodpigeon		AOD
21/07/2021	Vantage Point Survey, VP4	Jay		AOD
21/07/2021	Vantage Point Survey, VP4	Barn Swallow		AOD
21/07/2021	Vantage Point Survey, VP4	House Martin		AOD
21/07/2021	Vantage Point Survey, VP4	Song Thrush		AOD
21/07/2021	Vantage Point Survey, VP4	Blackbird		AOD
21/07/2021	Vantage Point Survey, VP4	Dunnock		AOD
11/08/2021	Vantage Point Survey, VP3	Hooded Crow		LD

Date	Survey	Species	Notes	Surveyor
11/08/2021	Vantage Point Survey, VP3	Wren		LD
11/08/2021	Vantage Point Survey, VP3	Barn Swallow		LD
11/08/2021	Vantage Point Survey, VP3	Raven		LD
11/08/2021	Vantage Point Survey, VP3	Woodpigeon		LD
11/08/2021	Vantage Point Survey, VP3	Chaffinch		LD
11/08/2021	Vantage Point Survey, VP3	Siskin		LD
11/08/2021	Vantage Point Survey, VP3	Raven		LD
11/08/2021	Vantage Point Survey, VP3	Mistle Thrush		LD
11/08/2021	Vantage Point Survey, VP3	Blackbird		LD
11/08/2021	Vantage Point Survey, VP3	Jackdaw		LD
16/08/2021	Vantage Point Survey, VP4	Chaffinch		LD
16/08/2021	Vantage Point Survey, VP4	Wren		LD
16/08/2021	Vantage Point Survey, VP4	Hooded Crow		LD
16/08/2021	Vantage Point Survey, VP4	Barn Swallow		LD
16/08/2021	Vantage Point Survey, VP4	Raven		LD
16/08/2021	Vantage Point Survey, VP4	Coal Tit		LD
16/08/2021	Vantage Point Survey, VP4	Mistle Thrush		LD
16/08/2021	Vantage Point Survey, VP4	House Martin		LD
16/08/2021	Vantage Point Survey, VP4	Reed Bunting		LD
16/08/2021	Vantage Point Survey, VP4	Blackbird		LD
16/08/2021	Vantage Point Survey, VP4	Jackdaw		LD
16/08/2021	Vantage Point Survey, VP4	Song Thrush		LD
16/08/2021	Vantage Point Survey, VP4	Woodpigeon		LD
16/08/2021	Vantage Point Survey, VP4	Magpie		LD
16/08/2021	Vantage Point Survey, VP4	Siskin		LD
16/08/2021	Vantage Point Survey, VP4	Willow Warbler		LD
25/08/2021	Vantage Point Survey, VP1	Wren		LD
25/08/2021	Vantage Point Survey, VP1	Chaffinch		LD
25/08/2021	Vantage Point Survey, VP1	Barn Swallow		LD
25/08/2021	Vantage Point Survey, VP1	Hooded Crow		LD
25/08/2021	Vantage Point Survey, VP1	Coal Tit		LD

Date	Survey	Species	Notes	Surveyor
25/08/2021	Vantage Point Survey, VP1	Robin		LD
25/08/2021	Vantage Point Survey, VP1	Raven		LD
25/08/2021	Vantage Point Survey, VP1	Jackdaw		LD
25/08/2021	Vantage Point Survey, VP1	Siskin		LD
25/08/2021	Vantage Point Survey, VP1	Linnet		LD
25/08/2021	Vantage Point Survey, VP1	Great Spotted Woodpecker		LD
25/08/2021	Vantage Point Survey, VP1	Dunnock		LD
26/08/2021	Vantage Point Survey, VP2	Robin		LD
26/08/2021	Vantage Point Survey, VP2	Wren		LD
26/08/2021	Vantage Point Survey, VP2	Barn Swallow		LD
26/08/2021	Vantage Point Survey, VP2	House Martin		LD
26/08/2021	Vantage Point Survey, VP2	Raven		LD
26/08/2021	Vantage Point Survey, VP2	Chaffinch		LD
26/08/2021	Vantage Point Survey, VP2	Coal Tit		LD
26/08/2021	Vantage Point Survey, VP2	Siskin		LD
26/08/2021	Vantage Point Survey, VP2	Woodpigeon		LD
26/08/2021	Vantage Point Survey, VP2	Mistle Thrush		LD
26/08/2021	Vantage Point Survey, VP2	Blue Tit		LD
26/08/2021	Vantage Point Survey, VP2	Hooded Crow		LD
26/08/2021	Vantage Point Survey, VP2	Jackdaw		LD
01/09/2021	Vantage Point Survey, VP2	Goldfinch		AOD
01/09/2021	Vantage Point Survey, VP2	Raven		AOD
01/09/2021	Vantage Point Survey, VP2	Sand Martin		AOD
01/09/2021	Vantage Point Survey, VP2	Pied Wagtail		AOD
01/09/2021	Vantage Point Survey, VP2	Chaffinch		AOD
01/09/2021	Vantage Point Survey, VP2	Barn Swallow		AOD
02/09/2021	Vantage Point Survey, VP3	Barn Swallow		AOD
02/09/2021	Vantage Point Survey, VP3	Sand Martin		AOD
02/09/2021	Vantage Point Survey, VP3	Lesser Redpoll		AOD
02/09/2021	Vantage Point Survey, VP3	Reed Bunting		AOD
02/09/2021	Vantage Point Survey, VP3	Raven		AOD

Date	Survey	Species	Notes	Surveyor
02/09/2021	Vantage Point Survey, VP3	Hooded Crow		AOD
02/09/2021	Vantage Point Survey, VP3	Magpie		AOD
02/09/2021	Vantage Point Survey, VP3	Starling		AOD
03/09/2021	Vantage Point Survey, VP2	Raven		AOD
03/09/2021	Vantage Point Survey, VP2	Barn Swallow		AOD
03/09/2021	Vantage Point Survey, VP2	Sand Martin		AOD
03/09/2021	Vantage Point Survey, VP2	Skylark		AOD
03/09/2021	Vantage Point Survey, VP2	House Martin		AOD
03/09/2021	Vantage Point Survey, VP4	Dunnock		AOD
03/09/2021	Vantage Point Survey, VP4	Robin		AOD
03/09/2021	Vantage Point Survey, VP4	Blackbird		AOD
03/09/2021	Vantage Point Survey, VP4	Starling		AOD
03/09/2021	Vantage Point Survey, VP4	Jay		AOD
03/09/2021	Vantage Point Survey, VP4	Song Thrush		AOD
03/09/2021	Vantage Point Survey, VP4	Goldcrest		AOD
03/09/2021	Vantage Point Survey, VP4	Barn Swallow		AOD
03/09/2021	Vantage Point Survey, VP4	House Martin		AOD
09/09/2021	Vantage Point Survey, VP1	Raven	60 plus at roost on site at vp1	AOD
09/09/2021	Vantage Point Survey, VP1	Robin		AOD
09/09/2021	Vantage Point Survey, VP1	Wren		AOD
09/09/2021	Vantage Point Survey, VP1	Woodpigeon		AOD
09/09/2021	Vantage Point Survey, VP1	Jay		AOD
09/09/2021	Vantage Point Survey, VP1	Barn Swallow		AOD
09/09/2021	Vantage Point Survey, VP1	House Martin		AOD
09/09/2021	Vantage Point Survey, VP1	Chaffinch		AOD
13/09/2021	Vantage Point Survey, VP3	Stonechat		AOD
13/09/2021	Vantage Point Survey, VP3	Raven		AOD
13/09/2021	Vantage Point Survey, VP3	Woodpigeon		AOD
13/09/2021	Vantage Point Survey, VP3	Pied Wagtail		AOD
13/09/2021	Vantage Point Survey, VP3	Robin		AOD
13/09/2021	Vantage Point Survey, VP3	Blackbird		AOD

Date	Survey	Species	Notes	Surveyor
13/09/2021	Vantage Point Survey, VP4	Dunnock		AOD
13/09/2021	Vantage Point Survey, VP4	Robin		AOD
13/09/2021	Vantage Point Survey, VP4	Goldfinch		AOD
13/09/2021	Vantage Point Survey, VP4	Blue Tit		AOD
13/09/2021	Vantage Point Survey, VP4	Song Thrush		AOD
13/09/2021	Vantage Point Survey, VP4	Hooded Crow		AOD
13/09/2021	Vantage Point Survey, VP4	Jay		AOD
13/09/2021	Vantage Point Survey, VP4	Barn Swallow		AOD

APPENDIX 3

CONFIDENTIAL SURVEY DATA

Appendix 6-5

Bird Survey Report Winter 2021-22

MKO Planning and Environmental Consultants

Winter Bird Survey Report 2021/2022

Lissinagroagh Wind Farm, Co. Leitrim



DOCUMENT DETAILS

Client:	**FuturEnergy Ireland**
Project Title:	**Lissinagroagh Wind Farm, Co. Leitrim**
Project Number:	**200217-f**
Document Title:	**Winter Bird Survey Report 2021/2022**
Document File Name:	**200217-f_F1_Lissinagroagh Winter Survey Report_2021_2022_2023.04.25**
Prepared By:	**MKO** **Tuam Road** **Galway** **Ireland** **H91 VW84**

Planning and Environmental Consultants

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1. SUMMARY

This report outlines the ornithological surveys completed at Lissinagroagh Wind Farm during the 2021/22 winter season. Lissinagroagh Wind Farm has been surveyed previously since 2018.

The following surveys were undertaken during the 2021/22 winter season:

- Vantage Point Surveys
- Winter Walkover Surveys
- Hen Harrier Roost Surveys
- Red Grouse Surveys

The key observations during surveys were relating to hen harrier and red grouse. These species were recorded frequently and in low numbers and are resident at the wind farm site.

Key impacts resulting from the proposed development for local avian receptors could include habitat loss, disturbance, displacement, and collision risk.

2. INTRODUCTION

MKO were appointed to carry out bird surveys at Lissinagroagh, Co. Leitrim for the winter season 2021/22. This report describes the ornithological survey methods employed and survey data collected at Lissinagroagh Wind Farm for the period from October 2021 to March 2022 inclusive.

2.1 Background

Lissinagroagh Wind Farm has been surveyed previously since the breeding season 2018. Please see the relevant end of season reports for full details of the survey methods and results from these survey periods. The following constraints on the Proposed Development were outlined in these reports:

- Two hen harrier nest sites within the windfarm site boundary.

2.2 Site Description

The site is located north of Manorhamilton Co. Leitrim (Grid Ref: X 591484.00 Y 842226.00). The dominant habitat on site is forestry, upland blanket bog and rough grassland. The total area of the development is approximately 152 hectares. Figure 1.0 shows the wind farm site boundary.

2.3 Purpose of this Report

This report describes the ornithological survey methods employed and survey data collected at Lissinagroagh Wind Farm for the period from October 2021 to March 2022 inclusive. Particular attention has been paid to species of conservation importance and identified target species.

The report is supported by Technical Appendix 1 which contains the raw data from the winter bird surveys in 2021/22. This includes detail on survey times, weather conditions, surveyors, survey results and other additional information. Bird observations during surveys have been digitised and are provided in Technical Appendix 2.

The report is structured as follows:

- An introduction describing the background and a statement of authority.
- A comprehensive description of the ornithological surveys carried out.
- A full description of results for all ornithological surveys carried out.
- A discussion providing a synopsis of the findings of the ornithological surveys.
- A conclusion describing the key findings and possible impacts on the local ornithological receptors.

3. METHODS

3.1 Scope

The study area for the purposes of ornithological surveys is the redline boundary of the wind farm site and up to a 500m radius. Depending on the survey type, the survey area may extend to 2km and 5km of the wind farm site. Section 3.2 provides details on the field surveys and the survey areas for each.

The following defines terms used in this report.

- "Zones of Influence" (ZOI) for potential ornithological receptors refers to the zone within which potential effects are anticipated. ZOIs were assigned following best available guidance (SNH 2016 and McGuinness et.al 2015).
- "Potential Collision Height" (PCH) refers to the height at which birds are regarded to be at risk of collision with turbine blades. For the purposes of this report, this refers to flights between 25m and 175m high.

Field surveys were designed to monitor the target species expected to be found at the wind farm site. Target species were determined based on the habitats on-site, the species expected in the wider area, Special Protection Areas (SPAs) within the ZOI, and protected species. Target species included those listed on Annex I of the EU Birds Directive (2009/147/EC), species that are a Special Conservation Interest (SCI) of a SPA designated under the EU Habitats Directive (92/43/EEC) Natura 2000 network within 15km of the proposed development site, species listed on the Red List of Birds of Conservation Concern in Ireland (Gilbert *et al.,* 2021), and raptor species sensitive to wind farm developments.

3.2 Field Surveys

This section of the report describes the various field survey methods employed. Field surveys were undertaken from October 2021 to March 2022 inclusive. The data provided in this report is robust and in line with industry best practises, including the NatureScot (formerly Scottish Natural Heritage) guidance "Recommended bird survey methods to inform impact assessment of onshore windfarms" (SNH, 2017). Field survey methodologies have been devised to survey for the bird species composition and assemblages that occur within the study area.

3.2.1 Vantage Point Surveys

Vantage point (VP) surveys were undertaken in accordance with SNH (2017) from four vantage point locations from October 2021 to March 2022.

Data on bird observations and flight activity was collected from a scanning arc of 180° and a 2km radius by an observer at each fixed location for six hours per month. Surveys were scheduled to provide a spread over the full daylight period including at dawn and dusk to coincide with the highest peaks of bird activity.

Details on vantage point watch survey effort and results are presented in Appendix 1 of this report. This appendix includes full details of dates, times, survey locations, survey duration and weather conditions for each survey, as well as bird records. Appendix 2, Figure 1.0 shows the locations of vantage points and technical data is provided in Appendix 1. Figure 1.1 to Figure 1.8 show maps of bird observations.

Flight activity was assigned to distinct height bands. The flight bands were chosen with reference to the dimensions of likely turbine models for the site and the resulting potential collision height. Bands are split into 0-15m, 15-25m, 25m-175m and 175m+. Taking a precautionary approach, flights recorded within the 25-175m height band were considered to be at PCH.

3.2.1.1 Viewshed Analysis

Viewshed analysis was carried out to confirm the sufficiency of the chosen vantage point location (VP1, VP2, VP3 and VP4) prior to the commencement of initial surveys in 2018. The viewshed analysis aims to establish whether the selected VP offers adequate coverage of the turbine layout proposed at the time of surveying. A 500m buffer was applied to the likely maximum viable area of the site for the wind energy development in line with SNH (2017) recommendations to conduct surveys to 500m from the outermost turbines. Viewsheds were calculated using Resoft Wind Farm ZTV (Zone of Theoretical Visibility) software in combination with QGIS (Version 3.22), using a notional and precautionary layer suspended at 25m, which represents the lowest swept height of the turbine blades. While the relevance of being able to view as much of the site to ground level is acknowledged, the SNH guidance emphasises the importance of visibility of the 'collision risk volume' when the data is to be used to estimate the risk of collision with turbines by birds.

The viewshed analysis involved testing each VP location for its visibility coverage by creating a view shed point 1.5m in height (to represent the height of the observer) on a map using 10 metre contours terrain data. The relative height of forestry and its effects on visibility is also accounted for in the analysis. Using the ZTV software, a viewshed of 360 degrees was produced calculating an area 25m from ground level up to a two-kilometre radius. The resulting viewshed image was then cropped to 180 degrees to give the viewshed from each VP location in line with SNH (2017).

Survey effort, including details of survey duration and weather condition and results are presented in Appendix 1. Figure 1.0 in Appendix 2 shows the survey area, while bird observations are shown in Figure 1.1 to Figure 1.8.

3.2.2 Red Grouse Surveys

Red Grouse surveys were undertaken in March 2022. The methodology used was derived from that described in Bibby et al. (2000) and the survey methods for the most recent national Red Grouse survey (2006/2007 to 2007/2008) coordinated by BirdWatch Ireland and submitted to the NPWS (Murray et al., 2013). The survey targeted areas of suitable habitat (i.e., open moorland and areas of heather) within 500m of the wind farm site. Areas of forestry/agricultural grassland/etc. were not surveyed as they do not have potential to support red grouse populations. The survey consisted of tape luring transects. Survey effort undertaken for transect surveys is presented in Appendix 1, including details of survey duration and weather conditions and results. Figure 4.0 in Appendix 2 shows survey area and transects, while bird observations are shown in Figure 4.1.

The work was carried out under NPWS Licence Number 38/2021.

3.2.3 Winter Walkover Surveys

Winter Walkover Surveys were undertaken to determine the presence of bird species of high conservation concern within areas of potentially suitable habitat in the study area. The survey area extended to a 500m radius of the site boundary (where access allowed).

Transect routes were devised to ensure coverage of different habitat complexes between vantage point locations within the study area, during the winter months. The methodology was broadly based on methods described in Bibby et al. (2000) and Brown and Shepherd (1993). Target species were raptors, waterbirds, gulls, and ground birds of conservation interest. Along with target species, all additional species observed were recorded to inform the evaluation of supporting habitat.

The survey effort, including details of survey duration and weather conditions, is presented in Appendix 1. Figure 2.0 in Appendix 2 shows the surveyed area and transects.

3.2.4 Hen Harrier Roost Surveys

Potential hen harrier roost sites within 2km of the proposed development area (as per SNH 2017) were surveyed for the presence of hen harrier during the winter season. Survey work was undertaken in

accordance with the methodology devised by Gilbert et al. (1998) and the 'Irish Hen Harrier Winter Roost Survey' (unpublished document coordinated by members of NPWS). Surveys were carried out throughout the entirety of the non-breeding seasons (October 2021 to March 2022). Surveys were conducted from four locations each month (HHVP1, HHVP2, HHVP3 and HHVP4) which overlooked the most suitable hen harrier roosting habitat. Appendix 2, Figure 3.0 shows the locations of hen harrier roost surveys and full technical data is provided in Appendix 1.

3.3 Project Team

This report has been prepared by Andrew O'Donoghue (B.Sc.) Project Ornithologist with MKO. The field surveys were undertaken in the 2021/2022 winter season by Robert Vaughan, Lee Dark, Kate Bismilla and Andrew O'Donoghue, all of whom are competent bird surveyors.

3.4 Survey Limitations

A comprehensive suite of bird surveys was undertaken at the site between October 2021 and March 2022, as detailed in this report. Results from the 2021/2022 winter season are derived from a continuous six months of surveying undertaken in accordance with best practice guidance (SNH, 2017). The survey duration and scope are considered entirely satisfactory.

4. RESULTS

4.1.1 Method of Identification of Target Species

Following a comprehensive desk study by MKO prior to surveys in 2018, initial site visit and consultation, a list of "Target species" likely to occur at the site was compiled. The survey work carried out at the wind farm site was specifically designed to survey for these identified target species in accordance with SNH guidance (2017). The target species list was drawn from:

- Annex I of the EU Birds Directive
- Red listed birds on the BoCCI
- SCIs of SPAs within the zone of likely significant effects
- Raptor species sensitive to wind farm developments.

4.2 Field survey results

4.2.1 Introduction

The following bird species were recorded during the 2021/2022 winter season and observations are described in detail in subsequent sections below. The list is ordered in accordance with conservation significance: Annex I species, SCIs of SPAs, Red listed species, and raptors:

- Hen harrier (Annex I)
- Golden plover (Annex I)
- Whooper swan (Annex I)
- Red grouse (BoCCI Red list)
- Woodcock (BoCCI Red list)
- Snipe (BoCCI Red list)
- Kestrel (BoCCI Red list)
- Redwing (BoCCI Red list)
- Meadow pipit (BoCCI Red list)
- Grey wagtail (BoCCI Red list)
- Long eared owl (Raptor)
- Buzzard (Raptor)
- Sparrowhawk (Raptor)

The following sections describe the observations of each target species under the individual survey headings. Raw data and maps are provided in Appendix 1 and Appendix 2, respectively.

4.2.2 Vantage Point Survey Results

Vantage point surveys were undertaken at the site between October 2021 and March 2022 inclusive. Summary results from vantage point surveys are presented below in Table 4-1 and discussed in further detail in Section 5 of this report.

Table 4-1 Vantage Point Survey Results

Species	Total number of observations recorded during this survey type	Total Number of Bird Seconds at PCH	Number of observations on site/within 500m	Activity of note	Figure[1]
Hen harrier	11	355	10	On the 30th of March a male and female were observed displaying to south of the site near the previously used nest sites. All other observations involved single birds hunting, foraging, and flying over. One observation was from both October and February, with nine from March.	Appendix 2, Figure 1.1
Golden plover	12	797	8	All observations involved flocks of up to 100 birds in flight on and around Dough Mountain or unseen birds calling in the same area. Average flock size was of 39 birds.	Appendix 2, Figure 1.2
Whooper swan	1	50	1	On the 22nd of October a flock of eight migrating birds flew over the southern section of the site.	Appendix 2, Figure 1.3
Woodcock	3	0	0	All observations involved single birds in flight off site.	Appendix 2, Figure 1.4
Kestrel	7	810	5	All observations involved single adult or immature birds in flight, hunting, or hovering.	Appendix 2, Figure 1.5
Snipe	9	50	8	All observations involved one or two birds in flight or calling. Observed across the site.	Appendix 2, Figure 1.6
Sparrowhawk	13	96	8	All observations involved single adult or immature birds hunting, foraging, or flying over. Observations were made across the site.	Appendix 2, Figure 1.7
Buzzard	24	3970	19	In December a pair were observed displaying over the southern section of the site. The remaining observations involved either one or two birds circling, flying over and calling across the survey area.	Appendix 2, Figure 1.8

Species	Total number of observations recorded during this survey type	Total Number of Bird Seconds at PCH	Number of observations on site/within 500m	Activity of note	Figure[1]
Redwing	7	-	7	Flocks of up to 50 birds across the site and within 500m of site.	-
Meadow pipit	16	-	16	Flocks of up to 17 birds across the site and within 500m of site.	-
Grey wagtail	1	-	1	Single bird in flight on south of site in February.	-

4.2.3 Red Grouse Survey Results

Red grouse surveys were carried out in March 2022. Summary results from these surveys are presented below in Table 4-2 and discussed in more detail in Section 5 of this report.

Table 4-2 Red Grouse Survey Results

Species	Total number of observations recorded during survey type	Number of observations on site/ within 500m	Activity of note	Breeding Status	Figure
Red Grouse	2	2	Single displaying males recorded at both Killea and Saddle Hill.		Appendix 2, Figure 4.1

4.2.4 Winter Walkover Survey Results

Winter walkover surveys were carried out during the 2021/2022 winter season: October to March. Summary results from these surveys are presented below in Table 4-3 and discussed in more detail in Section 5 of this report.

Table 4-3 Winter Walkover Survey Results

Species	Total number of observations recorded during survey type	Number of observations on site/ within 500m	Activity of note	Figure
Whooper swan	1	1	On the 28th of October a flock of 30 migrating birds were recorded flying over the northern section of site.	Appendix 2, Figure 2.1
Red grouse	6	6	Birds observed flushed or calling at Killea and Saddle hill. Max. flock size two birds.	Appendix 2, Figure 2.2
Woodcock	1	1	One bird observed flushed on site west of Killea.	Appendix 2, Figure 2.3
Kestrel	1	1	Single bird observed in flight on site.	Appendix 2, Figure 2.4
Snipe	6	5	All observations involved one or two birds flushed or in flight.	Appendix 2, Figure 2.5
Sparrowhawk	2	2	Both observations involved adult birds hunting on site or within 500m of site.	Appendix 2, Figure 2.6
Buzzard	3	3	On the 27th of March a pair were observed in Courtship over Boleyboy on site. Single birds were also observed in flight.	Appendix 2, Figure 2.7
Redwing	11	11	Flocks of up to 75 birds on site and within 500m of site.	-
Meadow pipit	21	21	Flocks of up 38 birds on site and within 500m of site.	-

4.2.5 Hen Harrier Roost Survey Results

Hen harrier roost surveys were carried out during the 2021/2022 winter season: October to March. Summary results from these surveys are presented below in Table 4-4 and discussed in more detail in Section 5 of this report.

Table 4-4 Hen Harrier Roost Survey Results

Species	Total number of observations recorded during survey type	Number of observations on site/ within 500m	Activity of note	Roosting Status	Figure
Hen Harrier	1	1	One observation of an adult male in flight north of the southern section of site in March.	No roosts identified.	Appendix 2, Figure 3.1

4.2.6 Incidentals

Several incidental observations of target species were recorded during the survey period. The most significant of these observations are detailed in Table 4-5 below and discussed in further detail in Section 5 of this report.

Table 4-5 Incidental Observations

Species	Survey Type(s)	No. of Observations	Activity of note	Figure
Hen harrier	VP and Winter Walkover Surveys.	7	On the 29th of March a pair were observed displaying on the southern section of the site, near previously used nest sites. All other observations involved single birds in flight, foraging and hunting.	Appendix 2, Figure 5.0
Red grouse	VP Surveys.	1	Single male observed on the ground at Killea within 500m of site.	Appendix 2, Figure 5.1
Woodcock	VP and HHVP Surveys.	20	One observation of three birds flushed on site, two birds also flushed on one occasion. Remaining observations involved single birds in flight or flushed on site or within 2km of the site.	Appendix 2, Figure 5.2
Snipe	VP and HHVP Surveys.	8	A flock of five birds was flushed near Killea. Other observations involved birds flushed and in flight on site and within 2km of the site.	Appendix 2, Figure 5.3
Long-eared owl	HHVP Surveys.	2	In March a single bird was twice observed hunting near Raheelin approx. 1km off site.	Appendix 2, Figure 5.4
Sparrowhawk	HHVP Surveys.	4	All were of single male, female and juvenile birds hunting or flying over.	Appendix 2, Figure 5.5
Buzzard	HHVP and Winter Walkover Surveys.	4	One observation of two birds in flight on site in the northern section. Other observations were of single birds in flight across the site.	Appendix 2, Figure 5.6
Redwing	HHVP Surveys	5	Flocks of up to 100 birds recorded across the site and survey area.	-
Meadow pipit	VP and HHVP Surveys	3	Flocks of up to 3 birds recorded across the site and survey area.	-
Grey Wagtail	HHVP Surveys	1	A single bird was recorded off site in October.	-

5. DISCUSSION

The following section provides a synopsis of the findings of the surveys undertaken during the 2021/22 winter season (October 2021 to March 2022) for each of the target species recorded.

5.1 Hen Harrier

This species was recorded nineteen times during the survey period. Adult male and female birds were recorded, in flight, foraging, hunting, and displaying on one occasion. Hen harrier were recorded early and late in the winter season, with the majority of observations in late March and no records in the core winter period (November-January). This suggests these observations are of late and early breeding birds rather than a wintering population. No roosting hen harrier were recorded.

In late March a pair were observed displaying in the vicinity of the 2019,2020 and 2021 nest on the southern section of the site. This indicates probable breeding in this area. Breeding season surveys will aim to establish if further breeding activity occurs.

5.2 Golden Plover

This species was recorded on twelve occasions during the survey period. All observations were in the Dough Mountain area off site or within 500m of the site. In November a peak flock size of 100 birds was recorded in flight. Remaining observations involved flocks in flight or calling.

5.3 Whooper swan

There were two observations of this species. In October two migrating flocks of eight and thirty birds were recorded in flight over site, the flock of eight at PCH. As these were migrating flights the birds were likely travelling beyond the survey area given lack of suitable habitat on site.

5.4 Red Grouse

Red grouse were recorded on eight occasions during surveys. A resident population exists on the boundary of the site at Saddle Hill and Killea/Dough Mountain. A single displaying male was recorded at each of these locations during species specific red grouse surveys. Single birds or pairs were also encountered calling and in flight on site and within 500m of site in these areas during other survey types.

5.5 Woodcock

Woodcock were recorded on 24 occasions during surveys. Birds were recorded across the site. The majority of observations involved single birds flushed or in flight at dawn and dusk. A peak flock size of three birds was recorded in December.

5.6 Snipe

Snipe were recorded on 23 occasions during surveys. The majority of observations involved single birds flushed or in flight with a peak flock size of five birds recorded in October. Birds were recorded across the site.

5.7 Kestrel

Kestrel were recorded eight times during surveys. Birds were recorded in flight foraging hunting and hovering. Adults and juvenile birds were recorded across the site.

5.8 Buzzard

Buzzard were recorded 31 times during the survey period. A pair were observed displaying near Boleyboy in December and March. Other observations involved one or two birds in flight, foraging or soaring. Observed across the site.

5.9 Sparrowhawk

There were nineteen observations of sparrowhawk during the survey period. Observations involved male female and juvenile birds in flight or hunting on site or within 500m of site. Birds were recorded across the site.

5.10 Red-listed passerines

Redwing were recorded regularly on site with a peak flock size of 100 birds. Meadow pipit were also regularly recorded in open habitats on site, with a peak flock size of 38 birds. Grey wagtail was recorded on two occasions off site.

6. CONCLUSION

Key impacts resulting from the proposed development for local avian receptors could include habitat loss, disturbance, displacement, and collision risk.

There is a resident population of hen harrier, red grouse, golden plover, woodcock, snipe, kestrel, buzzard, and sparrowhawk on or within 500m of the wind farm site. The proposed development could result in habitat loss and disturbance/displacement impacts on these species. These potential impacts should be considered in greater detail at the assessment stage. Given the number of birds recorded and the frequency of observations, it is likely that these impacts will not be significant. However, a full two-years of survey data will be required to provide a robust assessment of these impacts.

Collision risk should be a key consideration at the assessment stage for hen harrier and buzzard. However, until the collision risk analysis is undertaken this impact cannot be considered in any detail. All findings should be considered in the context of two full years of surveys (i.e., two breeding seasons and two non-breeding seasons), as two years of flight activity data is required to inform a robust collision risk analysis.

Whooper swan were recorded infrequently flying over the wind farm site. To date, no significant impacts are anticipated for these species. Redwing and meadow pipit were regularly recorded on site; however, no significant impact is anticipated for these species.

BIBLIOGRAPHY

Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. & Fuller, R.J. (2013) *Bird Atlas 2007-11: The breeding and wintering birds of Britain and Ireland*. BTO Books, Thetford.

Bibby, C.J., Burgess, N.D., Hill, D.A., and Mustoe, S. (2000) *Bird Census Techniques*. Academic Press, London.

Council Directive 92/43/EEC 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31992L0043

Council Directive 2009/147/EC 30 November 2009 on the conservation of wild birds. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32009L0147

Gilbert, G., Gibbons, D.W. and Evans, J. (1998) *Bird Monitoring Methods.* Bedfordshire, England: Pelagic Publishing, Royal Society for the protection of Birds.

Gilbert, G., Stanbury, A. and Lewis, A. (2021). Birds of Conservation Concern in Ireland 4: 2020-2026. *Irish Birds,* 43:1-22. Available at: https://birdwatchireland.ie/birds-of-conservation-concern-in-ireland/

Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. and Thompson, D. (2013) *Raptors. A field Guide for Surveys and Monitoring*. The Stationary Office, Edinburgh.

SNH (2016). Assessing connectivity with Special Protection Areas (SPAs). Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2018-08/Assessing%20connectivity%20with%20special%20protection%20areas.pdf

SNH (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms. Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2018-06/Guidance%20Note%20-%20Recommended%20bird%20survey%20methods%20to%20inform%20impact%20assessment%20of%20onshore%20windfarms.pdf

APPENDIX 1

BIRD SURVEY DATA

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Appendix 1 Table 1 Survey Effort

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
10/10/2021	Vantage Point Survey	VP3	3:00 starting at 06:50	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none		RV
10/10/2021	Vantage Point Survey	VP3	3:00 starting at 06:50	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none		RV
10/10/2021	Vantage Point Survey	VP3	3:00 starting at 10:20	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none		RV
10/10/2021	Vantage Point Survey	VP3	3:00 starting at 10:20	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none		RV
10/10/2021	Hen Harrier Roost Survey	HHR2	1:30 starting at 17:45	Visibility: good; Wind speed and direction: light air W-NW; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none		RV
15/10/2021	Vantage Point Survey	VP4	3:00 starting at 07:00	Visibility: good; Wind speed and direction: light breeze E-NE; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none		RV
15/10/2021	Vantage Point Survey	VP4	3:00 starting at 10:30	Visibility: good; Wind speed and direction: light breeze E-NE; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none		RV
15/10/2021	Hen Harrier Roost Survey	HHR3	2:00 starting at 17:30	Visibility: good; Wind speed and direction: light air SE; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none		RV
17/10/2021	Breeding Walkover Survey	Transect 1	2:08 starting at 11:10	Visibility: good; Wind speed and direction: gentle breeze S-SW; Cloud cover and height: 3% 150-500m; Rain: drizzle; Frost: none; Snow: none		RV
17/10/2021	Breeding Walkover Survey	Transect 2	1:43 starting at 13:45	Visibility: moderate; Wind speed and direction: gentle breeze S; Cloud cover and height: 3% 150-500m; Rain: drizzle; Frost: none; Snow: none		RV
17/10/2021	Breeding Walkover Survey	Transect 3	1:01 starting at 15:56	Visibility: moderate; Wind speed and direction: gentle breeze S; Cloud cover and height: 3% 150-500m; Rain: drizzle; Frost: none; Snow: none		RV

17/10/2021	Hen Harrier Roost Survey	HHR6	1:35 starting at 17:35	Visibility: poor; Wind speed and direction: gentle breeze S; Cloud cover and height: 3% <150m; Rain: drizzle; Frost: none; Snow: none		RV
20/10/2021	Vantage Point Survey	VP2	3:00 starting at 07:10	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		KB
20/10/2021	Vantage Point Survey	VP2	3:00 starting at 10:40	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		KB
22/10/2021	Vantage Point Survey	VP1	3:00 starting at 07:12	Visibility: good; Wind speed and direction: fresh breeze NW; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		KB
22/10/2021	Vantage Point Survey	VP1	3:00 starting at 10:42	Visibility: moderate; Wind speed and direction: fresh breeze NW; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		KB
28/10/2021	Breeding Walkover Survey	Transect 4	2:06 starting at 09:00	Visibility: good; Wind speed and direction: gentle breeze S-SW; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none		RV
28/10/2021	Breeding Walkover Survey	Transect 5	1:31 starting at 13:08	Visibility: good; Wind speed and direction: moderate breeze S-SW; Cloud cover and height: 3% 150-500m; Rain: drizzle; Frost: none; Snow: none		RV
28/10/2021	Hen Harrier Roost Survey	HHR4	1:50 starting at 17:00	Visibility: good; Wind speed and direction: light air S-SW; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none		RV
07/11/2021	Vantage Point Survey	VP1	3:00 starting at 10:52	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		LD
07/11/2021	Vantage Point Survey	VP1	2:00 starting at 14:22	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		LD

07/11/2021	Vantage Point Survey	VP1	1:00 starting at 16:22	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		LD
10/11/2021	Hen Harrier Roost Survey	HHR6	2:00 starting at 07:00	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none		RV
10/11/2021	Breeding Walkover Survey	Transect 3	1:07 starting at 09:27	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 3% >500m; Rain: none; Frost: none; Snow: none		RV
10/11/2021	Vantage Point Survey	VP2	6:30 starting at 11:10	Visibility: good; Wind speed and direction: gentle breeze S-SW; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none		RV
19/11/2021	Hen Harrier Roost Survey	HHR4	1:50 starting at 07:10	Visibility: moderate; Wind speed and direction: gentle breeze SW; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none		RV
19/11/2021	Breeding Walkover Survey	Transect 4	2:20 starting at 09:16	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 3% 150-500m; Rain: drizzle; Frost: none; Snow: none		RV
23/11/2021	Hen Harrier Roost Survey	HHR2	2:00 starting at 07:15	Visibility: good; Wind speed and direction: light breeze W-SW; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none		RV
23/11/2021	Vantage Point Survey	VP3	6:30 starting at 10:50	Visibility: good; Wind speed and direction: gentle breeze W-SW; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none		RV
24/11/2021	Hen Harrier Roost Survey	HHR3	2:00 starting at 07:25	Visibility: good; Wind speed and direction: light air N; Cloud cover and height: 2% 150-500m; Rain: none; Frost: none; Snow: none		RV
24/11/2021	Vantage Point Survey	VP4	6:30 starting at 10:50	Visibility: good; Wind speed and direction: gentle breeze N; Cloud cover and height: 2% 150-500m; Rain: light showers; Frost: none; Snow: none		RV
25/11/2021	Breeding Walkover Survey	Transect 1	1:59 starting at 09:04	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none		RV

25/11/2021	Breeding Walkover Survey	Transect 2	1:32 starting at 11:35	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none		RV
25/11/2021	Breeding Walkover Survey	Transect 5	1:23 starting at 14:36	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: 3% 150-500m; Rain: drizzle; Frost: none; Snow: none		RV
14/12/2021	Vantage Point Survey	VP3	6:30 starting at 07:50	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none		RV
14/12/2021	Hen Harrier Roost Survey	HHR4	2:00 starting at 15:05	Visibility: good; Wind speed and direction: light air S-SW; Cloud cover and height: 1% >500m; Rain: none; Frost: none; Snow: none	No HH observations	RV
16/12/2021	Vantage Point Survey	VP1	6:30 starting at 07:50	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none		RV
16/12/2021	Hen Harrier Roost Survey	HHR1	2:00 starting at 15:05	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none	No HH observations	RV
20/12/2021	Vantage Point Survey	VP2	6:30 starting at 07:50	Visibility: moderate; Wind speed and direction: gentle breeze E; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none		RV
20/12/2021	Hen Harrier Roost Survey	HHR2	2:05 starting at 15:00	Visibility: good; Wind speed and direction: light breeze E-SE; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none	No HH observations	RV
31/12/2021	Vantage Point Survey	VP4	6:30 starting at 07:55	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 3% >500m; Rain: none; Frost: none; Snow: none		RV
31/12/2021	Hen Harrier Roost Survey	HHR3	2:00 starting at 15:15	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none	No HH observations	RV
11/01/2022	Vantage Point Survey	VP1	3:00 starting at 11:00	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 1% >500m; Rain: none; Frost: none; Snow: none		RV

11/01/2022	Vantage Point Survey	VP1	3:00 starting at 14:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 1% >500m; Rain: none; Frost: none; Snow: none		RV
12/01/2022	Vantage Point Survey	VP2	3:00 starting at 11:00	Visibility: moderate; Wind speed and direction: moderate breeze SW; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none	Low cloud just above VP, clear below	RV
12/01/2022	Vantage Point Survey	VP2	3:00 starting at 14:30	Visibility: moderate; Wind speed and direction: moderate breeze SW; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none	Low cloud just above VP, clear below	RV
13/01/2022	Vantage Point Survey	VP3	3:00 starting at 11:05	Visibility: moderate; Wind speed and direction: moderate breeze S-SW; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none	Low cloud through out, at times descended below VP	RV
13/01/2022	Vantage Point Survey	VP3	3:00 starting at 14:35	Visibility: moderate; Wind speed and direction: moderate breeze S-SW; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none	Low cloud through out, at times descended below VP	RV
20/01/2022	Vantage Point Survey	VP4	3:00 starting at 11:15	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 3% >500m; Rain: none; Frost: none; Snow: none		RV
20/01/2022	Vantage Point Survey	VP4	3:00 starting at 14:45	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 3% >500m; Rain: none; Frost: none; Snow: none		RV
08/02/2022	Vantage Point Survey	VP3	3:00 starting at 07:10	Visibility: good; Wind speed and direction: gentle breeze W-SW; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none	Male harrier seen, flushed a snipe.	RV
08/02/2022	Vantage Point Survey	VP3	3:00 starting at 10:40	Visibility: good; Wind speed and direction: gentle breeze W-SW; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none	Male harrier seen, flushed a snipe.	RV
08/02/2022	Hen Harrier Roost Survey	HHR1	2:00 starting at 16:25	Visibility: good; Wind speed and direction: gentle breeze W-SW; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none		RV
10/02/2022	Vantage Point Survey	VP4	3:00 starting at 07:20	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 1% >500m; Rain: light showers; Frost: none; Snow: none	Snow and frost on arrival, cleared quickl	RV

10/02/2022	Vantage Point Survey	VP4	3:00 starting at 10:50	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 1% >500m; Rain: light showers; Frost: none; Snow: none	Snow and frost on arrival, cleared quickl	RV
10/02/2022	Hen Harrier Roost Survey	HHR3	2:00 starting at 16:30	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 2% >500m; Rain: drizzle; Frost: none; Snow: none	Male harrier circling and dropping into cover just before start of Survey	RV
15/02/2022	Vantage Point Survey	VP2	3:00 starting at 07:00	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 3% 150-500m; Rain: light showers; Frost: none; Snow: none	Very changeable weather	RV
15/02/2022	Vantage Point Survey	VP2	3:00 starting at 10:30	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 3% 150-500m; Rain: light showers; Frost: none; Snow: none	Very changeable weather	RV
15/02/2022	Hen Harrier Roost Survey	HHR2	2:00 starting at 16:40	Visibility: moderate; Wind speed and direction: gentle breeze S; Cloud cover and height: 3% 150-500m; Rain: light showers; Frost: none; Snow: none	Light persistent rain	RV
25/02/2022	Vantage Point Survey	VP1	3:00 starting at 06:31	Visibility: good; Wind speed and direction: light air SW; Cloud cover and height: 66-100% <150m; Rain: none; Frost: heavy; Snow: falling		LD
25/02/2022	Vantage Point Survey	VP1	1:00 starting at 10:01	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: heavy; Snow: on ground		LD
25/02/2022	Vantage Point Survey	VP1	1:00 starting at 11:01	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: heavy; Snow: on ground		LD
25/02/2022	Vantage Point Survey	VP1	1:00 starting at 12:01	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: heavy; Snow: on ground		LD
26/02/2022	Hen Harrier Roost Survey	HHR4	2:00 starting at 17:00	Visibility: none; Wind speed and direction: moderate breeze S; Cloud cover and height: 3% >500m; Rain: none; Frost: none; Snow: none	Male sparrowhawk, 3 woodcock	RV
08/03/2022	Hen Harrier Roost Survey	HHR1	2:00 starting at 06:05	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 3% >500m; Rain: none; Frost: none; Snow: none	Male harrier seen at 07:40	RV

08/03/2022	Vantage Point Survey	VP2	3:00 starting at 12:50	Visibility: good; Wind speed and direction: fresh breeze S; Cloud cover and height: 3% 150-500m; Rain: heavy showers; Frost: none; Snow: none	Male harrier seen once, 1 sn flushed	RV
08/03/2022	Vantage Point Survey	VP2	3:00 starting at 16:20	Visibility: good; Wind speed and direction: fresh breeze S; Cloud cover and height: 3% 150-500m; Rain: heavy showers; Frost: none; Snow: none	Male harrier seen once, 1 sn flushed	RV
14/03/2022	Hen Harrier Roost Survey	HHR3	2:00 starting at 05:50	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 3% 150-500m; Rain: light showers; Frost: none; Snow: none		RV
14/03/2022	Vantage Point Survey	VP1	3:00 starting at 13:05	Visibility: good; Wind speed and direction: gentle breeze W-SW; Cloud cover and height: 1% >500m; Rain: none; Frost: none; Snow: none	Male harrier seen twice, 20 GP, several Buzzards.	RV
14/03/2022	Vantage Point Survey	VP1	3:00 starting at 16:35	Visibility: good; Wind speed and direction: gentle breeze W-SW; Cloud cover and height: 1% >500m; Rain: none; Frost: none; Snow: none	Male harrier seen twice, 20 GP, several Buzzards.	RV
15/03/2022	Hen Harrier Roost Survey	HHR2	2:00 starting at 05:50	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none	Dipper singing, 2 woodcock	RV
15/03/2022	Breeding Walkover Survey	Transect 1	1:02 starting at 11:17	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 3% 150-500m; Rain: drizzle; Frost: none; Snow: none	SH flushed along road	RV
15/03/2022	Vantage Point Survey	VP3	3:00 starting at 13:05	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 3% 150-500m; Rain: light showers; Frost: none; Snow: none	Very changeable weather	RV
15/03/2022	Vantage Point Survey	VP3	3:00 starting at 16:35	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 3% 150-500m; Rain: light showers; Frost: none; Snow: none	Very changeable weather	RV
27/03/2022	Hen Harrier Roost Survey	HHR4	2:00 starting at 06:20	Visibility: good; Wind speed and direction: calm E; Cloud cover and height: 1% >500m; Rain: none; Frost: none; Snow: none	Long-eared owl seen twice	RV
27/03/2022	Breeding Walkover Survey	Transect 2	1:27 starting at 08:48	Visibility: good; Wind speed and direction: light air E; Cloud cover and height: 1% >500m; Rain: none; Frost: none; Snow: none	2 BZ displaying and RG pair flushed	RV

27/03/2022	Breeding Walkover Survey	Transect 3	1:40 starting at 10:44	Visibility: good; Wind speed and direction: light breeze E; Cloud cover and height: 1% >500m; Rain: none; Frost: none; Snow: none	1 SN flushed	RV
29/03/2022	Breeding Walkover Survey	Transect 4	1:52 starting at 13:28	Visibility: good; Wind speed and direction: light breeze E-NE; Cloud cover and height: 1% >500m; Rain: none; Frost: none; Snow: none	Male K seen	RV
30/03/2022	Breeding Walkover Survey	Transect 5	2:18 starting at 09:01	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: 3% >500m; Rain: none; Frost: none; Snow: none	BZ heard but not seen	RV
30/03/2022	Vantage Point Survey	VP4	3:00 starting at 14:35	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none	Male and female harrier seen	RV
30/03/2022	Vantage Point Survey	VP4	3:00 starting at 18:05	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none	Male and female harrier seen	RV
31/03/2022	Breeding Red Grouse Survey	500m Radius	6:00 starting at 11:30	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		AOD

Appendix 1 Table 2 Vantage Point Flight Observations

Report Ref.	Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	PCH (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
	Not Mapped	VP3	10/10/2021	06:50	Meadow Pipit	13	-	-	-	-	-	upland blanket bog; flying, 13 mostly flyovers	RV
HH001	2021-11-30T11:51:12.600	VP3	10/10/2021	08:34	Hen Harrier	1	37	37	0	0	0	raised bog, conifer plantation and scrub; flying, meandering across site	RV
K001	2021-11-30T11:53:57.018	VP3	10/10/2021	12:17	Kestrel	1	276	16	125	140	0	upland blanket bog; hunting, hovering and hunting, landed 3 times	RV
K002	2021-11-30T11:56:06.280	VP3	10/10/2021	12:41	Kestrel	1	546	45	30	471	0	upland blanket bog; hunting, hunting, dropped low a few times, consistant around 30 metres height.	RV
	Not Mapped	VP4	15/10/2021	07:00	Redwing	30	-	-	-	-	-	conifer plantation; flying, 30, 3 singles and flock of 27	RV
	2021-11-30T12:09:30.222	VP4	15/10/2021	07:00	Meadow Pipit	17	-	-	-	-	-	conifer plantation; flying, 17, lots of flyovers, highest count	RV
WK001	2021-11-30T12:01:18.439	VP4	15/10/2021	07:11	Woodcock	1	5	5	0	0	0	scrub; flying, flew low, probable, seen through vegetation in low light	RV
SH001	2021-11-30T12:02:52.490	VP4	15/10/2021	08:21	Sparrowhawk	1	10	0	10	0	0	scrub; flying, flew low past vp	RV
BZ001	2021-11-30T12:12:40.823	VP4	15/10/2021	09:46	Buzzard	1	360	0	0	350	0	improved agricultural grassland and conifer plantation; circling,	RV

												circling behind turbines	
BZ002	2021-11-30T12:14:48.515	VP4	15/10/2021	12:36	Buzzard	1	225	0	0	225	0	conifer plantation and improved agricultural grassland; circling	RV
BZ003	2021-11-30T12:16:48.525	VP4	15/10/2021	13:11	Buzzard	1	1140	0	0	800	340	conifer plantation and improved agricultural grassland; circling, circling with 2 ravens	RV
	MP002	VP2	20/10/2021	08:43	Meadow Pipit	5	-	-	-	-	-	bogs; foraging	KB
GP001	GP002	VP2	20/10/2021	09:02	Golden Plover	8	10	10	0	0	0	bogs; flying over	KB
GP002	GP003	VP2	20/10/2021	09:14	Golden Plover	1	8	8	0	0	0	bogs; flying over	KB
	MP003	VP2	20/10/2021	10:02	Meadow Pipit	1	-	-	-	-	-	bogs; foraging	KB
	GP001	VP2	20/10/2021	10:02	Golden Plover	1	-	-	-	-	-	bogs; calling heard on ground	KB
BZ004	BZ001	VP2	20/10/2021	10:11	Buzzard	1	-	-	-	-	-	bogs; calling heard	KB
SN001	SN001	VP1	22/10/2021	07:34	Snipe	1	20	0	0	20	0	bogs; travelling	KB
SN002	SN002	VP1	22/10/2021	07:40	Snipe	1	12	0	12	0	0	bogs; travelling	KB
	MP001	VP1	22/10/2021	08:02	Meadow Pipit	7	-	-	-	-	-	bogs; foraging	KB
	RE001	VP1	22/10/2021	08:16	Redwing	2	-	-	-	-	-	bogs and conifer plantation; flying over	KB
SN003	SN003	VP1	22/10/2021	08:57	Snipe	2	30	0	0	30	0	bogs and conifer plantation; travelling	KB
WS001	WS001	VP1	22/10/2021	09:29	Whooper Swan	8	50	0	0	50	0	bogs and conifer plantation; travelling	KB
GP004	GP001	VP1	22/10/2021	10:58	Golden Plover	5	8	8	0	0	0	bogs; flying over	KB
	2022-12-23T16:56:49.071	VP2	10/11/2021	11:10	Redwing	16	-	-	-	-	-	improved agricultural grassland; flying, with ff	RV
SH002	SH001	VP2	10/11/2021	11:35	Sparrowhawk	1	13	5	8	0	0	conifer plantation; flying	RV

BZ005	BZ001	VP2	10/11/2021	11:51	Buzzard	1	285	0	190	95	0	improved agricultural grassland, conifer plantation and scrub; circling/ hunting, circling along edge of plantation	RV
BZ006	BZ002	VP2	10/11/2021	12:21	Buzzard	1	105	0	35	70	0	improved agricultural grassland; circling, circled up over far hill then glided north out of view	RV
K003	K001	VP2	10/11/2021	15:12	Kestrel	1	14	0	14	0	0	upland blanket bog; flying, male, flew toward me but doubled back, landed briefly on top of pine.	RV
GP005	GP001	VP2	10/11/2021	15:13	Golden Plover	100	34	0	0	34	0	upland blanket bog; flying, circled over hill behind vp just after k. flew that way, i walked up to see where k had gone, gp flew north.	RV
K004	K002	VP2	10/11/2021	15:32	Kestrel	1	184	5	12	167	0	improved agricultural grassland and upland blanket bog; hunting, male, hovering and hunting, landed briefly but caught nothing.	RV
BZ007	BZ003	VP2	10/11/2021	16:24	Buzzard	1	19	0	19	0	0	improved agricultural grassland and conifer plantation; flying, flew quickly across edge of plantation	RV
	2022-12-23T16:53:21.855	VP2	10/11/2021	16:53	Meadow Pipit	1	-	-	-	-	-	improved agricultural grassland; flying, flew south over vp	RV

SH003	SH002	VP2	10/11/2021	16:54	Sparrowhawk	1	9	0	9	0	0	improved agricultural grassland; flying, flew quickly just over the road.	RV
SH004	LD101	VP1	17/11/2021	12:24	Sparrowhawk	1	12	12	0	0	0	wet grassland and conifer plantation; hunting and travelling, sparrowhawk seen hunting on the hillside.	LD
	Not Mapped	VP1	17/11/2021	12:27	Meadow Pipit	1	10	10	0	0	0	wet grassland; travelling, meadow pipits on site.	LD
	Not Mapped	VP1	17/11/2021	14:40	Meadow Pipit	2	10	10	0	0	0	wet grassland; travelling, meadow pipits on site.	LD
BZ008	LD104	VP1	17/11/2021	15:17	Buzzard	1	12	2	14	0	0	wet grassland and conifer plantation; hunting, buzzard also hunting further west below the vp.	LD
	2022-12-23T16:58:59.657	VP3	23/11/2021	10:50	Meadow Pipit	4	-	-	-	-	-	improved agricultural grassland; flying, along road	RV
K005	K003	VP3	23/11/2021	14:41	Kestrel	1	61	0	61	0	0	upland blanket bog; hunting, female/imm, hovered twice behind plantation, flew west	RV
K006	K004	VP3	23/11/2021	15:11	Kestrel	1	155	0	123	32	0	improved agricultural grassland; hunting, same as above, hunting infront of turbines.	RV
	Not Mapped	VP4	24/11/2021	10:50	Meadow Pipit	2	-	-	-	-	-	improved agricultural grassland; flying	RV
	2022-12-23T17:00:25.139	VP4	24/11/2021	10:50	Redwing	25	-	-	-	-	-	improved agricultural grassland; flying, rough count, several flocks	RV

SH005	SH003	VP4	24/11/2021	11:24	Sparrowhawk	1	9	0	9	0	0	improved agricultural grassland and scrub; flying, juv male, flew leisurely across fields	RV
SH006	SH004	VP4	24/11/2021	11:54	Sparrowhawk	1	11	0	11	0	0	improved agricultural grassland and scrub; flying, same as above, flew into flock of thrush but caught nothing	RV
SH007	SH005	VP4	24/11/2021	12:29	Sparrowhawk	1	8	0	8	0	0	improved agricultural grassland, scrub and conifer plantation; flying, same as above, flew across field below vp	RV
BZ009	BZ004	VP4	24/11/2021	12:35	Buzzard	1	15	0	0	15	0	improved agricultural grassland, scrub and conifer plantation; flying, adult flew across fields behind laneway	RV
	Not Mapped	VP4	24/11/2021	15:04	Grey Wagtail	1	-	-	-	-	-	improved agricultural grassland; flying, calling	RV
SH008	SH006	VP4	24/11/2021	16:26	Sparrowhawk	1	5	0	5	0	0	scrub; flying, flew quickly over vp	RV
SN004	SN001	VP1	16/12/2021	08:17	Snipe	1	6	0	6	0	0	upland blanket bog; flying, called flying over	RV
GP006	GP001	VP1	16/12/2021	09:02	Golden Plover	75	45	0	0	45	0	upland blanket bog; circling, heard also at 08:50 and 10:07 but not seen	RV
GP007	GP002	VP1	16/12/2021	10:41	Golden Plover	75	275	0	35	240	0	upland blanket bog; circling, roughly 75 birds on each occasion	RV

GP008	GP003	VP1	16/12/2021	12:30	Golden Plover	75	35	0	0	35	0	upland blanket bog; flying, flew high over and north	RV
GP009	GP004	VP1	16/12/2021	12:38	Golden Plover	75	360	0	0	360	0	upland blanket bog; circling, circling, vocal	RV
SN005	SN002	VP2	20/12/2021	08:23	Snipe	1	5	5	0	0	0	upland blanket bog; flying, flew low past vp	RV
K007	K001	VP2	20/12/2021	09:04	Kestrel	1	67	0	67	0	0	upland blanket bog and improved agricultural grassland; hunting, male hunting low below low cloud	RV
SH009	SH001	VP2	20/12/2021	09:32	Sparrowhawk	1	9	9	0	0	0	improved agricultural grassland; flying, female flying low	RV
BZ010	BZ001	VP4	31/12/2021	10:02	Buzzard	1	315	0	60	255	0	conifer plantation; circling, hear also at 09:41 and 09:49, not seen	RV
BZ011	BZ002	VP4	31/12/2021	10:04	Buzzard	1	165	0	90	75	0	conifer plantation; circling/displaying, joined bird above, circled, called and displayed	RV
BZ012	BZ003	VP4	31/12/2021	12:22	Buzzard	1	425	0	0	425	0	improved agricultural grassland; hunting, circling, hovering and hunting infront of vp	RV
BZ013	BZ004	VP4	31/12/2021	13:08	Buzzard	1	135	0	30	105	0	improved agricultural grassland and conifer plantation; hunting, circled over famland infront of vp	RV
BZ014	BZ005	VP4	31/12/2021	13:17	Buzzard	1	8	8	0	0	0	improved agricultural grassland; flying, flew in and landed in tree	RV
BZ015	BZ006	VP4	31/12/2021	14:12	Buzzard	1	15	0	15	0	0	improved agricultural grassland; flying, flew from tree	RV

	MP001	VP1	11/01/2022	07:50	Meadow Pipit	1	-	-	-	-	-	upland blanket bog; flew over vp	RV
	RE001	VP1	11/01/2022	07:50	Redwing	15	-	-	-	-	-	upland blanket bog; flying	RV
	Not Mapped	VP4	20/01/2022	11:15	Redwing	50	-	-	-	-	-	mixed broadleaved/conifer woodland; feeding, recorded as wo	RV
	Not Mapped	VP4	20/01/2022	11:15	Meadow Pipit	5	-	-	-	-	-	mixed broadleaved/conifer woodland; feeding, recorded as wo	RV
SH010	SH001	VP4	20/01/2022	12:57	Sparrowhawk	1	96	0	0	96	0	conifer plantation; circling, circled far hill, probably a male	RV
WK002	WK001	VP4	20/01/2022	17:31	Woodcock	1	4	0	4	0	0	mixed broadleaved/conifer woodland; flying, flew from below vp south to farmland	RV
WK003	WK002	VP4	20/01/2022	17:33	Woodcock	1	4	0	4	0	0	mixed broadleaved/conifer woodland; flying, flew from below vp south to farmland	RV
SN006	SN001	VP4	20/01/2022	17:37	Snipe	1	3	0	3	0	0	mixed broadleaved/conifer woodland; flying, flew from below vp, kept low	RV
SN007	SN001	VP3	08/02/2022	07:56	Snipe	1	7	0	7	0	0	upland blanket bog; flying, flew up hill before sunrise, others heard but not seen 0718,0735 and 0738.	RV
SH011	SH001	VP3	08/02/2022	09:41	Sparrowhawk	1	72	0	72	0	0	conifer plantation; circling, circled over plantation, male	RV
HH002	HH001	VP3	08/02/2022	10:58	Hen Harrier	1	56	56	0	0	0	upland blanket bog; hunting, male hunting	RV

SN008	SN002	VP3	08/02/2022	10:59	Snipe	1	5	5	0	0	0	upland blanket bog and conifer plantation; flushed, flushed by hh, flew low and lost into plantation	RV
HH004	MP001	VP4	10/02/2022	07:10	Meadow Pipit	13	0	0	0	0	0	improved agricultural grassland and scrub; flying, flew east over vp during survey in singles and pairs	RV
HH005	RE001	VP4	10/02/2022	07:10	Redwing	20	0	0	0	0	0	improved agricultural grassland and hedgerows; feeding, feeding in sheep fields, flushed by sh twice and flew to hedgerows	RV
BZ016	BZ001	VP3	10/02/2022	08:55	Buzzard	1	18	0	18	0	0	improved agricultural grassland and hedgerows; flying, flew across fields	RV
SH012	SH002	VP4	10/02/2022	09:26	Sparrowhawk	1	10	0	10	0	0	improved agricultural grassland, hedgerows and conifer plantation; flying, female flew across infront of vp	RV
SH013	SH003	VP4	10/02/2022	11:30	Sparrowhawk	1	6	10	0	0	0	improved agricultural grassland and hedgerows; flying, female flew low across fields	RV
BZ017	BZ002	VP4	10/02/2022	11:51	Buzzard	1	625	0	45	580	0	conifer plantation and improved agricultural grassland; circling, circling and calling over plantation opposite vp	RV

	GL001	VP4	10/02/2022	13:10	Grey Wagtail	1	0	0	0	0	0	improved agricultural grassland and eroding/upland rivers; flying, flew west calling at 13:10, roughly following river	RV
	MP002	VP2	15/02/2022	07:00	Meadow Pipit	3	0	0	0	0	0	upland blanket bog; feeding, 2-3 feeding along road above vp, regulary heard calling and flying about.	RV
	2022-12-01T12:36:18.545	VP1	25/02/2022	10:46	Meadow Pipit	1	10	10	0	0	0	wet grassland; travel/display, meadwo pipit's seen on site	LD
BZ018	2022-12-01T12:39:31.520	VP1	25/02/2022	10:54	Buzzard	1	-	-	-	-	-	conifer plantation and wet grassland; calling, bz was heard calling from forestry below the vp to the west.	LD
BZ019	2022-12-01T12:38:23.766	VP1	25/02/2022	11:07	Buzzard	1	140	0	140	0	0	wet grassland and conifer plantation; hunting, a buzzard heard calling, and then seen hunting below the vp in the valley off to the west.	LD
	2022-12-01T12:37:02.234	VP1	25/02/2022	11:37	Meadow Pipit	1	10	10	0	0	0	wet grassland; travel/display, meadwo pipit's seen on site	LD
HH003	HH001	VP2	08/03/2022	18:20	Hen Harrier	1	9	9	0	0	0	conifer plantation and upland blanket bog; flying, male arrived late in evening	RV
SN009	SN001	VP2	08/03/2022	18:46	Snipe	1	6	0	6	0	0	upland blanket bog; flying, circled over plantation, male	RV

HH004	HH002	VP1	14/03/2022	13:53	Hen Harrier	1	15	0	15	0	0	upland blanket bog; hunting, male hunting mobbed by raven	RV
BZ020	BZ001	VP1	14/03/2022	14:09	Buzzard	1	145	0	0	145	0	improved agricultural grassland and conifer plantation; circling, circling bz, joined by a 2nd bird	RV
BZ021	BZ002	VP1	14/03/2022	14:10	Buzzard	1	55	0	0	55	0	improved agricultural grassland and conifer plantation; circling, joined #2 and circled higher together before gliding west	RV
GP010	GP001	VP1	14/03/2022	14:29	Golden Plover	20	58	0	0	58	0	upland blanket bog; circling, flock of c.20 circling over mountain top	RV
BZ022	BZ003	VP1	14/03/2022	15:23	Buzzard	1	156	0	0	156	0	conifer plantation; circling, circled from east and then turned north	RV
BZ023	BZ004	VP1	14/03/2022	16:42	Buzzard	1	184	0	0	184	0	conifer plantation and improved agricultural grassland; circling, circled from east and then flew sw	RV
GP011	GP002	VP1	14/03/2022	16:56	Golden Plover	20	25	0	0	25	0	upland blanket bog; circling, circling and calling	RV
HH005	HH003	VP1	14/03/2022	17:37	Hen Harrier	1	65	0	35	30	0	upland blanket bog and conifer plantation; circling, circled in from west and past vp	RV
BZ024	BZ005	VP1	14/03/2022	18:28	Buzzard	1	435	0	0	435	0	conifer plantation and improved agricultural grassland; circling, circled calling before	RV

												landing out of view in trees	
GP012	GP003	VP3	15/03/2022	13:36	Golden Plover	12	15	0	15	0	0	upland blanket bog; flying, flew low behind vp3 calling	RV
HH006	HH004	VP4	30/03/2022	16:35	Hen Harrier	1	75	65	10	0	0	upland blanket bog and conifer plantation; hunting, male flew in and landed out of view	RV
HH007	HH005	VP4	30/03/2022	16:36	Hen Harrier	1	385	15	45	325	0	upland blanket bog and conifer plantation; displaying, female arrived after male then circled and displayed high over area	RV
HH008	HH006	VP4	30/03/2022	17:41	Hen Harrier	1	75	25	50	0	0	upland blanket bog and conifer plantation; circling, male circled up and flew west	RV
HH009	HH007	VP4	30/03/2022	17:58	Hen Harrier	1	20	20	0	0	0	improved agricultural grassland; hunting, male hunting	RV
HH010	HH008	VP4	30/03/2022	18:10	Hen Harrier	1	28	28	0	0	0	upland blanket bog and conifer plantation; hunting, male flew in slowly hunting and landed out of view	RV
HH011	HH009	VP4	30/03/2022	19:04	Hen Harrier	1	75	50	25	0	0	upland blanket bog, improved agricultural grassland and conifer plantation; hunting, male flew around hunting, out of view behind vp and then	RV

												landed briefly before flying west	

Appendix 1 Table 3 Winter Walkover Observations

Report Ref.	Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
	2021-11-30T14:04:29.798	17/10/2021	11:10	Meadow Pipit	6	improved agricultural grassland; feeding, feeding in rough grassland (suitable nesting habitat; possible breeder)	RV
	NOT MAPPED	17/10/2021	11:10	Redwing	13	scrub and conifer plantation; flyover, flushed from scrub in plantation (flyover; non-breeding)	RV
	2021-11-30T14:07:11.623	17/10/2021	13:45	Meadow Pipit	7	improved agricultural grassland and upland blanket bog; feeding, 2 flocks feeding (suitable nesting habitat; possible breeder)	RV
	NOT MAPPED	17/10/2021	13:45	Redwing	5	conifer plantation; flyovers, flyovers (flyover; non-breeding)	RV
SN010	2021-11-30T13:46:47.368	17/10/2021	13:45	Snipe	2	upland blanket bog; flushed, 2 flushed on mountain top (suitable nesting habitat; possible breeder)	RV
	NOT MAPPED	17/10/2021	15:56	Redwing	25	conifer plantation: flyovers, 1 flock flying over (flyover; non-breeding)	RV
	2021-11-30T13:48:52.132	17/10/2021	15:56	Meadow Pipit	4	conifer plantation; flyover, flyovers (flyover; non-breeding)	RV
	2021-11-30T13:50:06.613	28/10/2021	09:00	Meadow Pipit	28	upland blanket bog and conifer plantation; flushed, a few singles and small flocks (suitable nesting habitat; possible breeder)	RV
	NOT MAPPED	28/10/2021	09:00	Redwing	75	conifer plantation: flyovers, single flock in plantation chased by sh (flyover; non-breeding)	RV
SH014	2021-11-30T13:53:24.819	28/10/2021	09:00	Sparrowhawk	1	conifer plantation: hunting, male chasing re, appeared to catch one (suitable nesting habitat; possible breeder)	RV
	2021-11-30T13:55:08.851	28/10/2021	13:08	Meadow Pipit	38	upland blanket bog and cutover bog; feeding, several small flocks (suitable nesting habitat; possible breeder)	RV
	NOT MAPPED	28/10/2021	13:08	Redwing	40	upland blanket bog; flyovers, 1 flock flying over (flyover; non-breeding)	RV
RG001	2021-11-30T13:59:12.505	28/10/2021	14:07	Red Grouse	2	upland blanket bog; flushed, pair flushed (suitable nesting habitat; possible breeder)	RV
SN011	2021-11-30T14:00:11.050	28/10/2021	14:10	Snipe	1	upland blanket bog; flushed, single flushed close to rg location (suitable nesting habitat; possible breeder)	RV
WS002	2023-01-03T14:33:06.929	28/10/2021	14:35	Whooper Swan	30	improved agricultural grassland, conifer plantation and upland blanket bog; flyovers, 30 flew east, 1 broke away and flew north. (flyover; non-breeding)	RV
	Not mapped	10/11/2021	09:04	Meadow Pipit	2	upland blanket bog; flyover (flyover; non-breeding)	RV

	SD001	10/11/2021	09:27	Stock Dove	5	conifer plantation; flyovers, flyovers (flyover; non-breeding)	RV
	Not mapped	19/11/2021	09:04	Redwing	20	upland blanket bog; flyover (flyover; non-breeding)	RV
	Not mapped	19/11/2021	09:04	Meadow Pipit	5	upland blanket bog; flyover (flyover; non-breeding)	RV
	Not mapped	19/11/2021	09:04	Snipe	1	upland blanket bog; flushed, close to road (suitable nesting habitat; possible breeder)	RV
	Not mapped	19/11/2021	09:04	Red Grouse	1	upland blanket bog; flushed, flushed below vp3 (suitable nesting habitat; possible breeder)	RV
	Not mapped	19/11/2021	09:16	Redwing	20	conifer plantation and scrub; flyovers, flyovers in plantation, may have been more birds involved. (flyover; non-breeding)	RV
SN012	SN001	19/11/2021	09:16	Snipe	1	upland blanket bog; flushed, 1 flushed by road (suitable nesting habitat; possible breeder)	RV
RG002	RG001	19/11/2021	09:16	Red Grouse	1	upland blanket bog; flushed, 1 male flushed by road near vp3 (suitable nesting habitat; possible breeder)	RV
	MP002	19/11/2021	09:16	Meadow Pipit	5	upland blanket bog and conifer plantation; flushed and flyovers, a few singles and small flocks (suitable nesting habitat; possible breeder)	RV
	Not mapped	25/11/2021	09:04	Meadow Pipit	6	improved agricultural grassland; feeding, feeding in rough grassland (suitable nesting habitat; possible breeder)	RV
	RE001	25/11/2021	09:04	Redwing	6	scrub and conifer plantation; flyover, flyovers, mostly singles,possibly more (flyover; non-breeding)	RV
	Not mapped	25/11/2021	09:04	Redwing	6	upland blanket bog; flyover (flyover; non-breeding)	RV
	Not mapped	25/11/2021	09:04	Meadow Pipit	6	upland blanket bog; flyover, in with donkeys (flyover; non-breeding)	RV
	Not mapped	25/11/2021	09:04	Meadow Pipit	6	upland blanket bog; flyover, on top of hill around sheep feeders (flyover; non-breeding)	RV
	Not mapped	25/11/2021	09:04	Redwing	14	upland blanket bog; flyover (flyover; non-breeding)	RV
	Not mapped	25/11/2021	09:04	Meadow Pipit	3	upland blanket bog; flushed (suitable nesting habitat; possible breeder)	RV
	Not mapped	25/11/2021	09:04	Red Grouse	1	upland blanket bog; , old latrine at g92113 44572 (suitable nesting habitat; possible breeder)	RV
	MP001	25/11/2021	11:35	Meadow Pipit	6	upland blanket bog; feeding, small numbers around sheep (suitable nesting habitat; possible breeder)	RV
	Not mapped	25/11/2021	14:36	Red Grouse	1	upland blanket bog; latrine, latrine at grid ref g92113 44572, not fresh (suitable nesting habitat; possible breeder)	RV
	Not mapped	25/11/2021	14:36	Redwing	14	upland blanket bog; flyover, flyovers (flyover; non-breeding)	RV

	Not mapped	25/11/2021	14:36	Meadow Pipit	3	upland blanket bog; flushed, flushed singles (suitable nesting habitat; possible breeder)	RV
BZ025	BZ001	29/01/2022	13:04	Buzzard	1	improved agricultural grassland; flushed, flew from pole by road across sheep fields (suitable nesting habitat; possible breeder)	RV
	GL001	29/01/2022	13:04	Grey Wagtail	1	improved agricultural grassland; feeding, feeding around sheep sheds in puddles (suitable nesting habitat; possible breeder)	RV
SN013	SN001	31/01/2022	12:01	Snipe	1	cutover bog; flushed, flushed close to road (suitable nesting habitat; possible breeder)	RV
WK004	WK001	31/01/2022	12:01	Woodcock	1	scrub; flushed, flushed from scrub at edge of plantation (suitable nesting habitat; possible breeder)	RV
	MP002	15/03/2022	11:17	Meadow Pipit	3	improved agricultural grassland; displaying, 3 displaying in sheep fields (courtship and display; probable breeding)	RV
SH015	SH001	15/03/2022	11:17	Sparrowhawk	1	scrub; flushed, male sh flushed from roadside scrub, possibly carrying prey (suitable nesting habitat; possible breeder)	RV
BZ026	BZ001	27/03/2022	08:48	Buzzard	2	conifer plantation; displaying, pair circling and displaying east of transect (courtship and display; probable breeding)	RV
	MP003	27/03/2022	08:48	Meadow Pipit	7	upland blanket bog; displaying, displaying along loop walk (courtship and display; probable breeding)	RV
	MP004	27/03/2022	08:48	Meadow Pipit	6	upland blanket bog; displaying, displaying along route, a few singles spread along remainder of route (courtship and display; probable breeding)	RV
RG003	RG001	27/03/2022	08:48	Red Grouse	2	upland blanket bog; flushed, pair flushed along the route on hill top (suitable nesting habitat; possible breeder)	RV
	MP001	27/03/2022	10:44	Meadow Pipit	12	upland blanket bog; displaying, 12 displaying in upland area (courtship and display; probable breeding)	RV
SN014	SN001	27/03/2022	10:44	Snipe	1	upland blanket bog; flushed, flushed from mountain top (suitable nesting habitat; possible breeder)	RV
K008	K001	29/03/2022	13:28	Kestrel	1	conifer plantation; flying, male flew north over route, circling briefly (flyover; non-breeding)	RV
	MP005	30/03/2022	09:01	Meadow Pipit	5	upland blanket bog; displaying, displaying along route (courtship and display; probable breeding)	RV
	MP006	30/03/2022	09:01	Meadow Pipit	11	upland blanket bog; displaying, displaying along route (courtship and display; probable breeding)	RV
	MP007	30/03/2022	09:01	Meadow Pipit	6	upland blanket bog; displaying, displaying in clearing (courtship and display; probable breeding)	RV

	Not mapped	30/03/2022	09:01	Mallard	1	upland blanket bog; , transect 5 (flyover; non-breeding)	RV
	not mapped	30/03/2022	09;01	Buzzard	1	upland blanket bog and conifer plantation; calling, heard calling but not seen (suitable nesting habitat; possible breeder)	RV

Appendix 1 Table 4 Hen Harrier Roost Survey Observations

Report Ref.	Ref.	HHVP	Date	Time	Species	Number	Habitat and activity	Surveyor
HH012	HH001	HHR1	08/03/2022	06:05	Hen Harrier	1	improved agricultural grassland, flying, male flew along edge of valley	RV

Appendix 1 Table 5 Breeding Red Grouse Survey Observations

Report Ref.	Ref.	Transect	Date	Time	Species	Number	Habitat and activity	Surveyor
RG004	2022-03-31T13:50:20.155	Transect 1	31/03/2022	13:50	Red Grouse	1	montane heath, call/fly, male called and flew	AOD
RG005	2022-03-31T17:56:31.117	Transect 2	31/03/2022	17:56	Red Grouse	1	montane heath, fly/call, male	AOD

Appendix 1 Table 6 Incidental Observations

Report Ref	Ref.	Location	Date	Time	Species	Number	Habitat and Activity	Surveyor
RG006	2021-11-30T14:14:20.696	Vantage Point Survey; VP3	10/10/2021	15:30	Red Grouse	1	upland blanket bog; feeding, male sat by track	RV
HH013	2021-11-30T14:15:42.145	Vantage Point Survey; VP3	10/10/2021	15:51	Hen Harrier	1	upland blanket bog; hunting, male hunting by track, seen again 15:56	RV
HH014	2021-11-30T14:11:20.392	Vantage Point Survey; VP3	10/10/2021	15:56	Hen Harrier	1	upland blanket bog; hunting, male seen before	RV
BZ027	2021-11-30T12:32:38.653	Hen Harrier Roost Survey; HHR2	10/10/2021	17:20	Buzzard	2	improved agricultural grassland and scrub; flew ne from pole & hawthorn at hhvp2, seen as arriving on site	RV
	2021-11-30T12:33:42.808	Hen Harrier Roost Survey; HHR2	10/10/2021	17:30	Dipper	1	eroding/upland rivers; singing on river below vp 17:30-18:00, called regularly then to 19:10	RV
	2021-11-30T12:34:47.037	Hen Harrier Roost Survey; HHR2	10/10/2021	17:50	Great Spotted Woodpecker	1	scrub; calling persistently 17:50-18:15, seen in treetops	RV
BZ028	2021-11-30T12:36:05.156	Hen Harrier Roost Survey; HHR2	10/10/2021	18:14	Buzzard	1	conifer plantation and improved agricultural grassland; flew across site	RV
	2021-11-30T12:37:16.846	Hen Harrier Roost Survey; HHR2	10/10/2021	18:23	Grey Heron	1	eroding/upland rivers and improved agricultural grassland; flew up from stream	RV
SN015	2021-11-30T12:44:48.990	Hen Harrier Roost Survey; HHR3	15/10/2021	17:44	Snipe	5	conifer plantation and improved agricultural grassland; flew over at 75m height & continued east	RV
SH016	2021-11-30T12:46:00.797	Hen Harrier Roost Survey; HHR3	15/10/2021	17:46	Sparrowhawk	1	conifer plantation and improved agricultural grassland; flew east, lost behind hill, female	RV
GL001	2021-11-30T12:47:57.173	Hen Harrier Roost Survey; HHR3	15/10/2021	18:00	Grey Wagtail	1	improved agricultural grassland and eroding/upland rivers; landed on road by vp, and slowly walked down toward stream feeding in puddles	RV
SH017	2021-11-30T12:47:14.295	Hen Harrier Roost Survey; HHR3	15/10/2021	18:45	Sparrowhawk	1	conifer plantation and improved agricultural grassland; flew east, lost behind hill, male	RV
	Not Mapped	Hen Harrier Roost Survey; HHR4	28/10/2021	17:00	Redwing	100	improved agricultural grassland; large flock moving across site	RV
SN016	2021-11-30T12:54:27.641	Hen Harrier Roost Survey; HHR4	28/10/2021	18:33	Snipe	1	improved agricultural grassland; heard not seen, sounded like flew south over vp	RV
SN017	2021-11-30T12:55:31.235	Hen Harrier Roost Survey; HHR4	28/10/2021	18:37	Snipe	1	improved agricultural grassland; heard not seen, sounded like flew south over vp	RV

WK005	WK001	Vantage Point Survey; In transit	14/12/2021	07:36	Woodcock	1	scrub and conifer plantation; flushed, flushed while driving	RV
	MP001	Vantage Point Survey; VP3	14/12/2021	10:12	Meadow Pipit	3	upland blanket bog; flyovers, 3 singles flew over in a loose flock	RV
SN018	SN001	Vantage Point Survey; VP3	14/12/2021	11:15	Snipe	2	upland blanket bog; flushed, 2 flushed walking back to vp after break	RV
SN019	SN002	Vantage Point Survey; VP3	14/12/2021	14:25	Snipe	1	upland blanket bog; flushed, 1 flushed after survey	RV
WK006	WK005	Hen Harrier Roost Survey; HHR4	14/12/2021	17:10	Woodcock	1	improved agricultural grassland and scrub; flushed, 1 flushed from roadside leaving vp	RV
WK007	WK002	Hen Harrier Roost Survey; In transit	16/12/2021	07:35	Woodcock	1	conifer plantation; flushed, flushed while driving	RV
WK008	WK003	Hen Harrier Roost Survey; In transit	20/12/2021	07:30	Woodcock	3	conifer plantation and scrub; flushed, 3 individuals flushed while driving along road	RV
	MP002	Vantage Point Survey; VP2	20/12/2021	08:30	Meadow Pipit	3	upland blanket bog; feeding, 3 feeding around vp throughout survey	RV
	DI001	Hen Harrier Roost Survey; HHR2	20/12/2021	15:00	Dipper	1	eroding/upland rivers; singing/calling, 1 dipper singing and calling throughout survey	RV
	RE001	Hen Harrier Roost Survey; HHR2	20/12/2021	15:45	Redwing	75	improved agricultural grassland and conifer plantation; flying, several small flocks flew into plantation between 15:45 and 16:15	RV
WK009	WK004	Vantage Point Survey; VP1	31/12/2021	07:45	Woodcock	1	improved agricultural grassland; flushed, flushed walking to vp	RV
	RE002	Hen Harrier Roost Survey; HHR3	31/12/2021	16:24	Redwing	35	improved agricultural grassland; flying, 1 flock flew over with ff	RV
	Not Mapped	Hen Harrier Roost Survey; HHR1	11/01/2022	07:50	Redwing	5	improved agricultural grassland; flying, 5 singles flew over calling in dark	RV
	2022-12-23T17:13:49.494	Hen Harrier Roost Survey; HHR2	12/01/2022	07:50	Redwing	3	improved agricultural grassland and conifer plantation; flying, 3 singles flew over	RV
	2022-12-23T17:14:48.354	Hen Harrier Roost Survey; HHR2	12/01/2022	07:50	Meadow Pipit	1	improved agricultural grassland; flying, 1 flew over south	RV
WK010	WK002	Hen Harrier Roost Survey; HHR2	12/01/2022	08:42	Woodcock	1	improved agricultural grassland; flying, flew ne	RV
WK011	WK001	Vantage Point Survey; VP2	12/01/2022	17:45	Woodcock	1	improved agricultural grassland; flushed , flew up from roadside	RV

WK012	WK003	Hen Harrier Roost Survey; HHR4	13/01/2022	08:08	Woodcock	1	improved agricultural grassland, scrub and conifer plantation; flying, 1 flew over	RV
WK013	WK004	Hen Harrier Roost Survey; HHR4	13/01/2022	08:11	Woodcock	1	improved agricultural grassland, scrub, and conifer plantation; flying, 1 flew over	RV
SH018	SH001	Hen Harrier Roost Survey; HHR4	13/01/2022	09:50	Sparrowhawk	1		RV
WK014	WK007	Hen Harrier Roost Survey; HHR3	20/01/2022	07:40	Woodcock	1	treelines and immature woodland; flushed, flushed from muddy roadside	RV
WK015	WK005	Hen Harrier Roost Survey; HHR3	20/01/2022	08:04	Woodcock	1	improved agricultural grassland; flying, flew over	RV
WK016	WK006	Hen Harrier Roost Survey; HHR3	20/01/2022	08:07	Woodcock	1	improved agricultural grassland; flying, flew over	RV
BZ029	2022-12-23T17:15:52.427	Hen Harrier Roost Survey; HHR3	20/01/2022	09:09	Buzzard	1	hedgerows; calling, calling behind vp	RV
WK017	WK001	Vantage Point Survey; VP4	10/02/2022	07:10	Woodcock	1	improved agricultural grassland and scrub; flushed, flushed as I walked up to vp	RV
HH015	HH001	Hen Harrier Roost Survey; HHR3	10/02/2022	16:12	Hen Harrier	1	conifer plantation and improved agricultural grassland; circling, circled and displayed briefly as i prepared for harrier roost vp, appeared to land just before heavy shower	RV
WK018	WK006	Vantage Point Survey; VP2	15/02/2022	06:45	Woodcock	1	improved agricultural grassland; flushed, flushed from roadside	RV
WK019	WK007	Vantage Point Survey; VP2	15/02/2022	06:46	Woodcock	1	conifer plantation; flushed, flushed from roadside	RV
WK020	WK002	Hen Harrier Roost Survey; HHR2	15/02/2022	18:03	Woodcock	1	improved agricultural grassland and conifer plantation; flying, flew over vp, low and lost against trees on far side of valley	RV
SN020	SN001	Hen Harrier Roost Survey; HHR2	15/02/2022	18:07	Snipe	2	improved agricultural grassland and conifer plantation; flying, flew over vp.	
SH019	SH001	Hen Harrier Roost Survey; HHR4	26/02/2022	17:02	Sparrowhawk	1	improved agricultural grassland and hedgerows; circling, circled in strong wind but buffered quickly west.	RV
WK021	WK003	Hen Harrier Roost Survey; HHR4	26/02/2022	18:19	Woodcock	1	improved agricultural grassland and hedgerows; flying, 1 woodcock flew out towards open fields	RV
WK022	WK004	Hen Harrier Roost Survey; HHR4	26/02/2022	18:27	Woodcock	1	improved agricultural grassland and hedgerows; flying, 1 woodcock flew out towards open fields	RV

WK023	WK005	Hen Harrier Roost Survey; HHR4	26/02/2022	18:29	Woodcock	1	improved agricultural grassland and hedgerows; flying, 1 woodcock flew out towards open fields	RV
SN021	SN002	Hen Harrier Roost Survey; HHR4	26/02/2022	18:36	Snipe	1	improved agricultural grassland; calling, heard flying over similar route to wk's but not seen	RV
WK024	WK001	Hen Harrier Roost Survey; HHR2	15/03/2022	06:05	Woodcock	2	improved agricultural grassland and scrub; flying, 2 woodcock flew along river against the sky.	RV
LE001	LE001	Hen Harrier Roost Survey; HHR4	27/03/2022	06:38	Long-Eared Owl	1	improved agricultural grassland; hunting, long-eared owl hunting infront of vp, may have landed	RV
LE002	LE002	Hen Harrier Roost Survey; HHR4	27/03/2022	06:41	Long-Eared Owl	1	improved agricultural grassland; hunting, same as above, flew across road and out of view.	RV
	Not Mapped	Walkover Survey, Transect 4	29/03/2022	12:15	Hen Harrier	1	conifer plantation and scrub; displaying, male circling and displaying at beginning of transect 4	RV
	Not Mapped	Walkover Survey, Transect 4	29/03/2022	12:27	Hen Harrier	1	conifer plantation and scrub; displaying, female joined male above displaying, together till 12:41	RV
	Not Mapped	Walkover Survey, Transect 4	29/03/2022	12:29	Buzzard	1	conifer plantation; flying, flew west high over displaying harriers	RV
	Not Mapped	Walkover Survey, Transect 4	29/03/2022	13:20	Hen Harrier	2	conifer plantation and scrub; displaying, pair of hh displaying together before moving north.	RV
HH016	2022-03-31T13:54:17.342	Breeding Red Grouse Survey; Killea	31/03/2022	13:54	Hen Harrier	1	conifer plantation and montane heath; foraging, male	AOD
SN022	2022-03-31T13:54:53.696	Breeding Red Grouse Survey; Killea	31/03/2022	13:54	Snipe	1	montane heath; fly, flushed	AOD
	2022-04-13T19:14:35.695	Walkover Survey; Faughary	13/04/2022	17:00	Hen Harrier	1	wet grassland; foraging, adult male.possibly same bird as earlier in day.	AOD
	2022-04-20T20:05:59.997	Walkover Survey; On Site	20/04/2022	20:06	Hare	1	conifer plantation; feeding	AOD
	2022-04-20T20:06:29.525	Walkover Survey; On Site	20/04/2022	20:06	Hare	1	conifer plantation; feeding	AOD
	2022-12-21T15:00:24.082	Breeding Raptor Survey; 5Km Radius	11/05/2022	15:35	Mallard	1	bogs; travelling	KB
	2022-10-11T16:39:16.983	Breeding Raptor Survey; 5Km Radius	18/05/2022	08:32	Lesser Black-Backed Gull	2	wet grassland, conifer plantation and bogs; travelling	KB
	2022-10-11T16:45:36.159	Breeding Raptor Survey; 5Km Radius	18/05/2022	09:11	Lesser Black-Backed Gull	3	wet grassland, conifer plantation and bogs; travelling	KB

	2022-10-11T16:57:37.974	Breeding Raptor Survey; 5Km Radius	19/05/2022	08:17	Meadow Pipit	3	bogs; foraging	KB
	2022-10-11T16:59:05.971	Breeding Raptor Survey; 5Km Radius	19/05/2022	08:45	Meadow Pipit	2	bogs; singing	KB
	2022-10-11T17:00:32.587	Breeding Raptor Survey; 5Km Radius	19/05/2022	09:14	Meadow Pipit	5	bogs; foraging	KB
	2022-10-11T17:08:11.901	Breeding Raptor Survey; 5Km Radius	24/05/2022	17:12	Snipe	2	bogs; vociferous chipping and drumming/displaying in sky together	KB
	2022-10-11T17:09:47.279	Breeding Raptor Survey; 5Km Radius	24/05/2022	17:15	Woodcock	1	bogs; roding	KB
	2022-10-11T17:11:02.439	Breeding Raptor Survey; 5Km Radius	24/05/2022	17:18	Snipe	2	bogs; chipping and drumming	KB
	2022-10-11T17:15:04.204	Breeding Raptor Survey; 5Km Radius	24/05/2022	18:00	Snipe	1	bogs; chipping	KB
	2022-10-11T17:16:09.781	Breeding Raptor Survey; 5Km Radius	24/05/2022	18:27	Snipe	1	bogs; chipping	KB
	2022-10-11T17:17:19.355	Breeding Raptor Survey; 5Km Radius	24/05/2022	18:34	Snipe	1	bogs; display flight	KB
	2022-10-11T17:18:33.321	Breeding Raptor Survey; 5Km Radius	24/05/2022	18:59	Snipe	1	bogs; display flight	KB
	2022-10-27T10:40:09.023	Breeding Raptor Survey; 5Km Radius	25/05/2022	14:21	Lesser Black-Backed Gull	3	bogs; travelling	KB
	2022-10-27T11:08:38.735	Breeding Raptor Survey; 5Km Radius	25/05/2022	14:33	Lesser Black-Backed Gull	1	semi-natural grassland and watercourses; travelling	KB
	2022-10-27T10:57:39.887	Breeding Raptor Survey; 5Km Radius	25/05/2022	14:58	Lesser Black-Backed Gull	1	semi-natural grassland, watercourses and bogs; travelling	KB
	2022-10-27T10:50:15.925	Breeding Raptor Survey; 5Km Radius	25/05/2022	15:20	Lesser Black-Backed Gull	8	bogs; travelling	KB
	2022-10-27T10:52:37.293	Breeding Raptor Survey; 5Km Radius	25/05/2022	15:58	Lesser Black-Backed Gull	5	bogs; travelling	KB
	2022-10-27T11:16:21.898	Breeding Raptor Survey; 5Km Radius	25/05/2022	16:40	Lesser Black-Backed Gull	3	semi-natural grassland and watercourses; soaring	KB
	2022-10-11T15:38:15.833	Vantage Point Survey; VP3	26/05/2022	04:09	Woodcock	1	bogs; flushed	KB

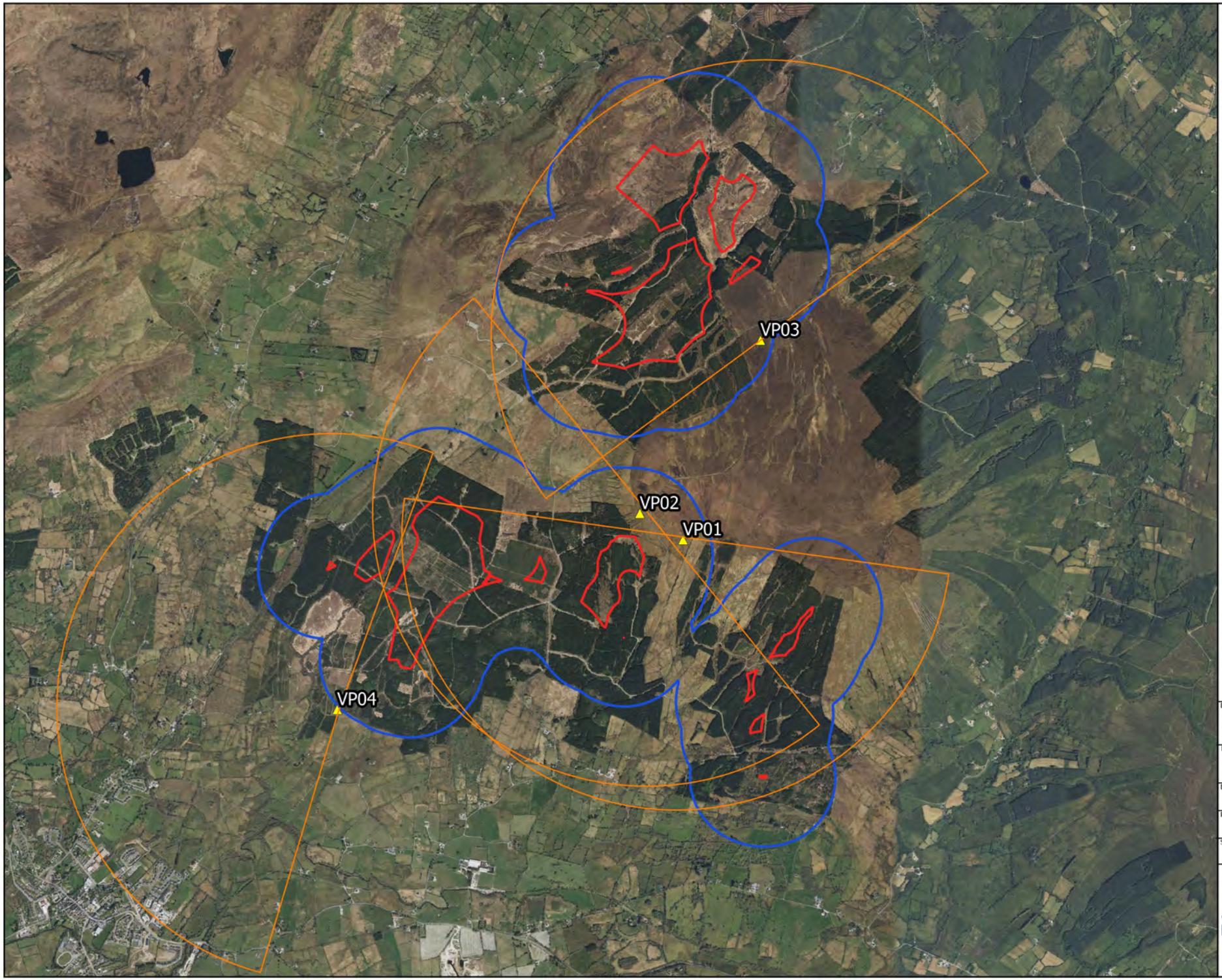
	2022-10-11T16:16:48.144	Vantage Point Survey; VP3	26/05/2022	04:11	Woodcock	1	conifer plantation; flushed	KB
	2022-10-27T11:13:28.595	Breeding Raptor Survey; 5Km Radius	26/05/2022	07:44	Snipe	1	bogs; chipping	KB
	2022-10-27T11:14:51.991	Breeding Raptor Survey; 5Km Radius	26/05/2022	07:50	Herring Gull	1	bogs and conifer plantation; travelling	KB
	2022-10-27T11:16:21.898	Breeding Raptor Survey; 5Km Radius	26/05/2022	10:02	Lesser Black-Backed Gull	1	conifer plantation; travelling	KB
	2022-10-27T11:25:45.922	Breeding Raptor Survey; 5Km Radius	27/05/2022	08:56	Meadow Pipit	1	bogs and wet grassland; singing	KB
	2022-10-27T11:27:37.307	Breeding Raptor Survey; 5Km Radius	27/05/2022	10:04	Meadow Pipit	2	bogs; singing	KB
	2022-10-27T11:33:53.709	Breeding Raptor Survey; 5Km Radius	30/05/2022	17:20	Meadow Pipit	2	semi-natural grassland and bogs; foraging	KB
	2022-10-27T11:36:12.113	Breeding Raptor Survey; 5Km Radius	31/05/2022	17:22	Meadow Pipit	2	bogs; foraging	KB
	2022-10-27T11:37:21.817	Breeding Raptor Survey; 5Km Radius	31/05/2022	17:58	Meadow Pipit	4	bogs; 2x fledglings	KB
	2022-10-27T11:38:44.607	Breeding Raptor Survey; 5Km Radius	31/05/2022	18:31	Meadow Pipit	2	bogs; foraging	KB
	2022-10-27T11:42:32.366	Breeding Raptor Survey; 5Km Radius	01/06/2022	16:34	Lesser Black-Backed Gull	1	bogs and semi-natural grassland; travelling	KB
	2022-10-27T11:44:09.777	Breeding Raptor Survey; 5Km Radius	01/06/2022	16:45	Meadow Pipit	4	bogs and wet grassland; singing and foraging	KB
	2022-12-02T08:34:46.487	Breeding Raptor Survey; 5Km Radius	14/06/2022	07:31	Meadow Pipit	2	bogs; singing	KB
	2022-12-02T08:35:47.878	Breeding Raptor Survey; 5Km Radius	14/06/2022	07:31	Meadow Pipit	5	bogs; foraging	KB
	2022-12-02T08:36:14.881	Breeding Raptor Survey; 5Km Radius	14/06/2022	07:48	Snipe	1	bogs; chipping	KB
	2022-12-02T08:36:40.278	Breeding Raptor Survey; 5Km Radius	14/06/2022	09:50	Snipe	1	bogs; chipping	KB
	2022-12-02T08:37:29.926	Breeding Raptor Survey; 5Km Radius	14/06/2022	10:48	Snipe	1	bogs; drumming	KB

	2022-12-02T08:42:52.487	Breeding Raptor Survey; 5Km Radius	14/06/2022	11:32	Snipe	1	bogs; drumming	KB
	2022-12-02T08:43:18.898	Breeding Raptor Survey; 5Km Radius	14/06/2022	13:39	Snipe	1	bogs; chipping	KB
	2022-12-02T08:45:11.820	Breeding Raptor Survey; 5Km Radius	15/06/2022	13:41	Lesser Black-Backed Gull	1	bogs; foraging	KB
	2022-12-02T08:45:53.048	Breeding Raptor Survey; 5Km Radius	15/06/2022	13:58	Meadow Pipit	7	bogs; foraging	KB
	2022-12-02T08:46:39.298	Breeding Raptor Survey; 5Km Radius	15/06/2022	16:20	Lesser Black-Backed Gull	1	lakes and ponds and bogs; on ground	KB
	2022-12-02T08:47:45.152	Breeding Raptor Survey; 5Km Radius	16/06/2022	13:22	Meadow Pipit	2	wet grassland and bogs; foraging	KB
	2022-12-02T08:49:27.659	Breeding Raptor Survey; 5Km Radius	17/06/2022	13:00	Meadow Pipit	6	bogs; foraging	KB
	2022-12-02T08:50:19.502	Breeding Raptor Survey; 5Km Radius	17/06/2022	15:47	Swift	1	bogs; foraging	KB
	2022-12-02T08:51:42.737	Breeding Raptor Survey; 5Km Radius	20/06/2022	14:41	Swift	1	bogs; foraging	KB
	2022-12-02T08:52:57.779	Breeding Raptor Survey; 5Km Radius	20/06/2022	14:47	Meadow Pipit	1	bogs; singing	KB
	2022-12-02T08:53:26.804	Breeding Raptor Survey; 5Km Radius	20/06/2022	15:11	Swift	9	bogs; foraging	KB
	2022-12-02T08:53:54.514	Breeding Raptor Survey; 5Km Radius	20/06/2022	15:35	Meadow Pipit	5	bogs; foraging	KB
	2022-12-02T08:55:33.327	Breeding Raptor Survey; 5Km Radius	20/06/2022	18:34	Meadow Pipit	4	bogs; foraging	KB
	2022-12-02T08:58:34.898	Breeding Raptor Survey; 5Km Radius	21/06/2022	11:00	Grey Wagtail	3	buildings and artificial surfaces; 2 adults + 1 fledgeling foraging	KB
	2022-12-02T08:59:23.663	Breeding Raptor Survey; 5Km Radius	21/06/2022	14:46	Lesser Black-Backed Gull	1	bogs and wet grassland; travelling	KB
	2022-12-02T08:59:57.062	Breeding Raptor Survey; 5Km Radius	21/06/2022	15:15	Meadow Pipit	24	bogs; 9 fledgelings, 15 adults - foraging	KB
	2022-12-02T09:01:06.000	Breeding Raptor Survey; 5Km Radius	21/06/2022	15:40	Lesser Black-Backed Gull	3	wet grassland; travelling	KB

	2022-12-02T09:02:00.053	Breeding Raptor Survey; 5Km Radius	21/06/2022	15:55	Lesser Black-Backed Gull	1	bogs and lakes and ponds; flew onto lake	KB
	2022-12-02T09:02:44.069	Breeding Raptor Survey; 5Km Radius	21/06/2022	16:32	Lesser Black-Backed Gull	1	lakes and ponds and bogs; travelling	KB
	2022-12-02T09:04:13.273	Vantage Point Survey; VP3	23/06/2022	17:17	Grey Wagtail	1	wet grassland and disturbed ground; foraging	KB
	2022-07-14T20:01:18.643	Walkover Survey; West of South Site	14/07/2022	20:01	Red Squirrel	1	mixed broadleaved/conifer woodland; feeding	AOD
	2022-12-19T11:40:11.816	Breeding Raptor Survey; 5Km Radius	15/07/2022	08:55	Meadow Pipit	38	bogs and wet grassland; foraging	KB
	2022-12-19T11:57:16.178	Breeding Raptor Survey; 5Km Radius	20/07/2022	12:10	Lesser Black-Backed Gull	3	conifer plantation and wet grassland; travelling	KB
	2022-12-19T12:53:15.058	Breeding Raptor Survey; 5Km Radius	20/07/2022	12:23	Lesser Black-Backed Gull	1	conifer plantation; travelling	KB
	2022-12-19T13:58:34.011	Breeding Raptor Survey; 5Km Radius	21/07/2022	08:05	Meadow Pipit	8	bogs; foraging (3x fledgelings)	KB
	2022-12-19T14:00:16.431	Breeding Raptor Survey; 5Km Radius	21/07/2022	08:11	Snipe	1	bogs; chipping	KB
	2022-08-11T10:21:00.236	Vantage Point Survey; VP2	11/08/2022	09:12	Golden Plover	1	montane heath; fly/call, flew low from heather called.likely migrant recently returned	AOD
	2022-08-11T10:22:08.523	Vantage Point Survey; VP2	11/08/2022	09:22	Snipe	1	montane heath; fly	AOD

APPENDIX 2

FIGURES



Map Legend

- VP Location
- 500m Buffer of Site
- Site Boundary
- VP Viewsheds

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Drawing Title

VP Locations and Viewsheds

Project Title

Lissinagroagh

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AO'D	AO'D
Project No.	Drawing No.
200217-f	Fig 1.0
Scale	Date
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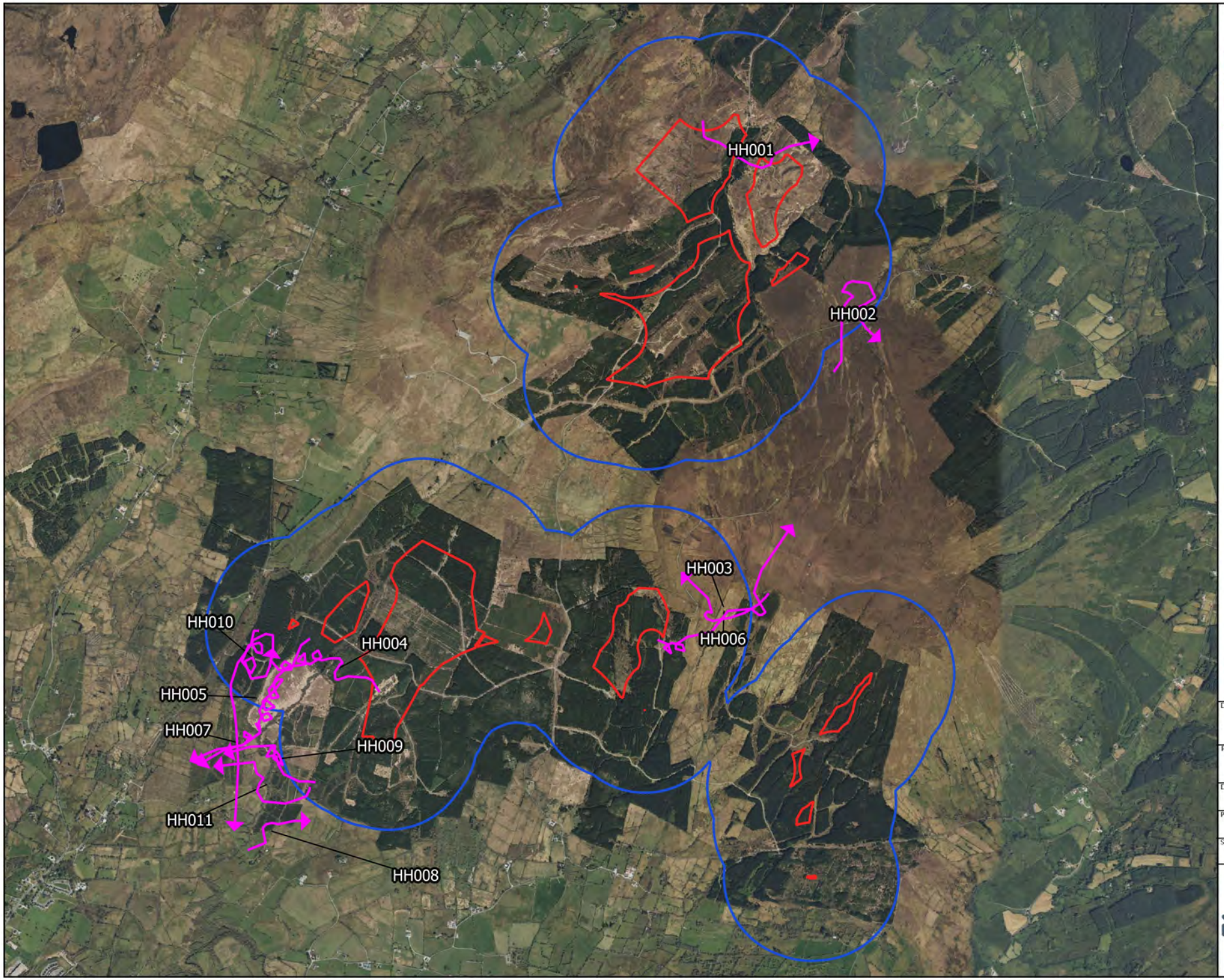

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Drawing Title: Hen harrier VP Observations

Project Title: Lissinagroagh

Drawn By	Checked By
AO'D	AO'D
Project No.	Drawing No.
200217-f	Fig 1.1
Scale	Date
1:30000	25.04.23

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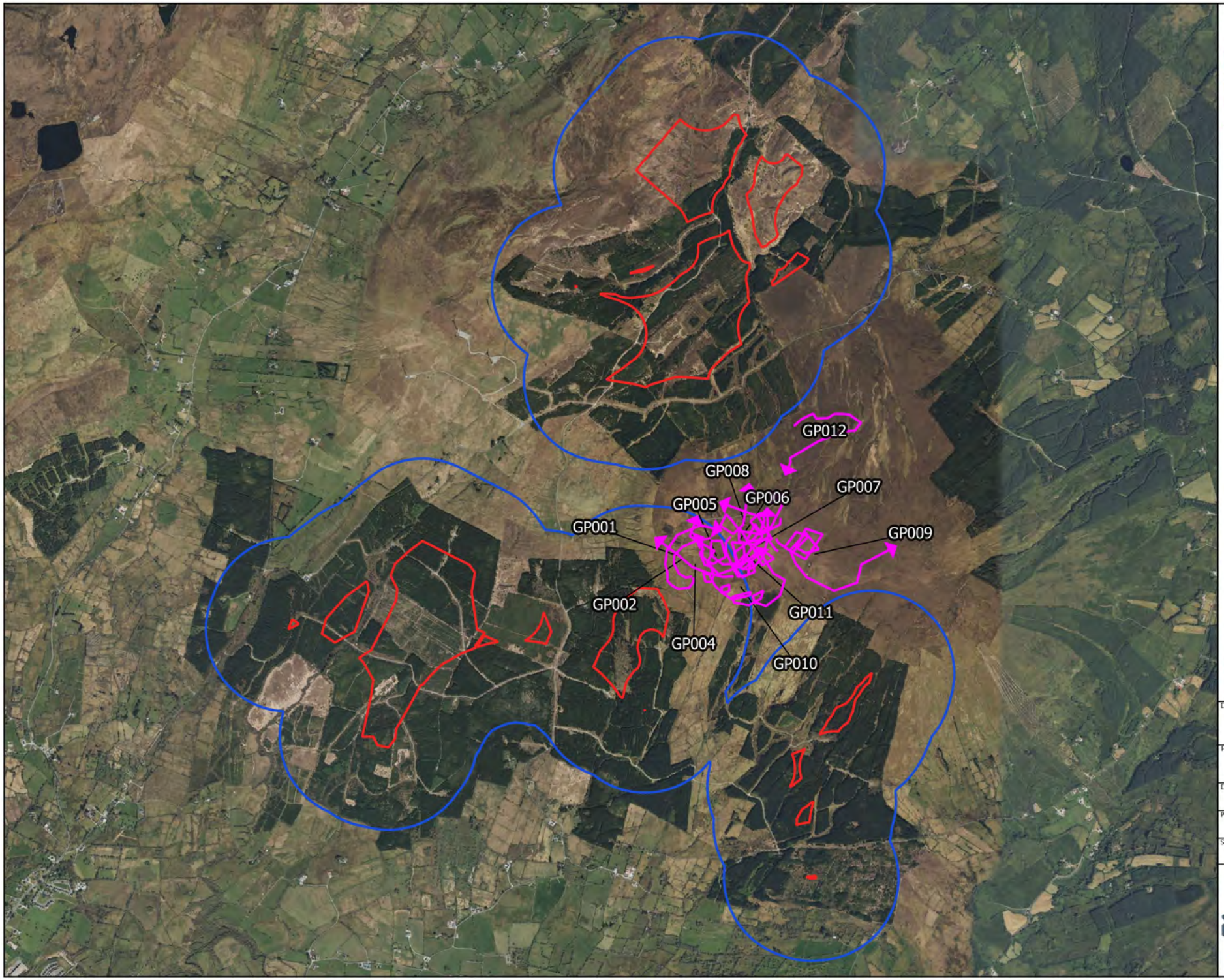

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Drawing Title
Golden plover
VP Observations

Project Title
Lissinagroagh

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200217-f	Fig 1.2
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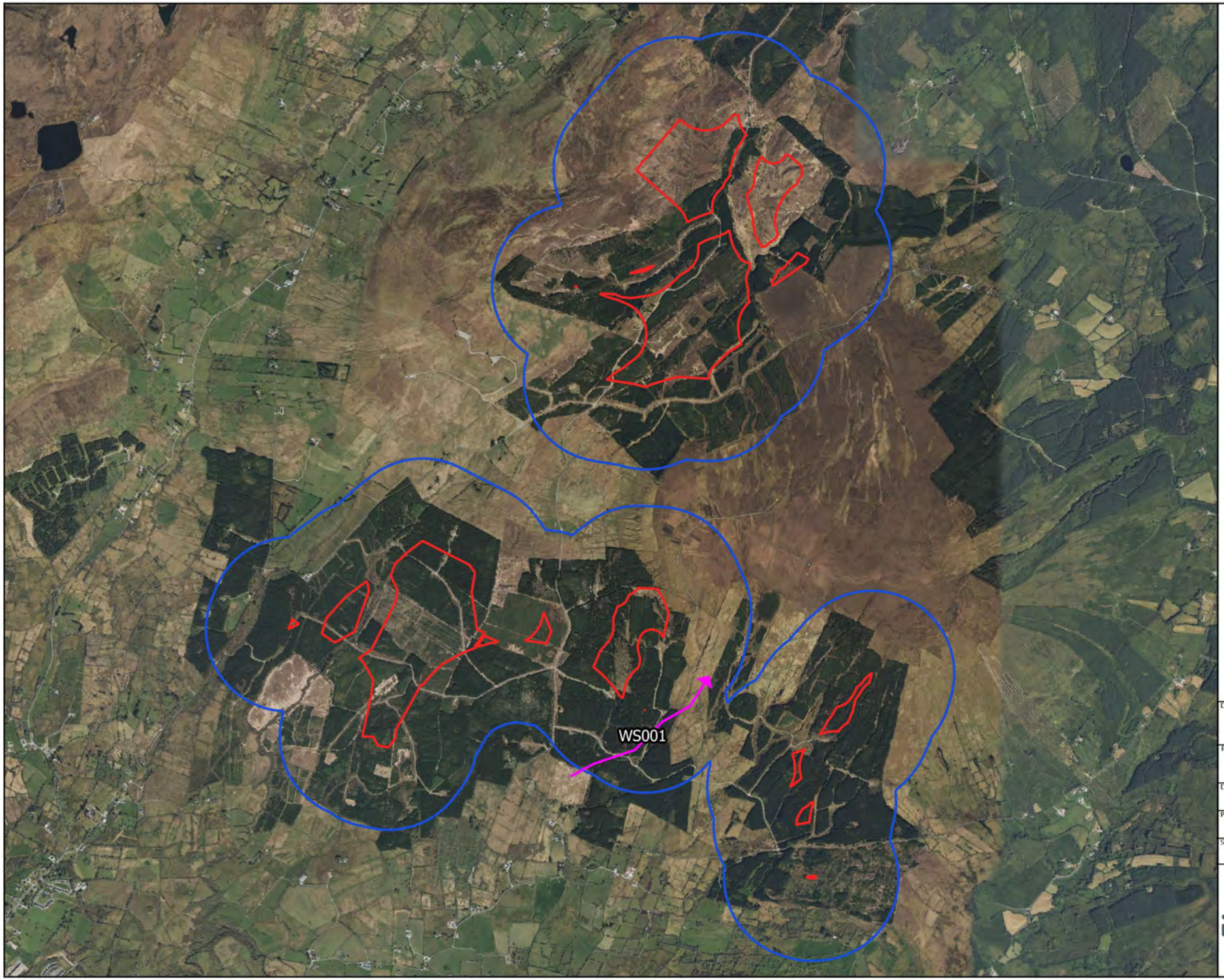

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Drawing Title
Whooper swan
VP Observations

Project Title
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Project No.	Drawing No.
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Scale	Date
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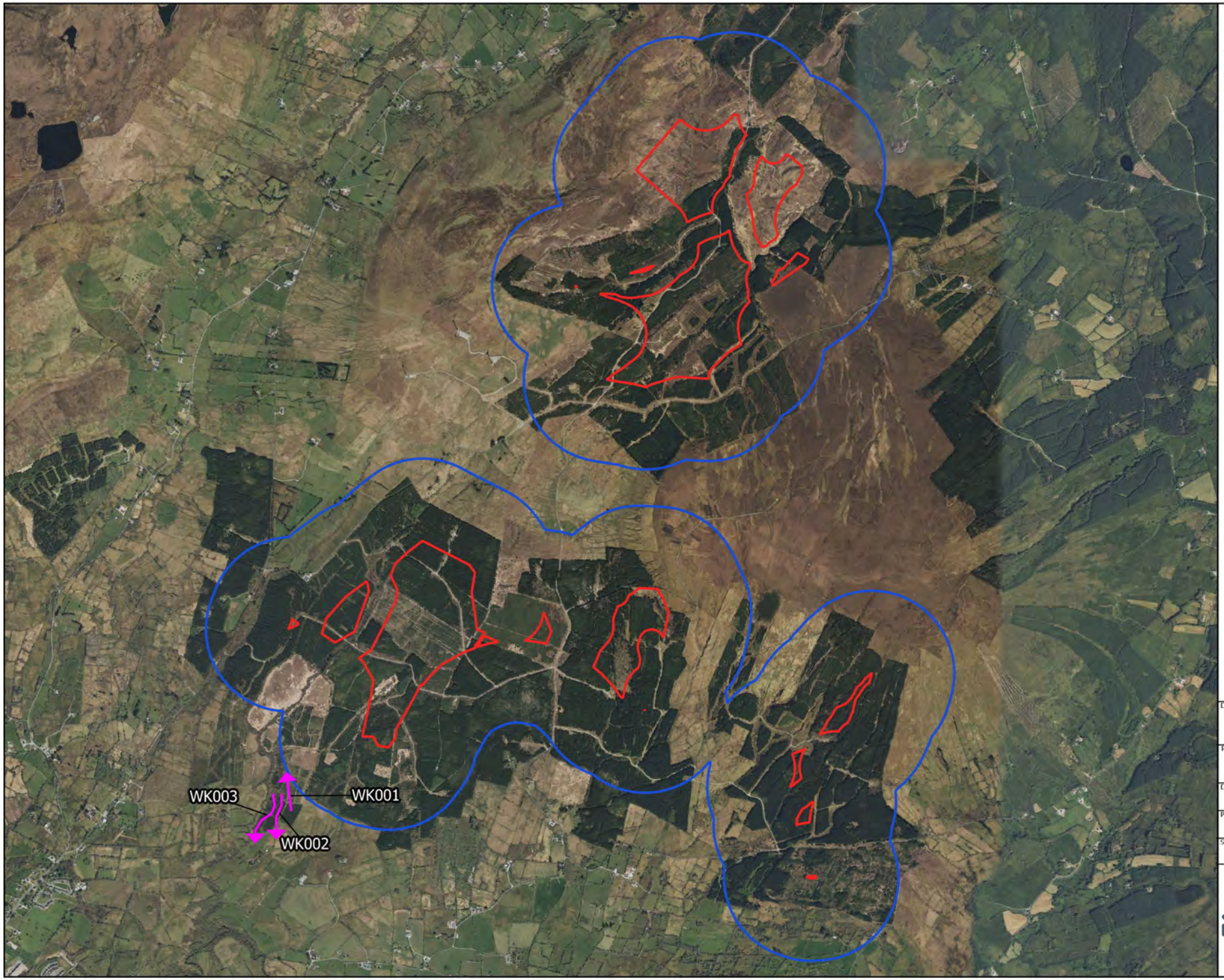

Map Legend

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Drawing Title
Woodcock
VP Observations

Project Title
Lissinagroagh

Drawn By	Checked By
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Project No.	Drawing No.
200217-f	Fig 1.4
Scale	Date
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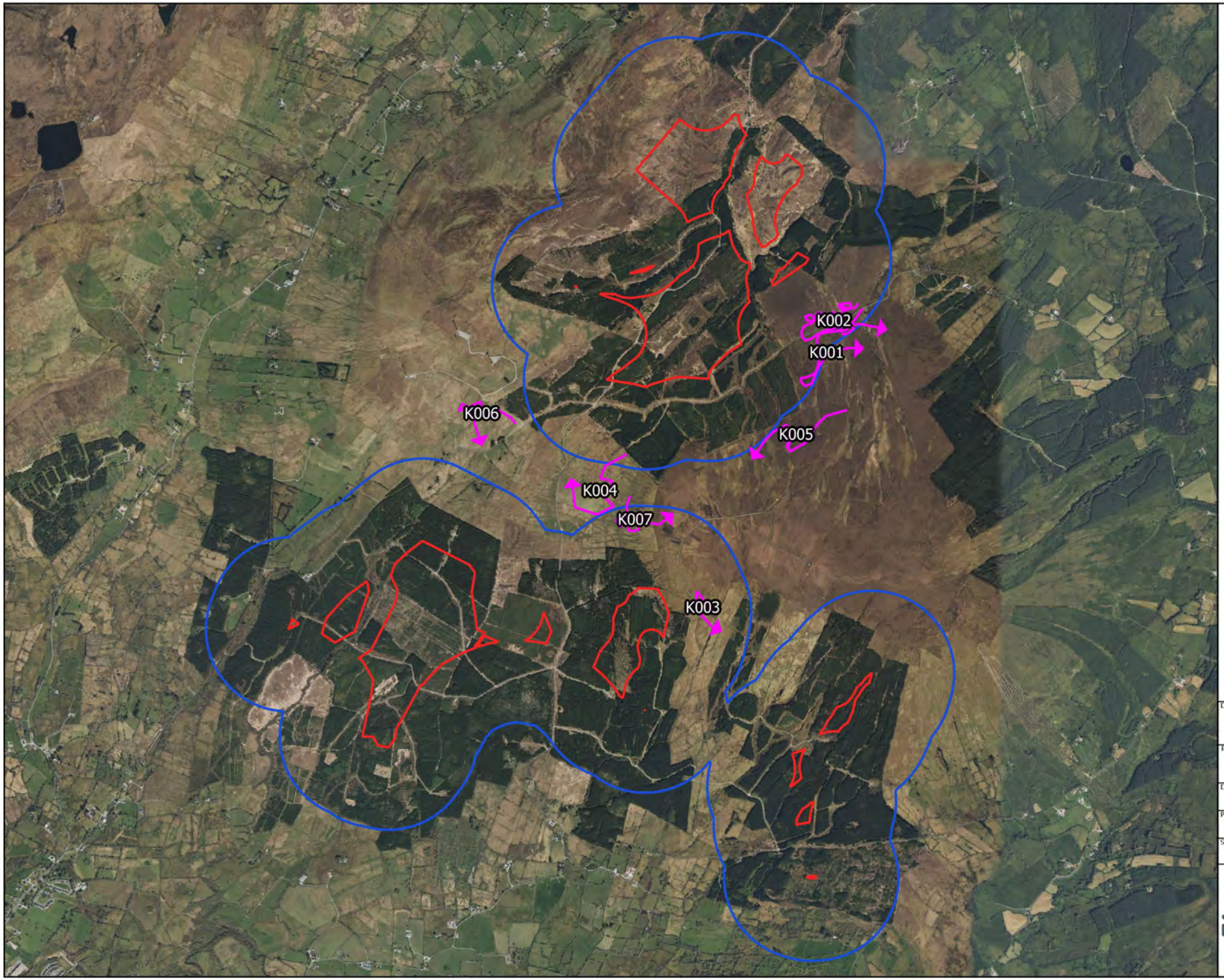

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Drawing Title
Kestrel
VP Observations

Project Title
Lissinagroagh

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Project No.	Drawing No.
200217-f	Fig 1.5
Scale	Date
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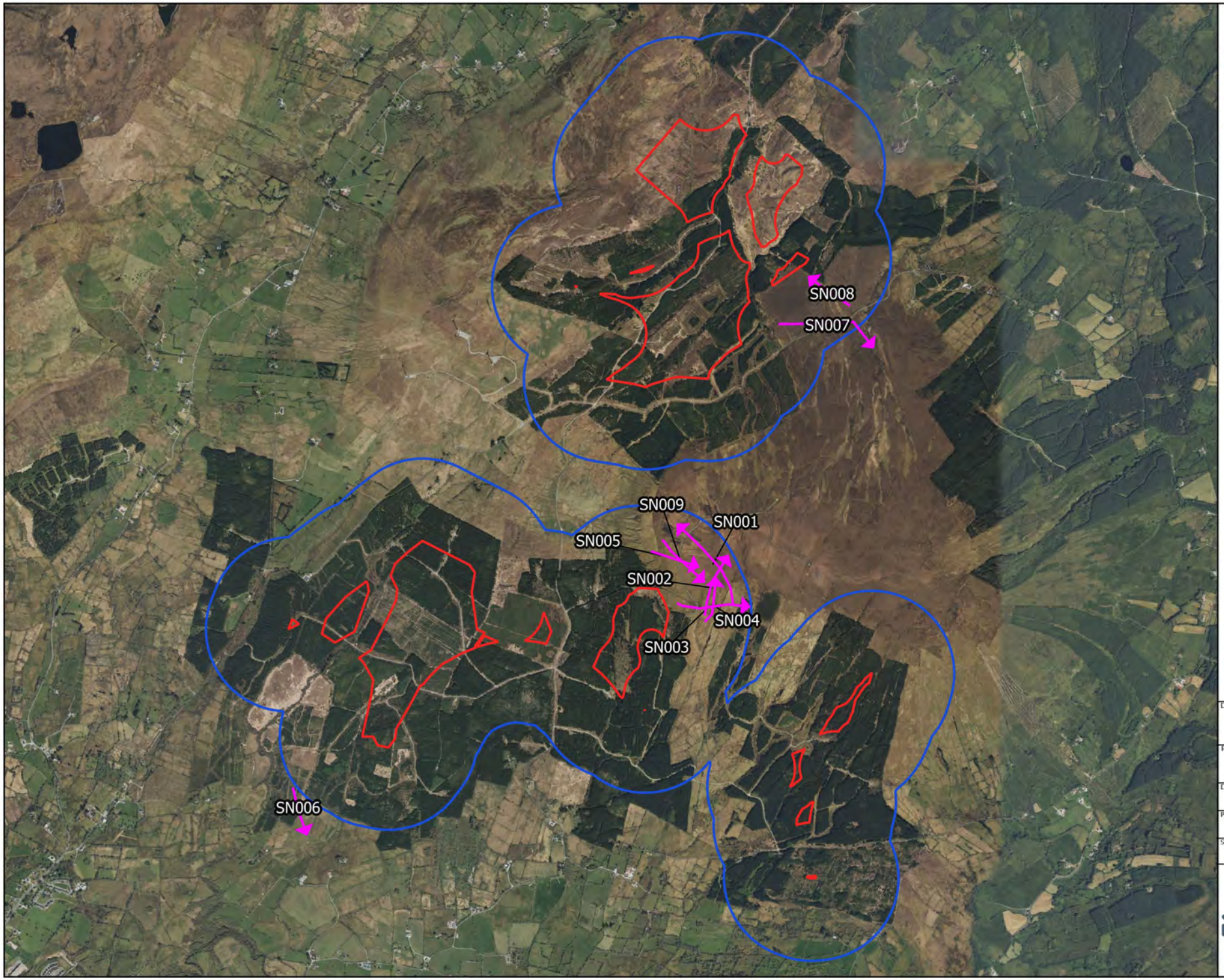

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Drawing Title

Snipe
VP Observations

Project Title

Lissinagroagh

Drawn By	Checked By
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Project No.	Drawing No.
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Scale	Date
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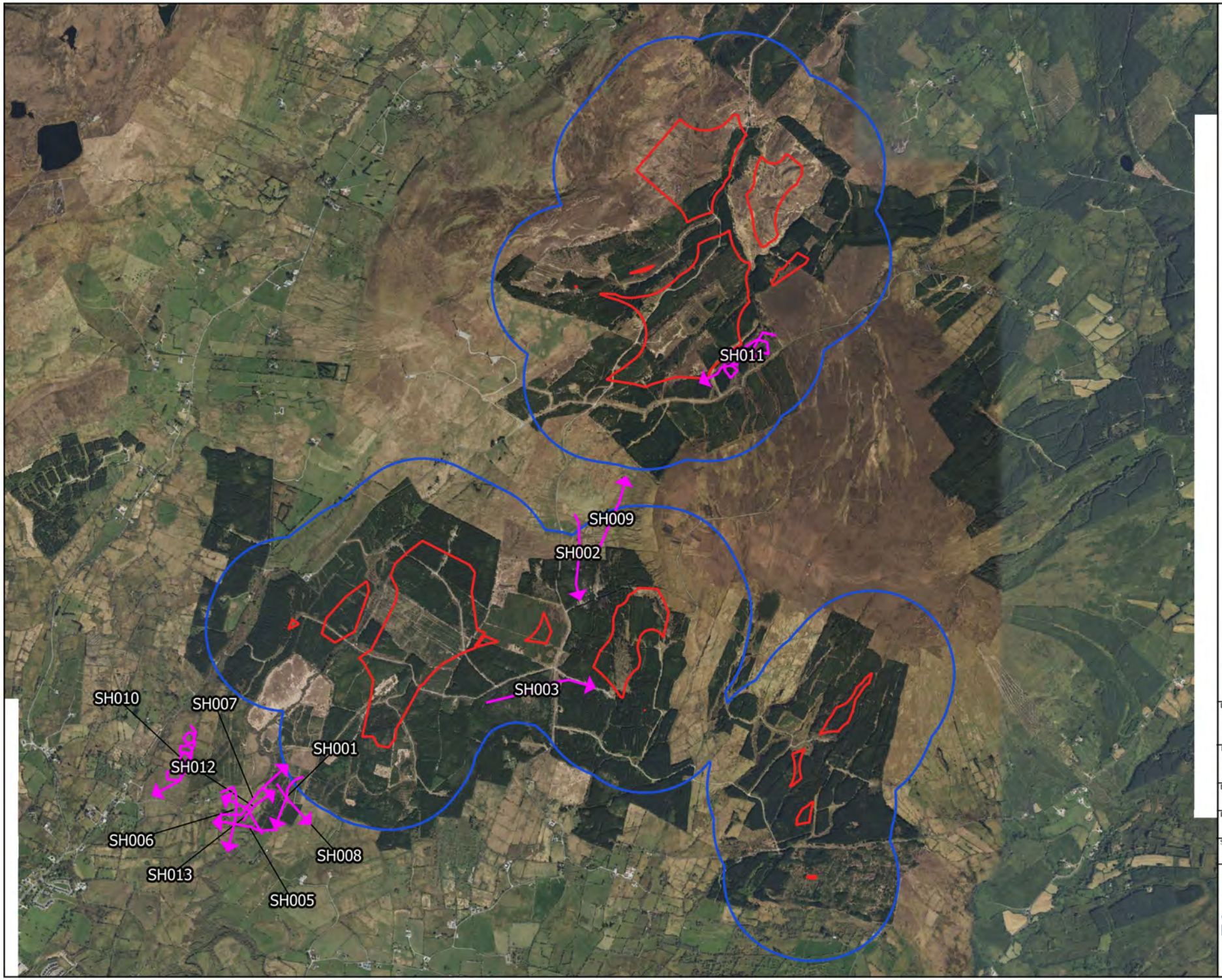

Map Legend

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Drawing Title	Sparrowhawk VP Observations
Project Title	Lissinagroagh
Drawn By: AO'D	Checked By: AO'D
Project No.: 200217-f	Drawing No.: Fig 1.7
Scale: 1:30000	Date: 25.04.23

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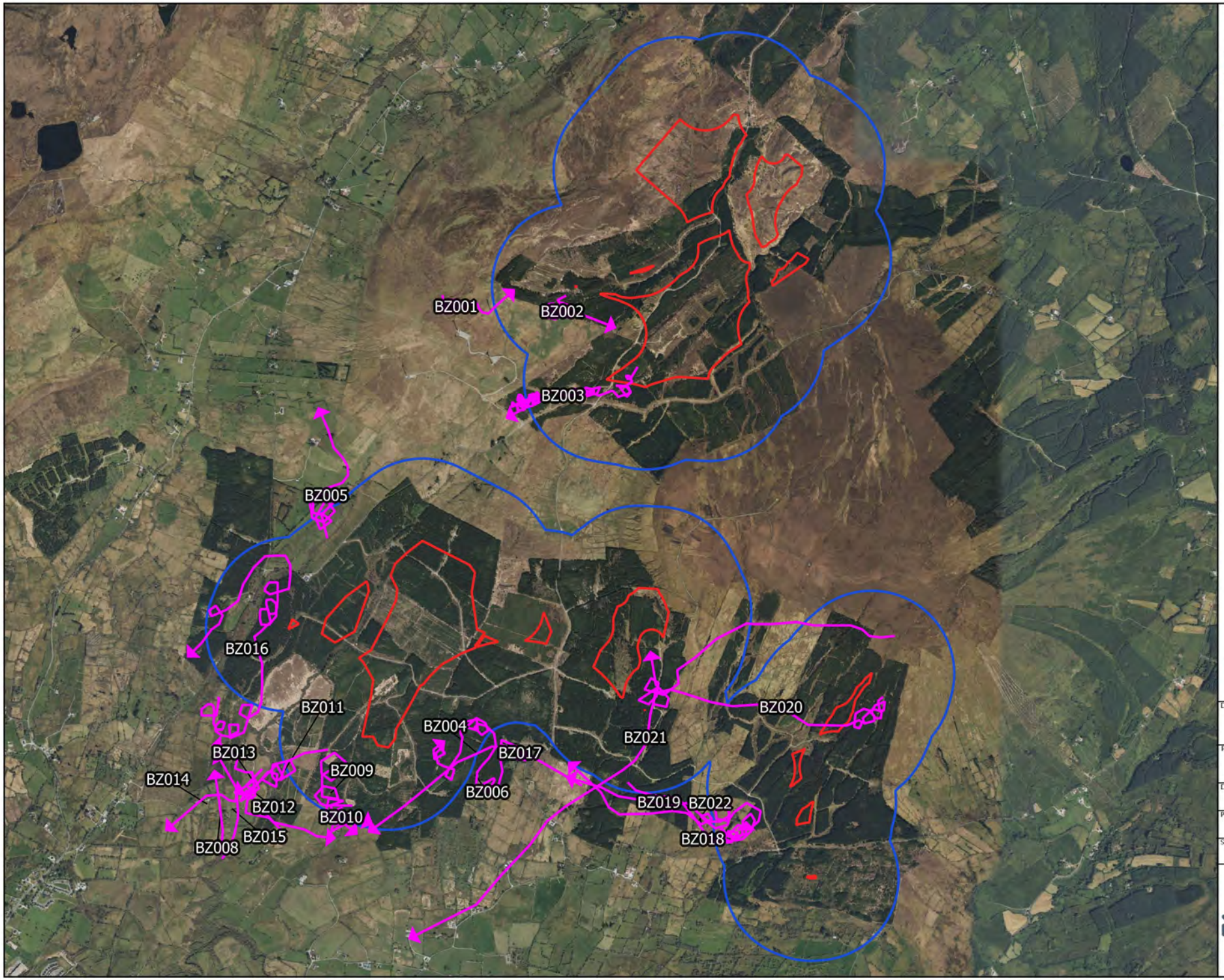

Map Legend

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- Site Boundary
- Observation Flightline

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Drawing Title	Buzzard VP Observations
Project Title	Lissinagroagh
Drawn By: AO'D	Checked By: AO'D
Project No.: 200217-f	Drawing No.: Fig 1.8
Scale: 1:30000	Date: 25.04.23

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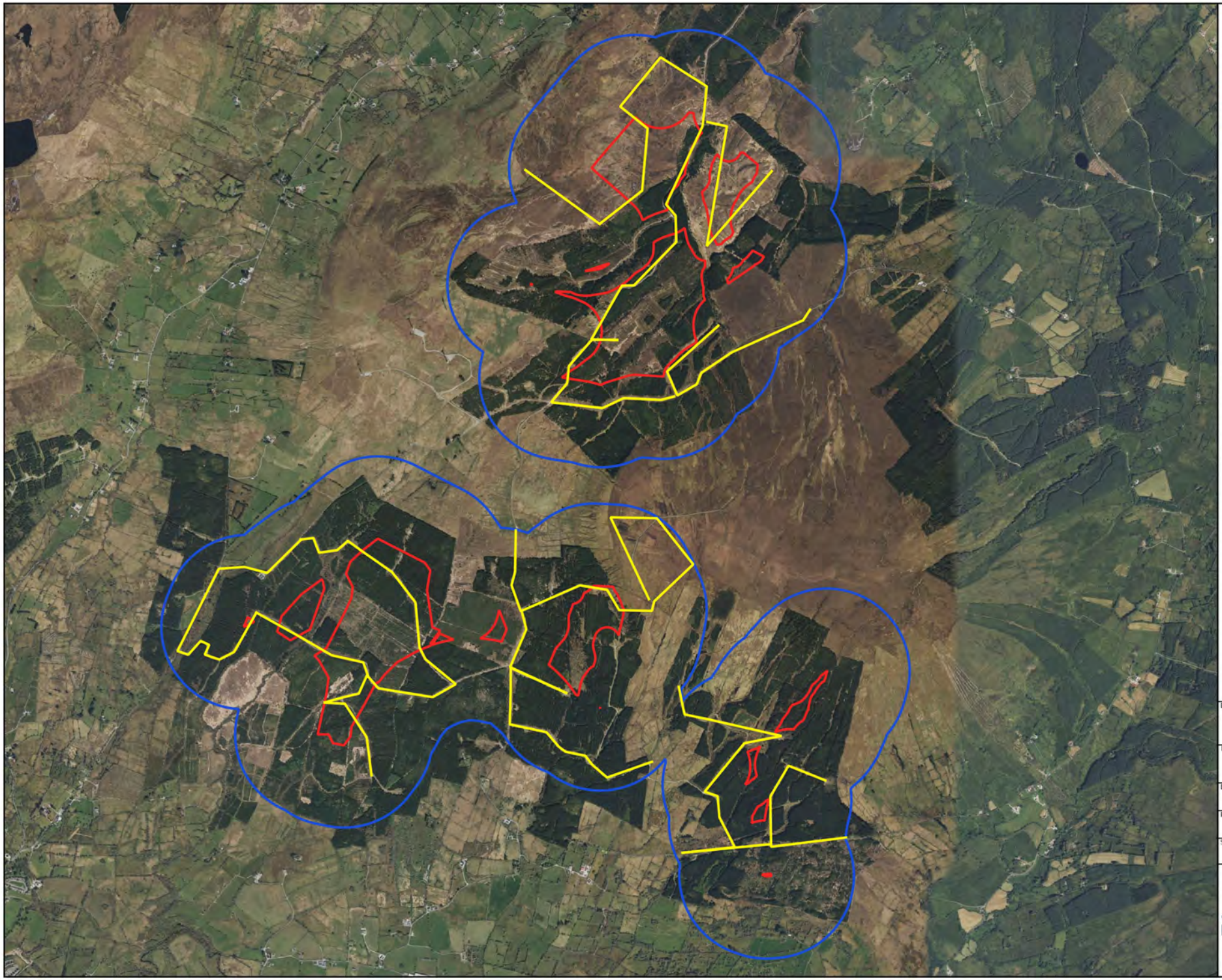

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Winter Walkover Transects

Project Title

Lissinagroagh

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Scale	Date
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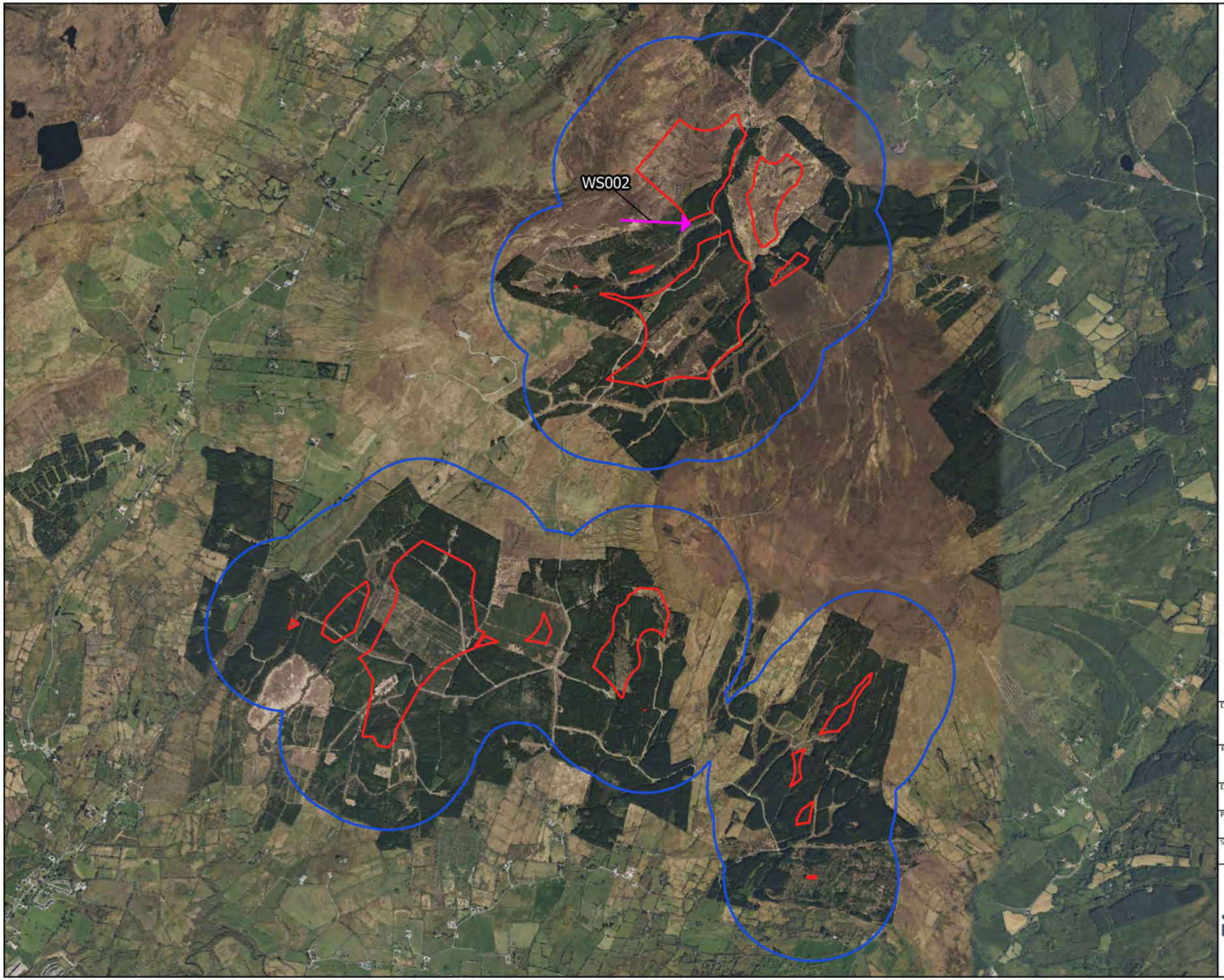

Map Legend

- 500m Buffer of Site
- Site Boundary
- Observation Flightline

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Drawing Title

Whooper swan
Winter Walkover Observations

Project Title

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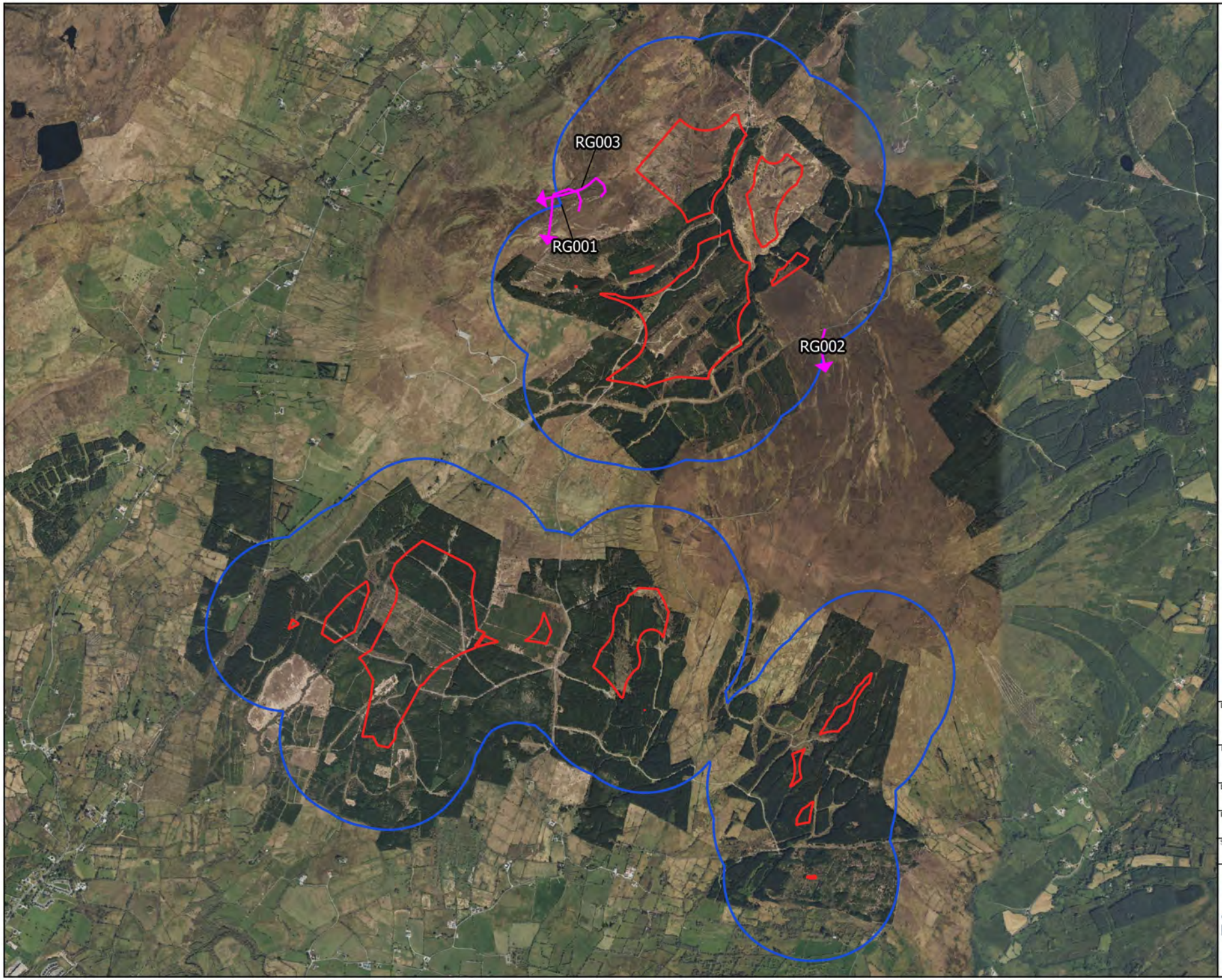

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Drawing Title

Red grouse
Winter Walkover Observations

Project Title

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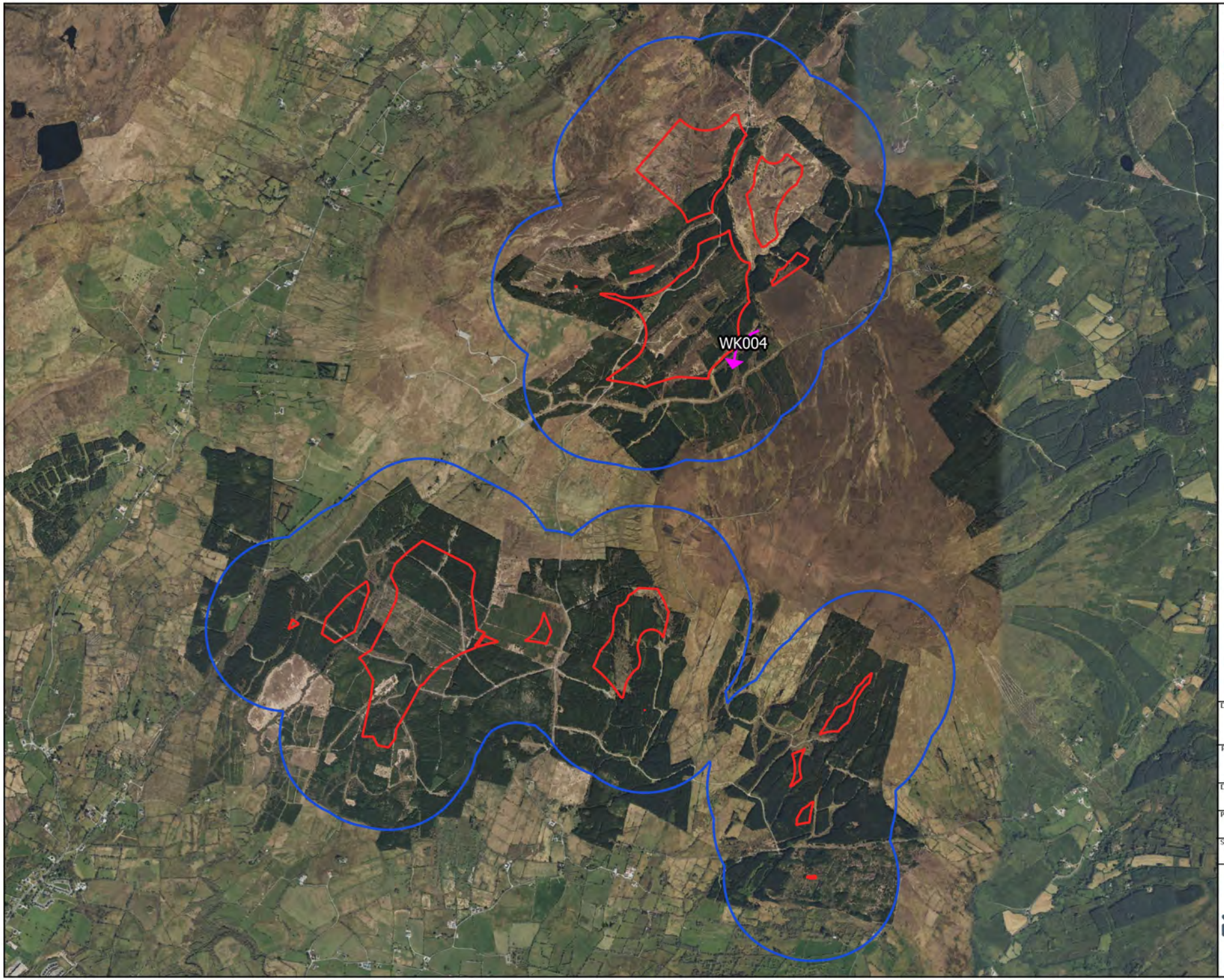

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Drawing Title

Woodcock
Winter Walkover Observations

Project Title

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Project No.	Drawing No.
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Scale	Date
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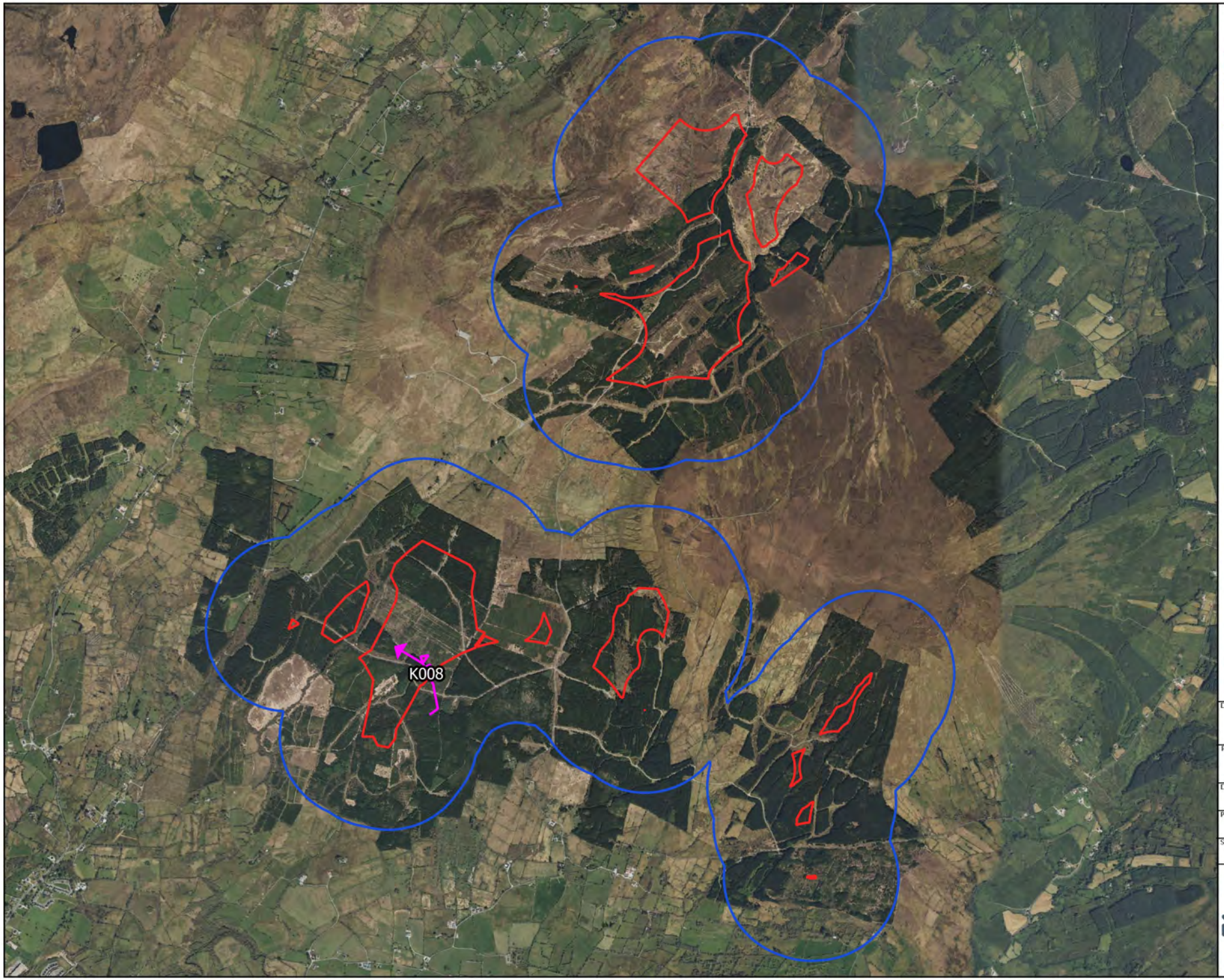

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Drawing Title

Kestrel
Winter Walkover Observations

Project Title

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Project No.	Drawing No.
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Scale	Date
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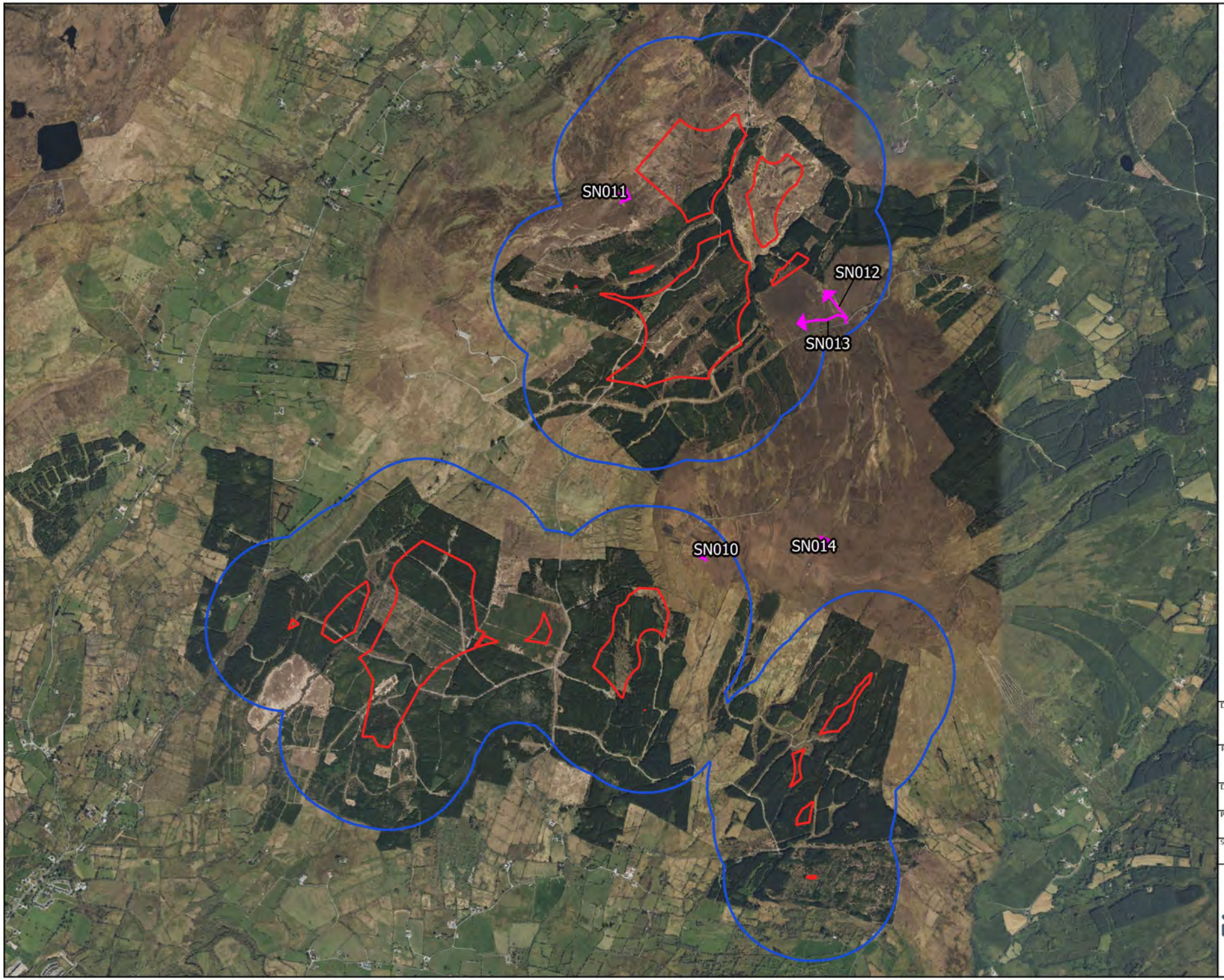

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Drawing Title

Snipe
Winter Walkover Observations

Project Title

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Project No.	Drawing No.
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Scale	Date
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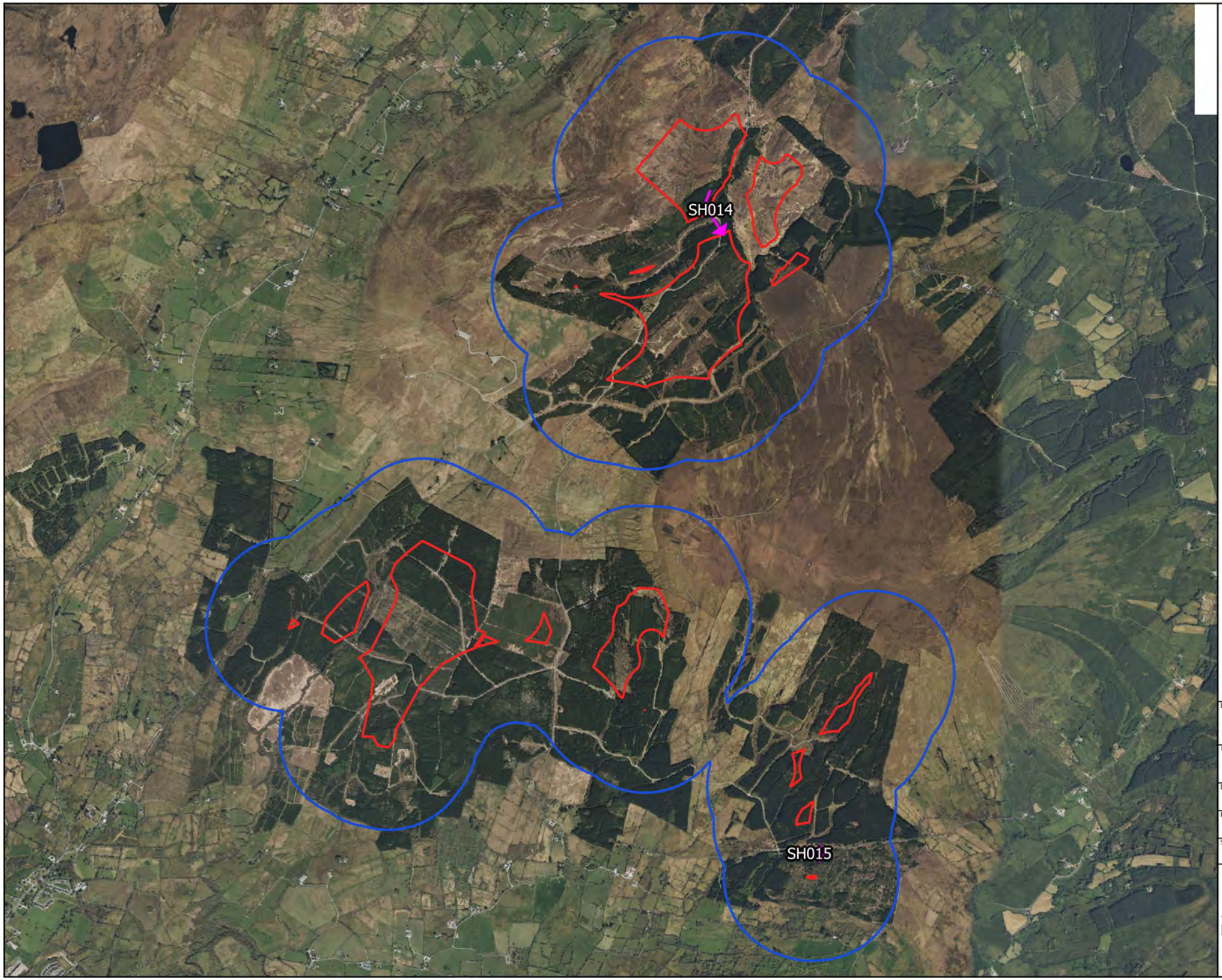

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Drawing Title

Sparrowhawk
Winter Walkover Observations

Project Title

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Drawn By	Checked By
AO'D	AO'D
Project No.	Drawing No.
200217-f	Fig 2.6
Scale	Date
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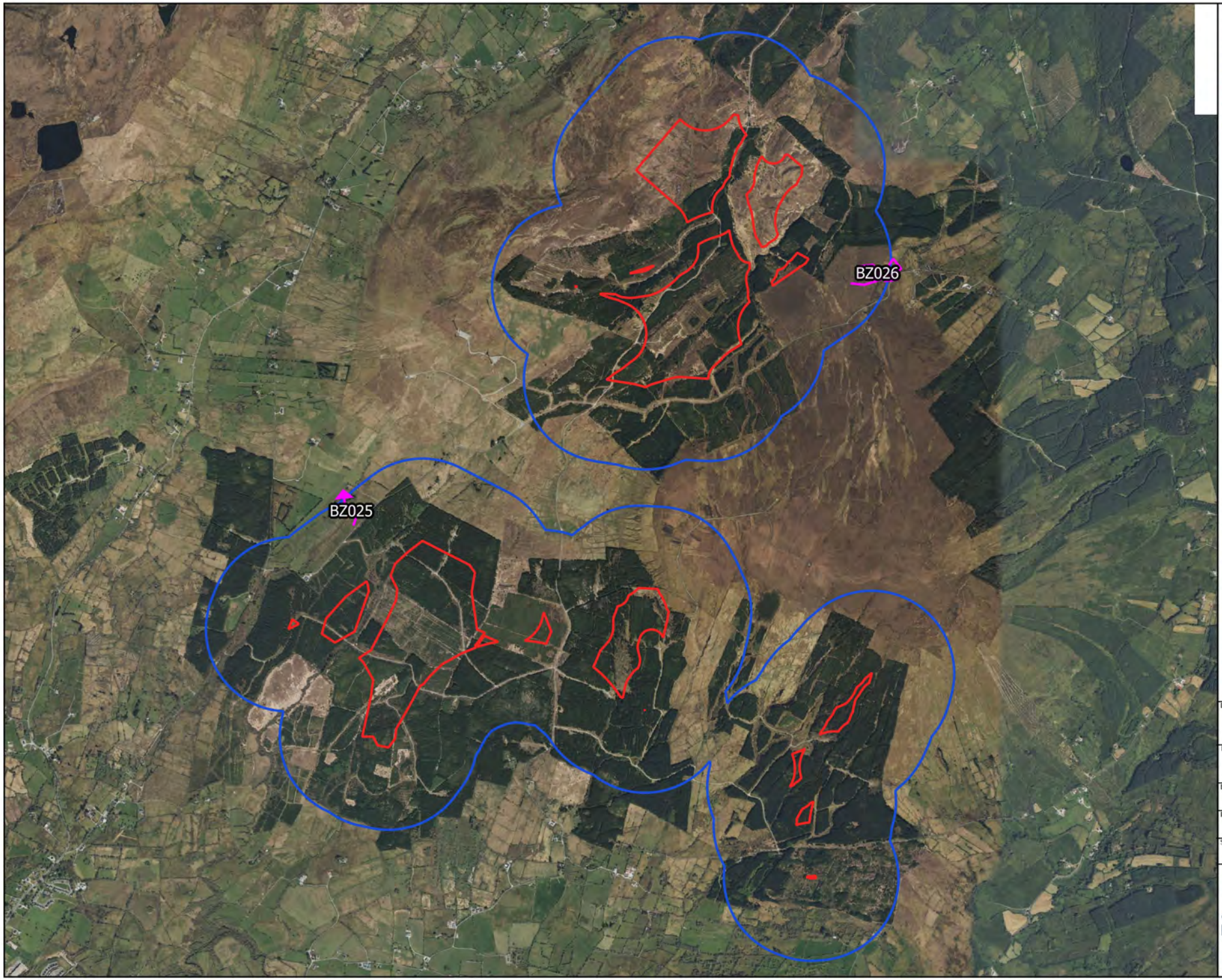

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Drawing Title

Buzzard
Winter Walkover Observations

Project Title

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Project No.	Drawing No.
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Scale	Date
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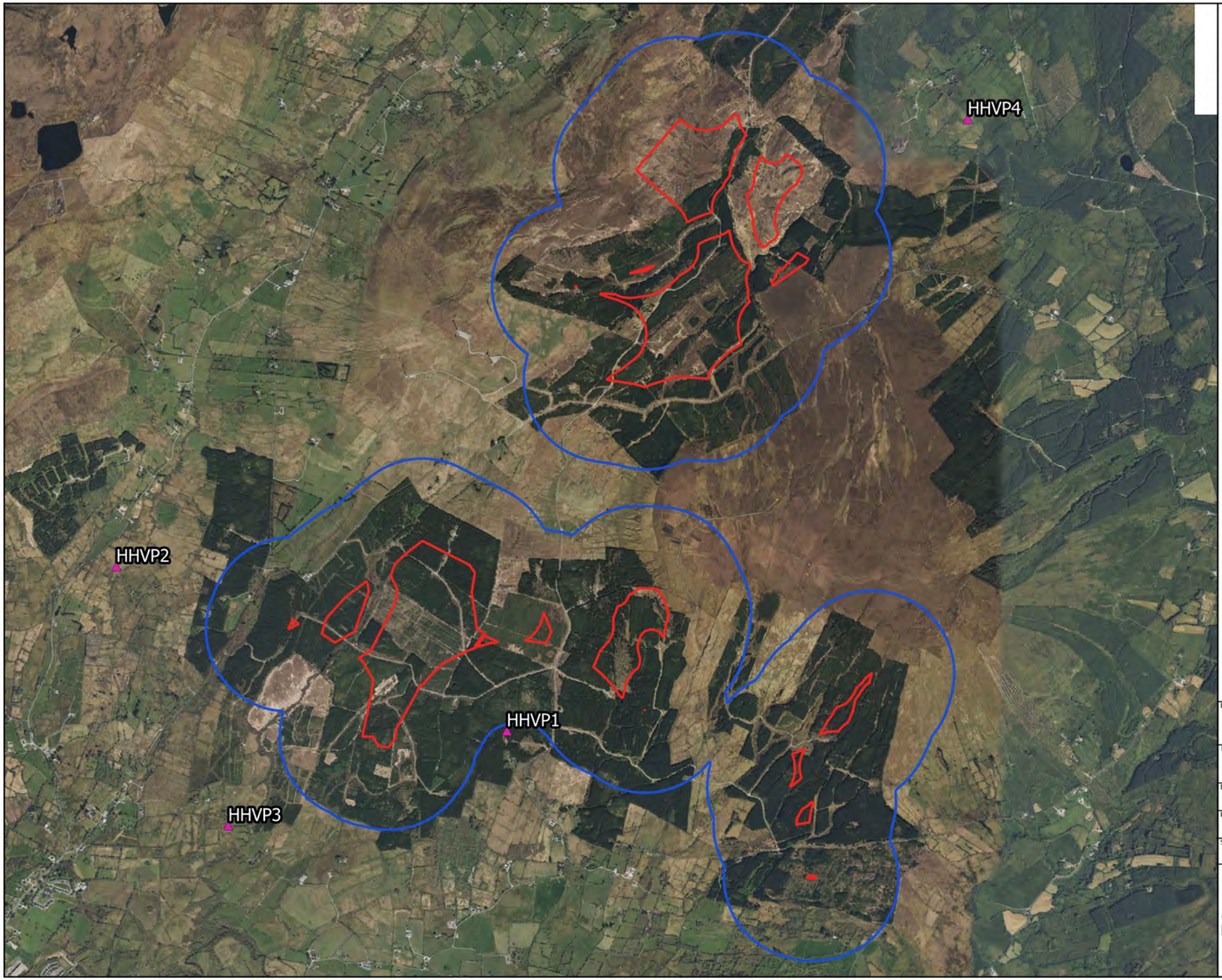

Map Legend

- 500m Buffer of Site
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- HHVP Location

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Drawing Title: HHVP Locations

Project Title: Lissinagroagh

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AO'D	AO'D
Project No.	Drawing No.
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Scale	Date
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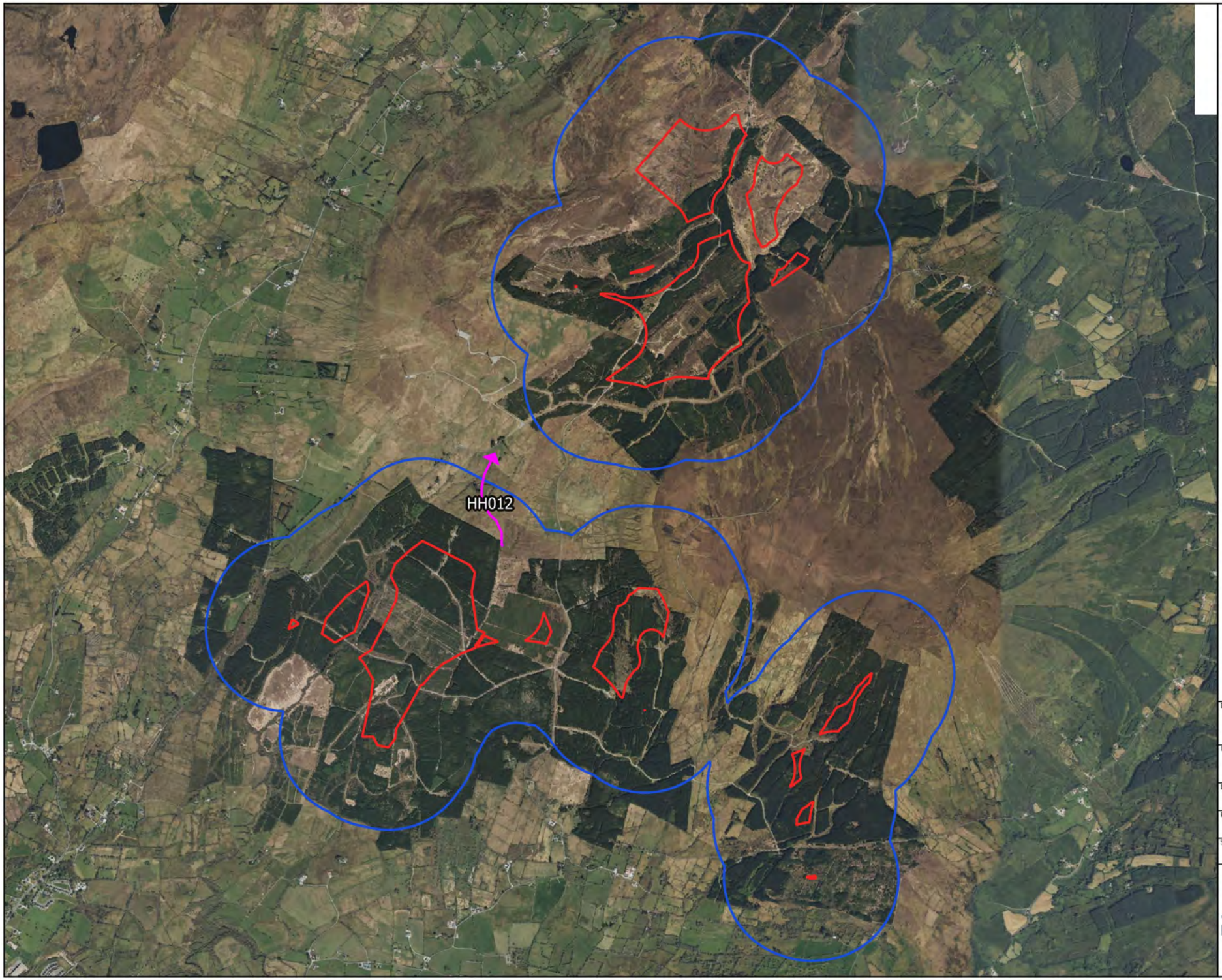

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Drawing Title
Hen harrier
HHVP Observations

Project Title
Lissinagroagh

Drawn By	Checked By
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Scale	Date
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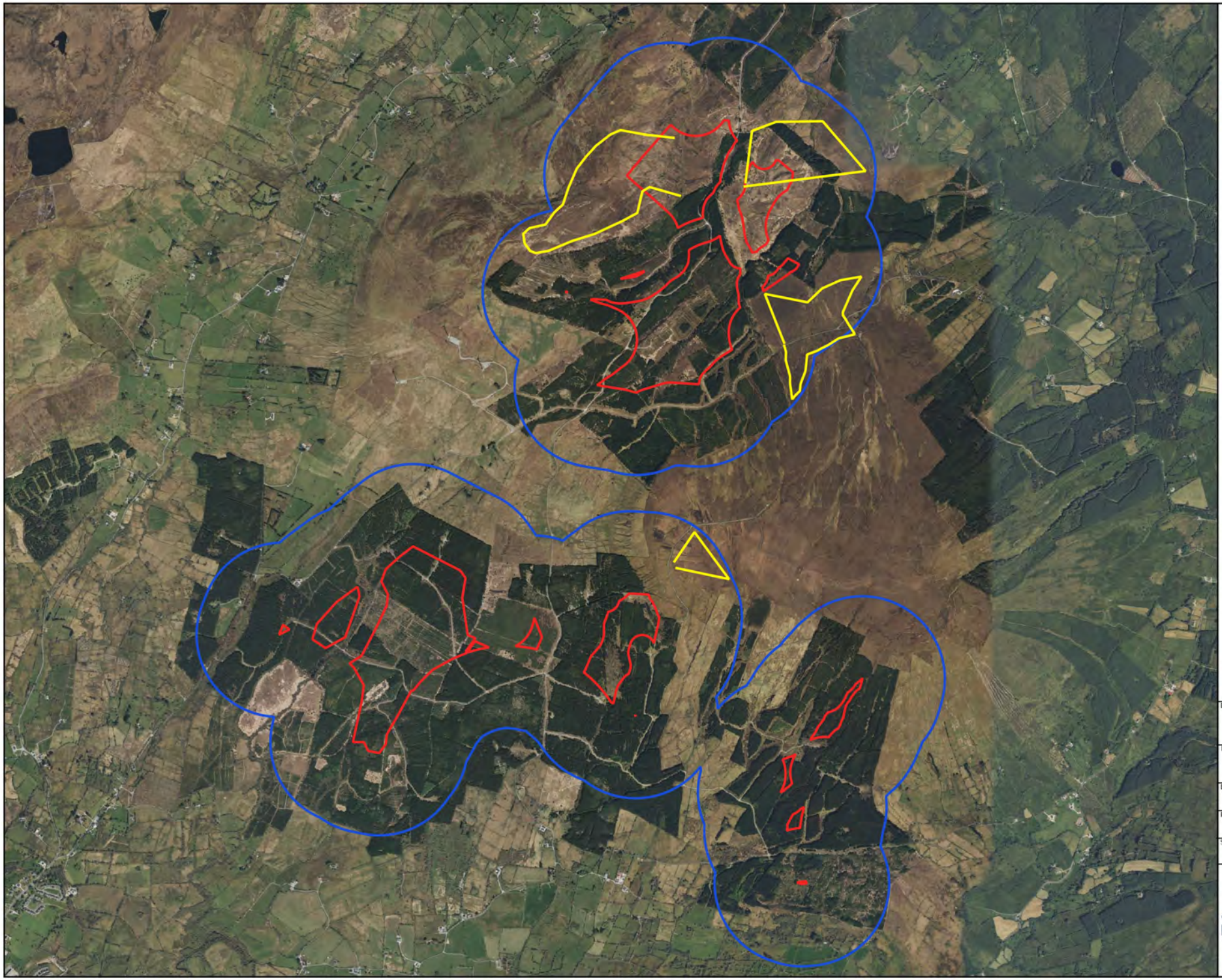
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Project No.
200217-f
Drawing No.
Fig 4.0
Scale
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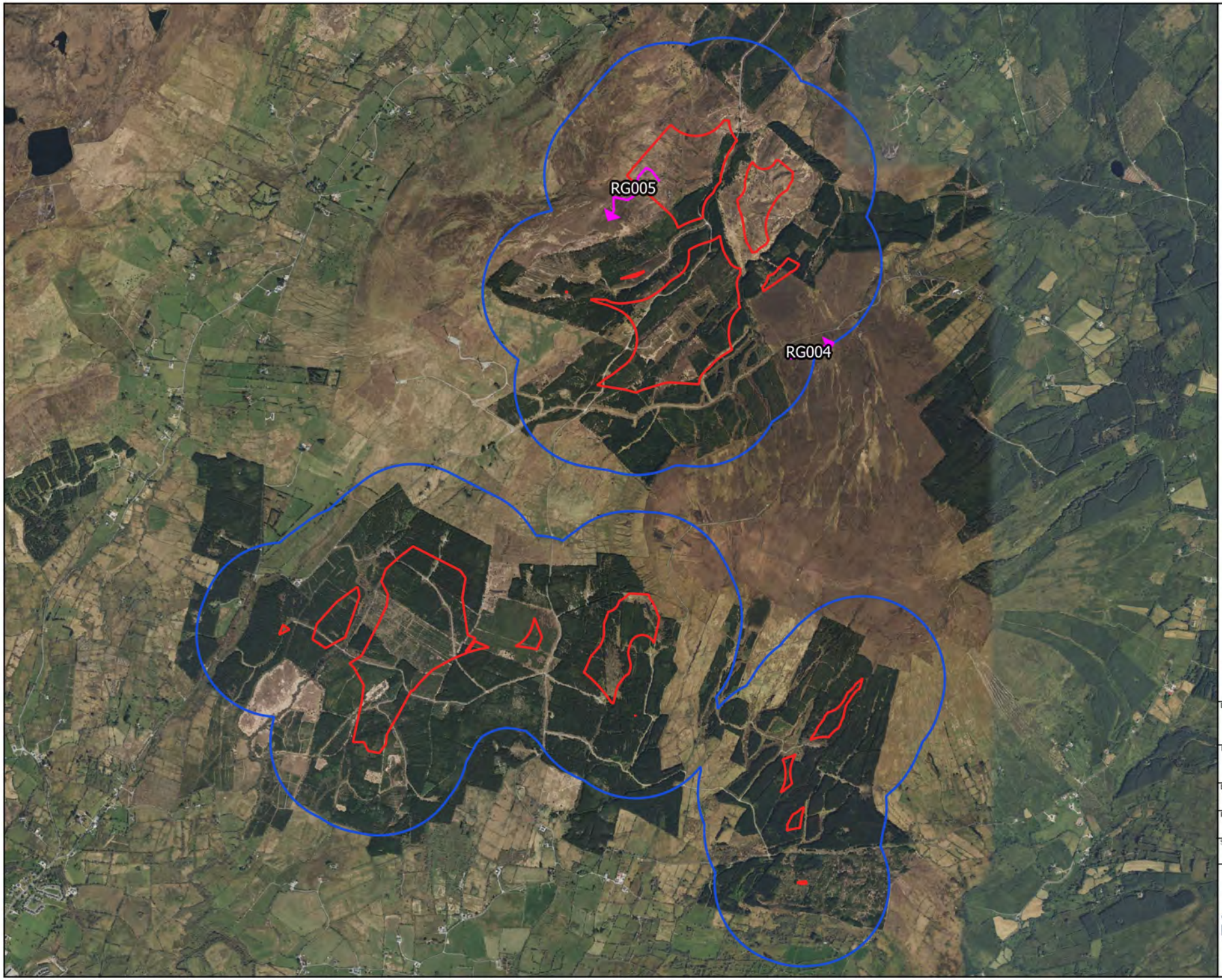

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- Observation Flightline

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Drawing Title
Red Grouse Survey Observations

Project Title
Lissinagroagh

Drawn By	Checked By
AO'D	AO'D
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Scale	Date
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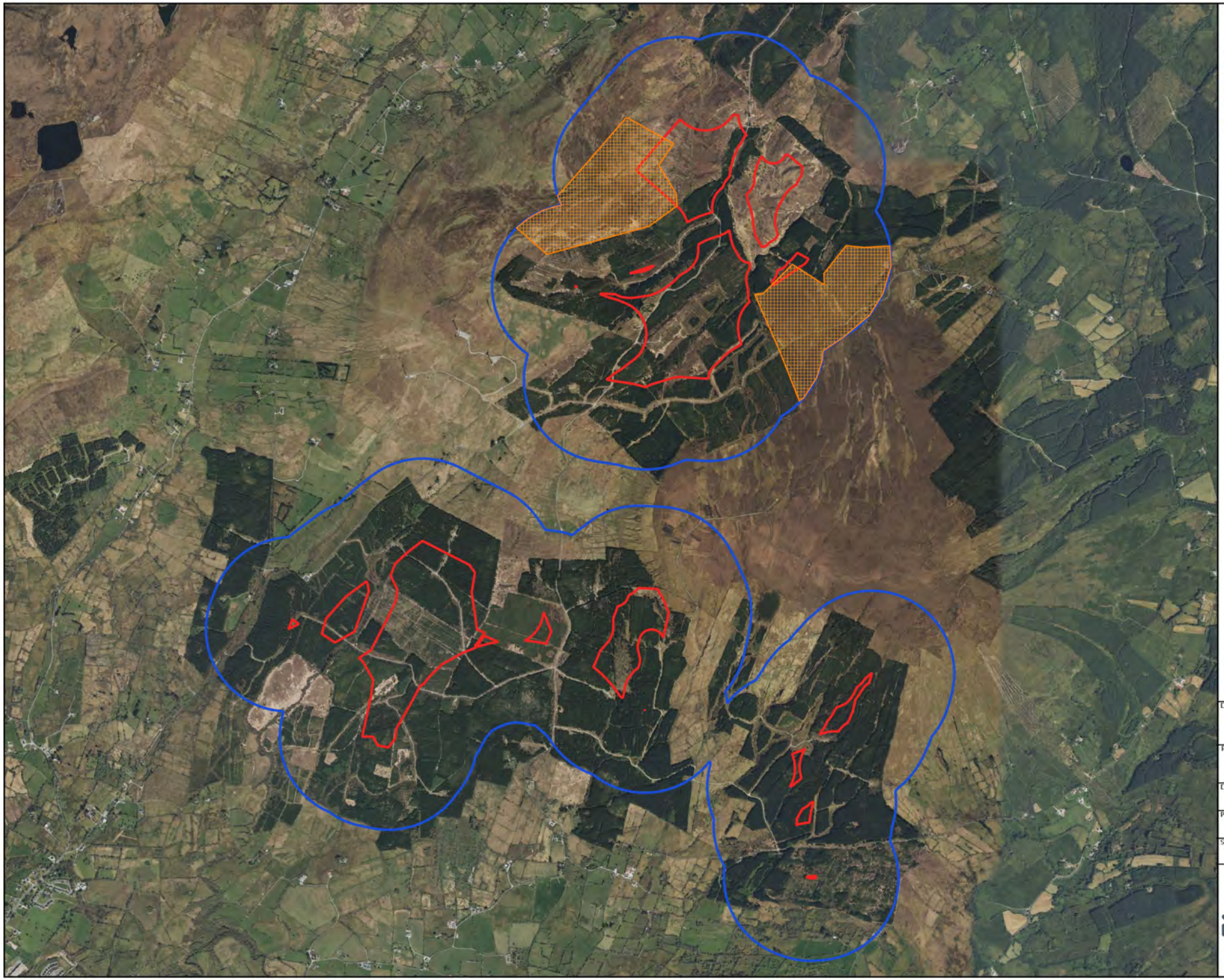
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Red grouse Territories
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Drawn By
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Project No.
200217-f
Drawing No.
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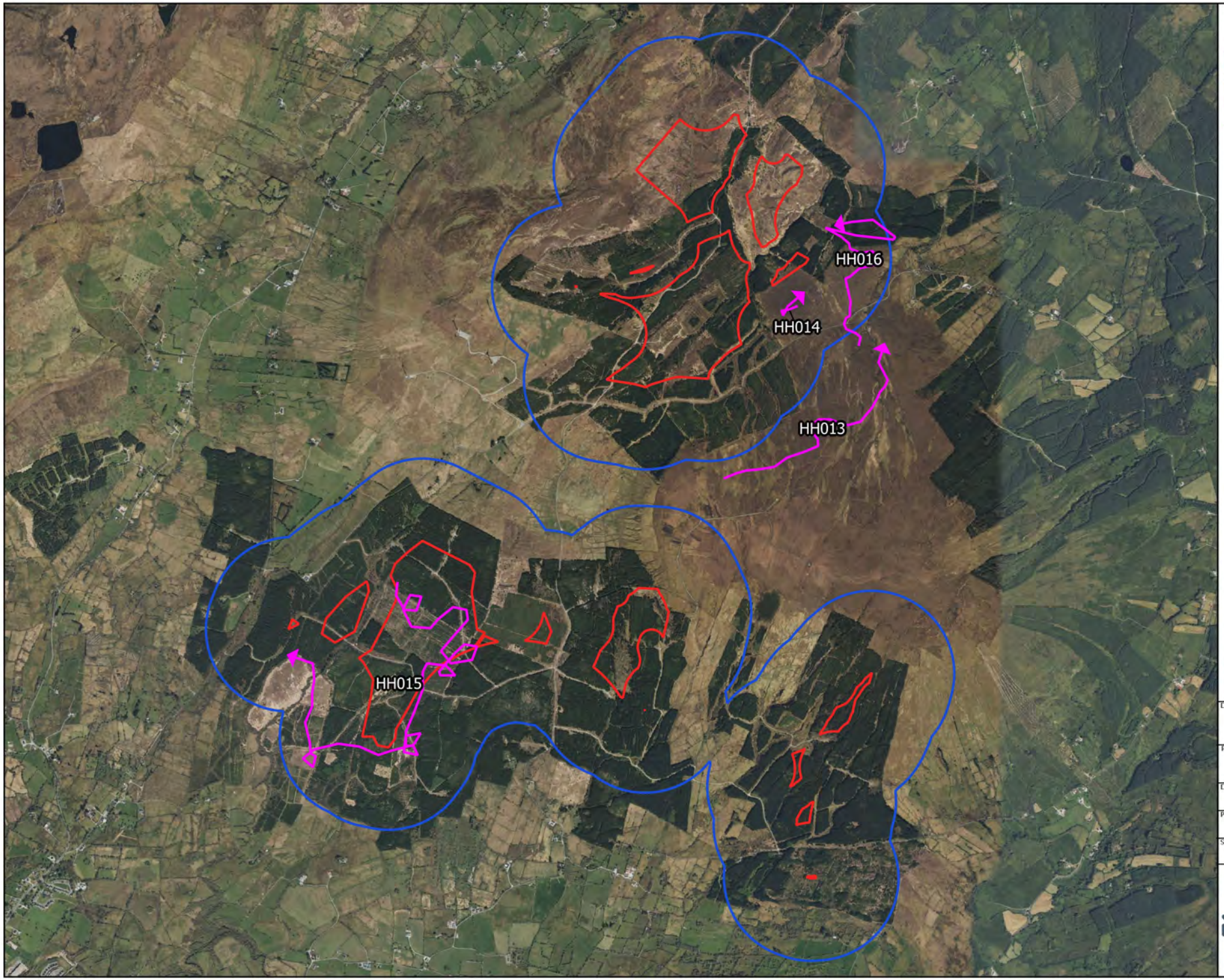

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Drawing Title
Hen harrier
Incidental Observations

Project Title
Lissinagroagh

Drawn By	Checked By
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Scale	Date
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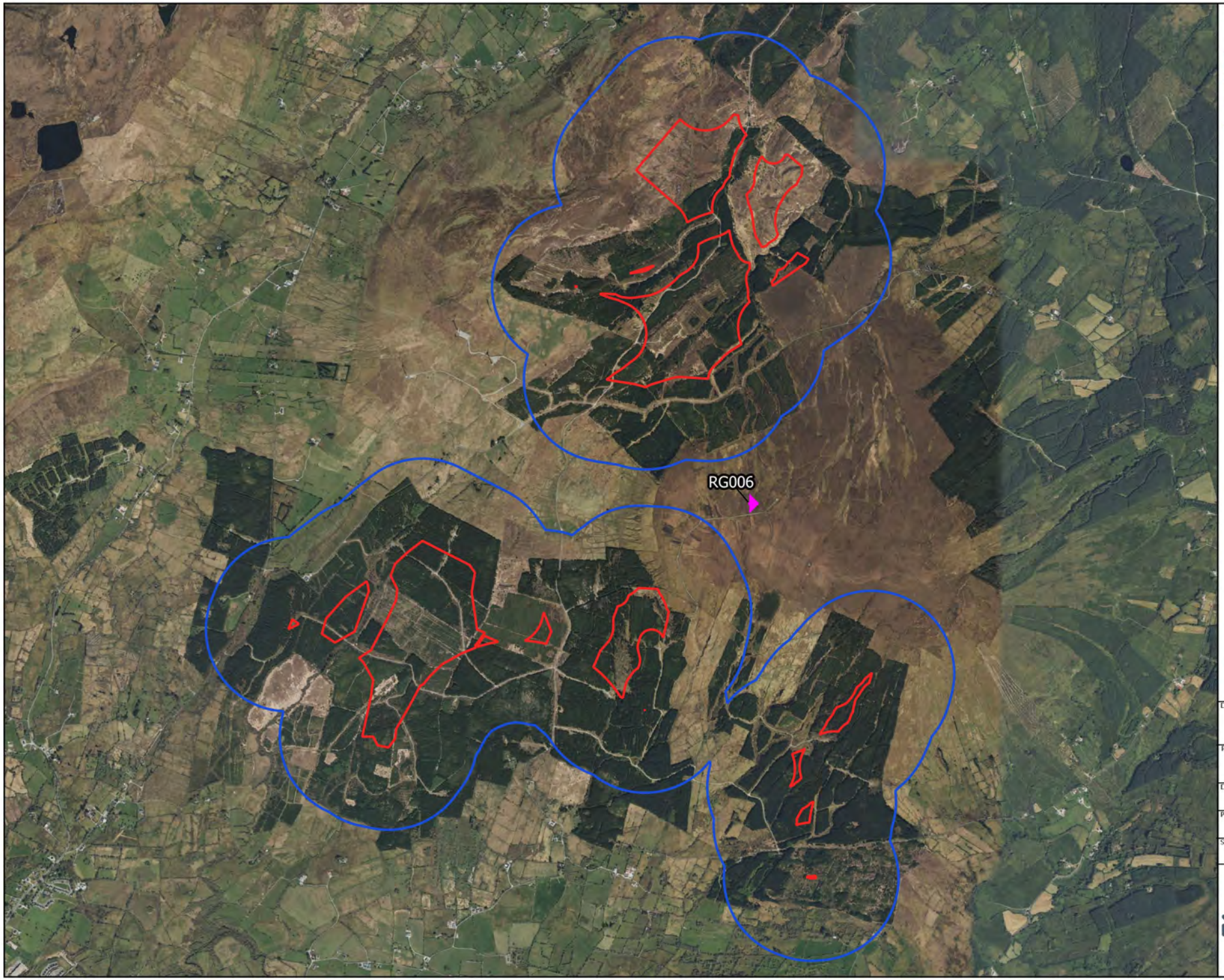

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Drawing Title
Red grouse
Incidental Observations

Project Title
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Drawn By	Checked By
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Scale	Date
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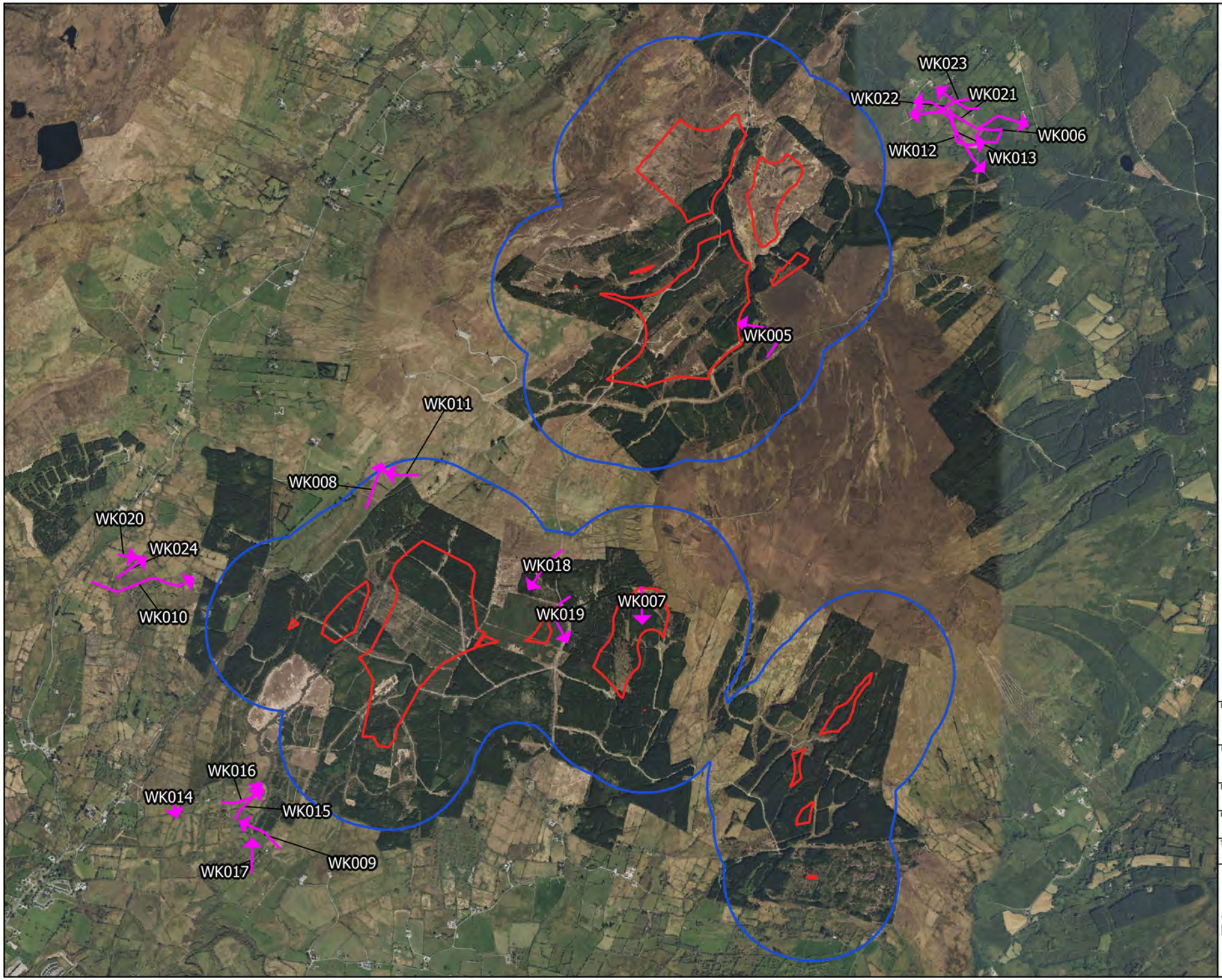

Map Legend

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- Site Boundary
- Observation Flightline

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Drawing Title
Woodcock
Incidental Observations

Project Title
Lissinagroagh

Drawn By	Checked By
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Project No.	Drawing No.
200217-f	Fig 5.2
Scale	Date
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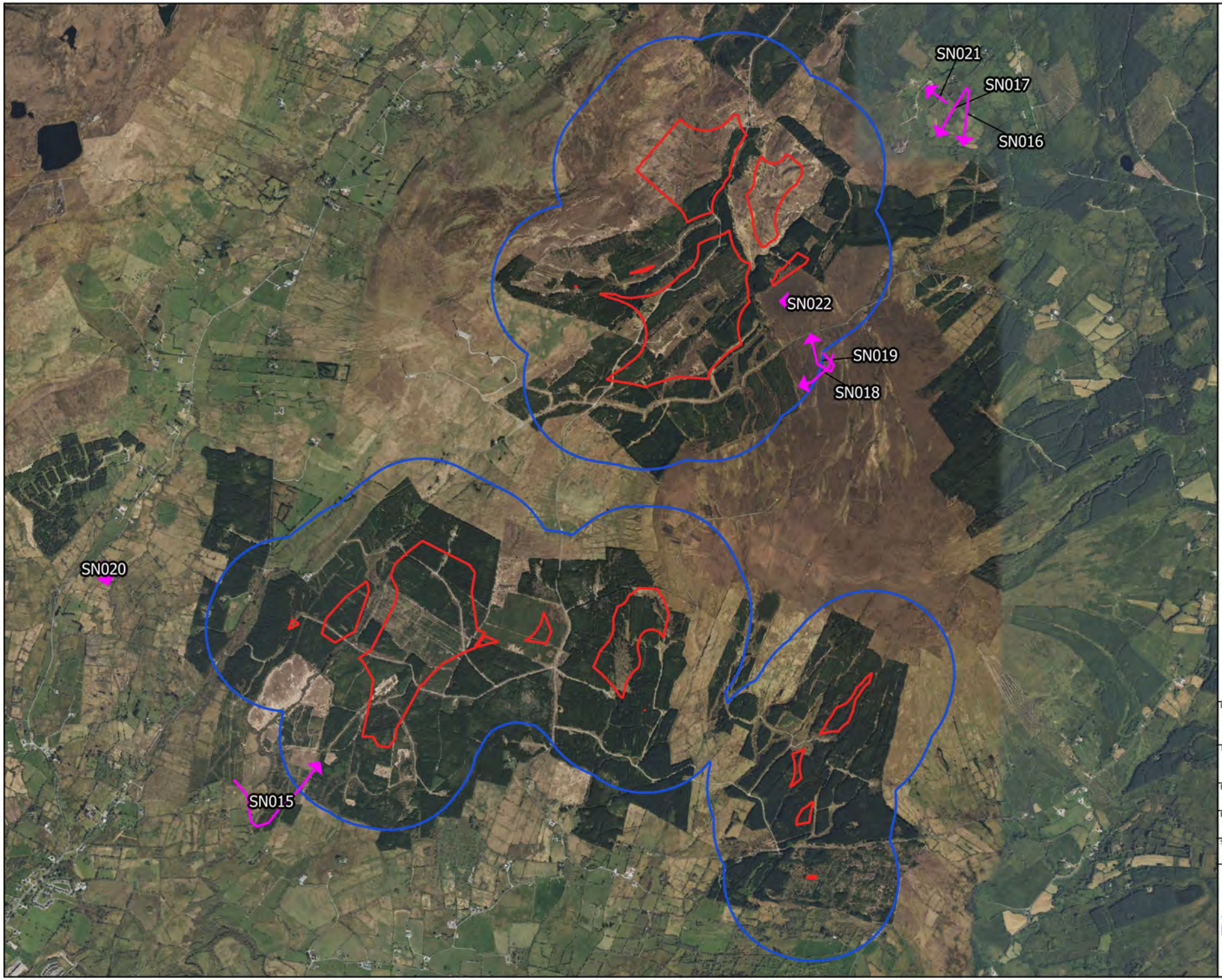

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Drawing Title

Snipe
Incidental Observations

Project Title

Lissinagroagh

Drawn By	Checked By
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Project No.	Drawing No.
200217-f	Fig 5.3
Scale	Date
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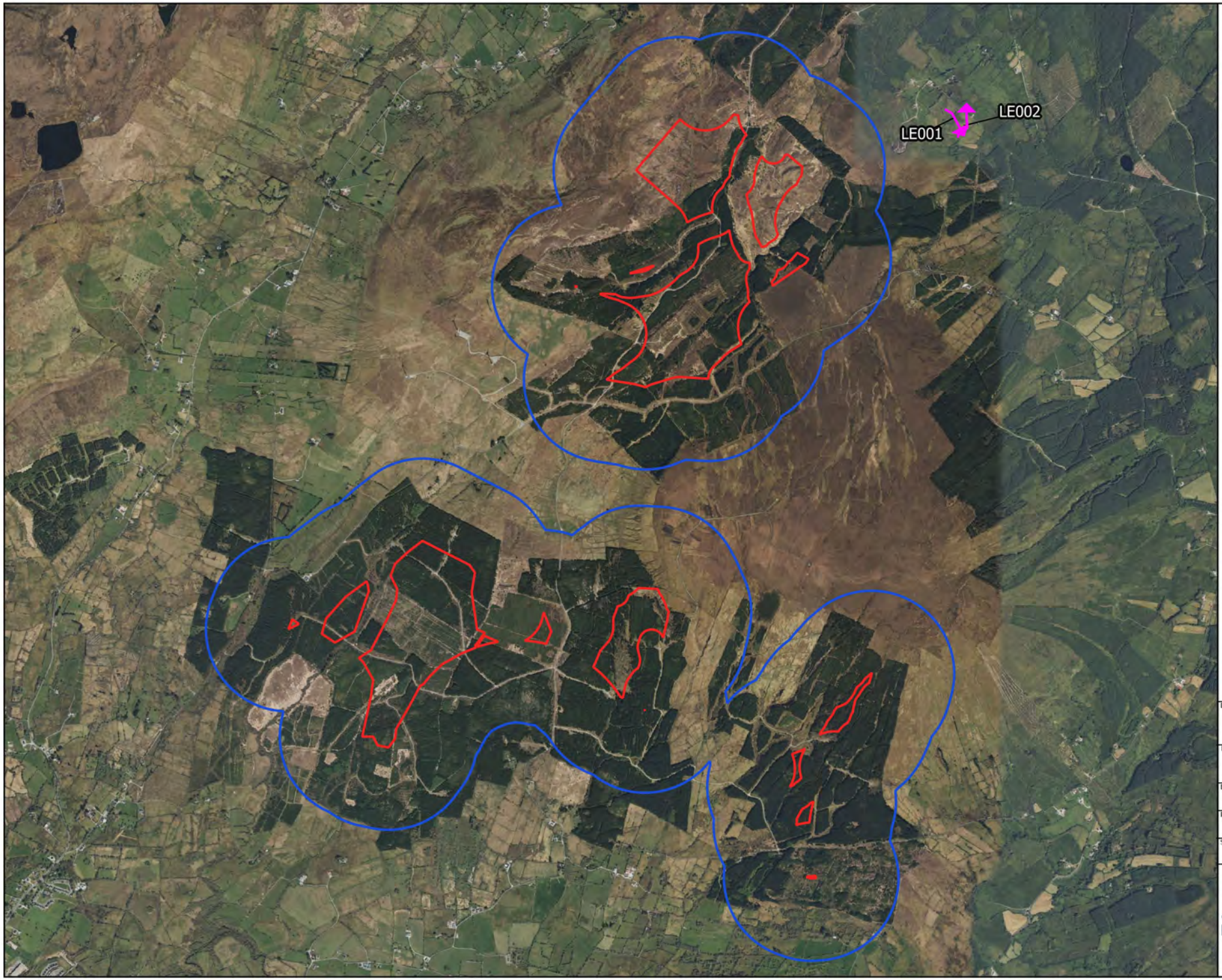

Map Legend

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Drawing Title
Long eared owl
Incidental Observations

Project Title
Lissinagroagh

Drawn By	Checked By
AO'D	AO'D
Project No.	Drawing No.
200217-f	Fig 5.4
Scale	Date
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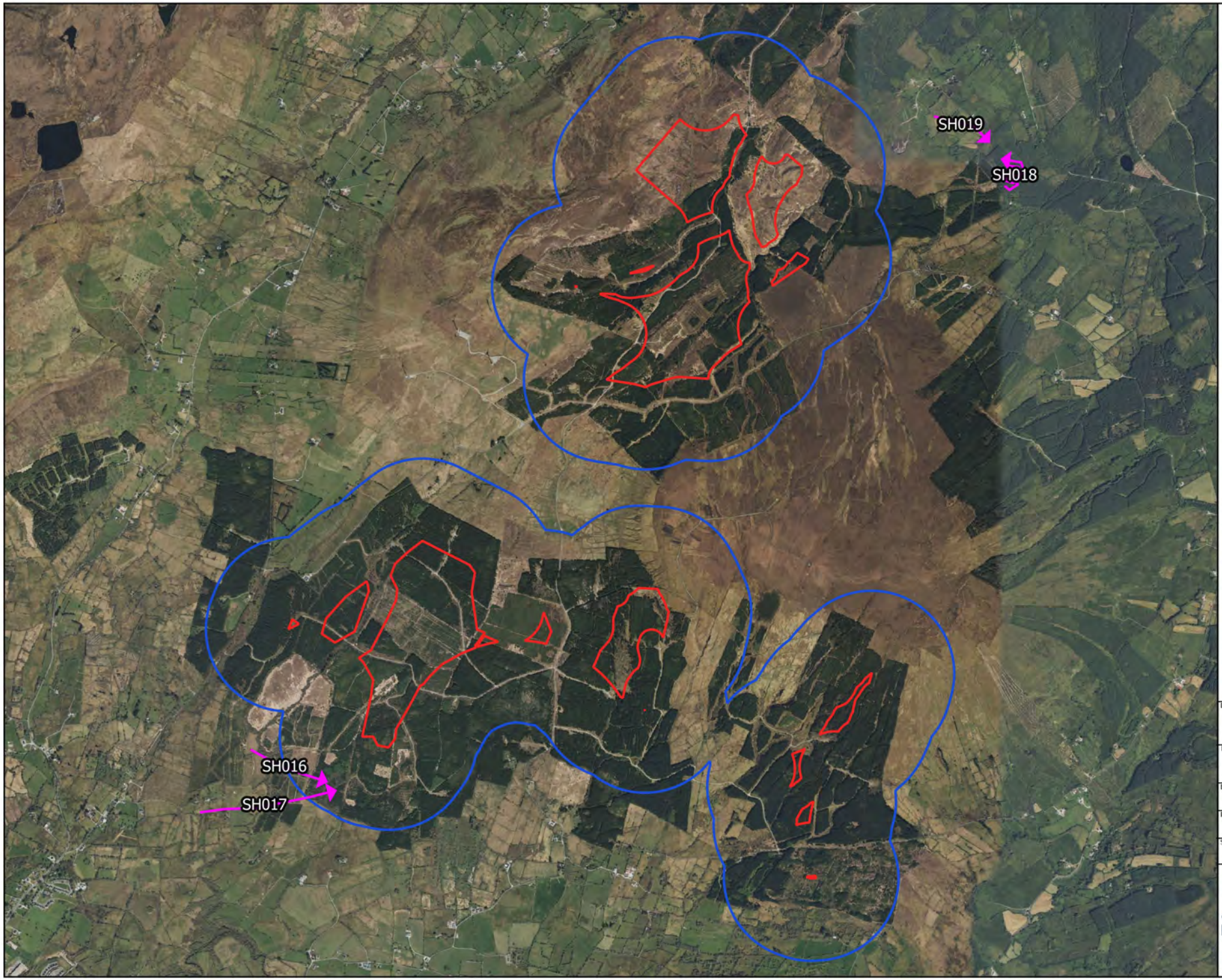

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Drawing Title
Sparrowhawk
Incidental Observations

Project Title
Lissinagroagh

Drawn By	Checked By
AO'D	AO'D
Project No.	Drawing No.
200217-f	Fig 5.5
Scale	Date
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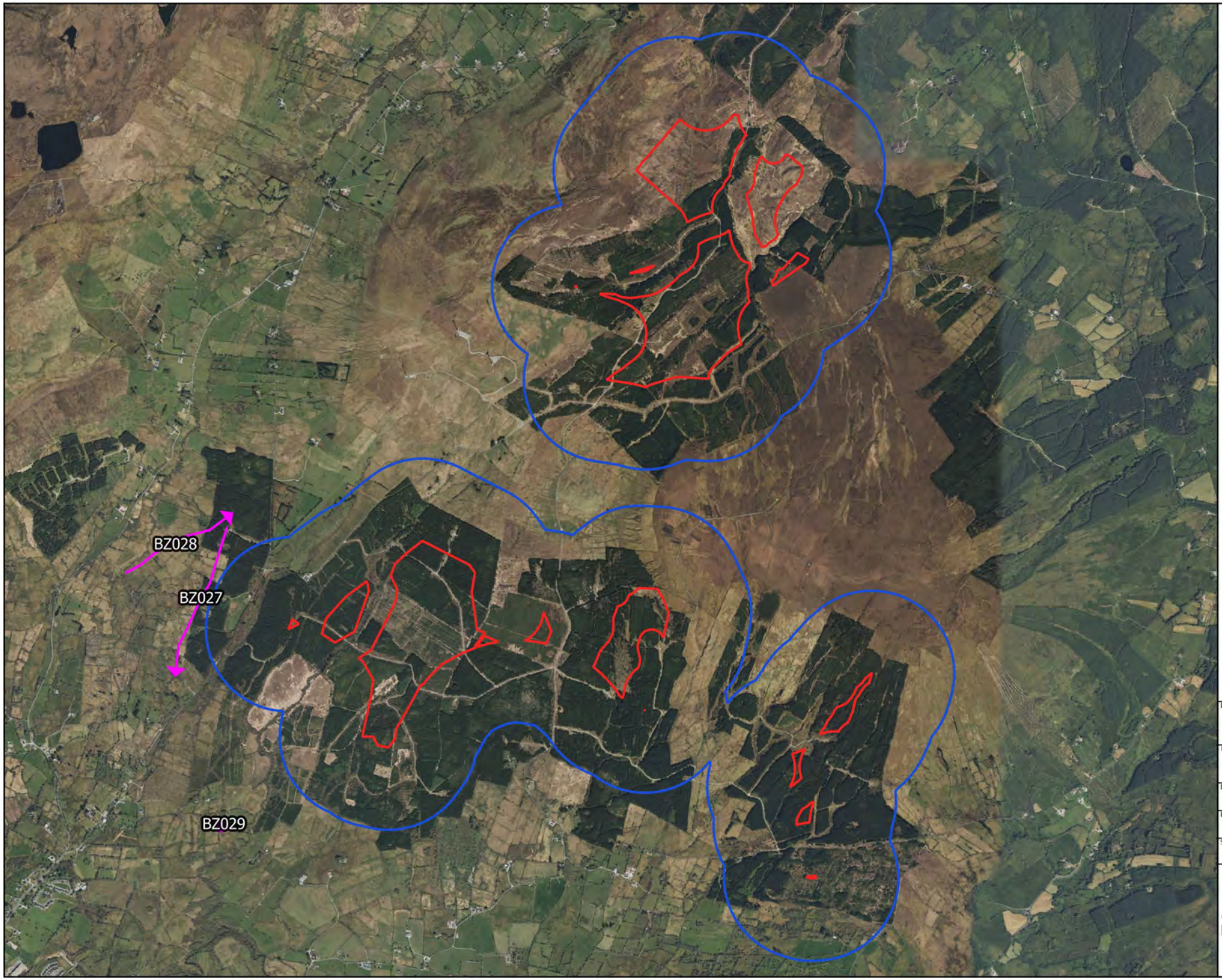

Map Legend

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Drawing Title
Buzzard
Incidental Observations

Project Title
Lissinagroagh

Drawn By	Checked By
AO'D	AO'D
Project No.	Drawing No.
200217-f	Fig 5.6
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Appendix 6-6

Bird Survey Report Breeding 2022

MKO Planning and Environmental Consultants

Breeding Bird Survey Report 2022

Lissinagroagh Wind Farm, Co. Leitrim



DOCUMENT DETAILS

Client:	**FuturEnergy Ireland**
Project Title:	**Lissinagroagh Wind Farm, Co. Leitrim**
Project Number:	**200217-g**
Document Title:	**Breeding Bird Survey Report 2022**
Document File Name:	**200217-g_F1_Lissinagroagh Breeding Survey Report_2022_2023.04.27**
Prepared By:	**MKO** **Tuam Road** **Galway** **Ireland** **H91 VW84**

Planning and Environmental Consultants

Rev	Status	Date	Author
01	Draft	21/4/23	AO'D
02	Final	27/4/23	AO'D

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1. SUMMARY

This report outlines the ornithological surveys completed at Lissinagroagh Wind Farm during the 2022 breeding season. Lissinagroagh Wind Farm has been surveyed previously since 2018.

The following surveys were undertaken during the 2022 breeding season:

- Vantage Point Surveys
- Breeding Walkover Surveys
- Breeding Raptor Surveys
- Breeding Woodcock Surveys

The key observations during surveys were relating to breeding hen harrier. This species was recorded frequently and in high numbers and are resident at the wind farm site.

Key impacts resulting from the proposed development for local avian receptors could include habitat loss, disturbance, displacement, and collision risk. There were breeding territories identified for red grouse, woodcock, snipe, and sparrowhawk at, or within 500m of, the wind farm site. There is the potential for direct habitat loss of nest sites for these species based on the 2022 breeding season surveys.

The following constraints on the Proposed Development were identified during this survey period:

- Hen harrier nest approx. 1km off-site.

2. INTRODUCTION

MKO were appointed to carry out bird surveys at Lissinagroagh Wind Farm, Co. Leitrim for the breeding 2022. This report describes the ornithological survey methods employed and survey data collected for the period from April 2022 to September 2022 inclusive.

2.1 Background

Lissinagroagh Wind Farm has been surveyed previously since the 2018 breeding season. Please see the relevant end of season reports for full details of the survey methods and results from these survey periods. The following constraints on the Proposed Development were outlined in these reports:

- Two hen harrier nests on site in the breeding season of 2020 and 2021.

2.2 Site Description

The site is located north of Manorhamilton (Grid Ref: X 591484.00 Y 842226.00). The dominant habitat on site is forestry, upland blanket bog and rough grassland. The wider surroundings are predominantly upland blanket bog, rough grassland, forestry, and improved agricultural grassland. The total area of the development is approximately 152 hectares. Figure 1.0 shows the wind farm site boundary.

2.3 Purpose of this Report

This report describes the ornithological survey methods employed and survey data collected at Lissinagroagh Wind Farm for the period from April 2022 to September 2022 inclusive. Particular attention has been paid to species of conservation importance and identified target species.

The report is supported by Technical Appendix 1 which contains the raw data from the breeding bird surveys in 2022. This includes detail on survey times, weather conditions, surveyors, survey results and other additional information. Bird observations during surveys have been digitised and are provided in Technical Appendix 2. Details relating to hen harrier are provided in Confidential Appendix 3. This appendix contains ecological sensitive information and should not be publicly disseminated.

The report is structured as follows:

- An introduction describing the background and a statement of authority.
- A comprehensive description of the ornithological surveys carried out.
- A full description of results for all ornithological surveys carried out.
- A discussion providing a synopsis of the findings of the ornithological surveys.
- A conclusion describing the key findings and possible impacts on the local ornithological receptors.

3. METHODS

3.1 Scope

The study area for the purposes of ornithological surveys is the redline boundary of the wind farm site and up to a 500m radius. Depending on the survey type, the survey area may extend to 2km and 5km off the wind farm site.

The following defines terms used in this report.

- "Zones of Influence" (ZOI) for potential ornithological receptors refers to the zone within which potential effects are anticipated. ZOIs were assigned following best available guidance (SNH 2016 and McGuinness et.al 2015).
- "Potential Collision Height" (PCH) refers to the height at which birds are regarded to be at risk of collision with turbine blades. For the purposes of this report, this refers to flights between 25m and 175m high.

Field surveys were designed to monitor the target species expected to be found at the wind farm site. Target species were determined based on the habitats on-site, the species expected in the wider area, Special Protection Areas (SPAs) within the ZOI, and protected species. Target species included those listed on Annex I of the EU Birds Directive (2009/147/EC), species that are a Special Conservation Interest (SCI) of a SPA designated under the EU Habitats Directive (92/43/EEC) Natura 2000 network within 15km of the proposed development site, species listed on the Red List of Birds of Conservation Concern in Ireland (Gilbert *et al.,* 2021), and raptor species sensitive to wind farm developments.

3.2 Field Surveys

This section of the report describes the various field survey methods employed. Field surveys were undertaken from April 2022 to September 2022 inclusive. The data provided in this report is robust and in line with industry best practises, including the NatureScot (formerly Scottish Natural Heritage) guidance "Recommended bird survey methods to inform impact assessment of onshore windfarms" (SNH, 2017). Field survey methodologies have been devised to survey for the bird species composition and assemblages that occur within the study area.

3.2.1 Vantage Point Surveys

Vantage point (VP) surveys were undertaken in accordance with SNH (2017) from four vantage point locations from April 2022 to September 2022.

Data on bird observations and flight activity was collected from a scanning arc of 180° and a 2km radius by an observer at each fixed location for six hours per month. Surveys were scheduled to provide a spread over the full daylight period including at dawn and dusk to coincide with the highest peaks of bird activity.

Details on vantage point watch survey effort and results are presented in Appendix 1 of this report. This appendix includes full details of dates, times, survey locations, survey duration and weather conditions for each survey, as well as bird records. Appendix 2, Figure 1.0 shows the locations of vantage points and technical data is provided in Appendix 1. Figure 1.1 to Figure 1.9 show maps of bird observations.

Flight activity was assigned to distinct height bands. The flight bands were chosen with reference to the dimensions of likely turbine models for the site and the resulting potential collision height. Bands are split into 0-15m, 15-25m, 25m-175m and 175m+. Taking a precautionary approach, flights recorded within the 25-175m height band were considered to be at PCH.

3.2.1.1 Viewshed Analysis

Viewshed analysis was carried out to confirm the sufficiency of the chosen vantage point locations (VP1, VP2, VP3 and VP4) prior to the commencement of surveys in 2018. The viewshed analysis aims to establish whether the selected VP offers adequate coverage of the turbine layout proposed at the time of surveying. A 500m buffer was applied to the likely maximum viable area of the site for the wind energy development in line with SNH (2017) recommendations to conduct surveys to 500m from the outermost turbines. Viewsheds were calculated using Resoft Wind Farm ZTV (Zone of Theoretical Visibility) software in combination with QGIS (Version 3.22), using a notional and precautionary layer suspended at 25m, which represents the lowest swept height of the turbine blades. While the relevance of being able to view as much of the site to ground level is acknowledged, the SNH guidance emphasises the importance of visibility of the 'collision risk volume' when the data is to be used to estimate the risk of collision with turbines by birds.

The viewshed analysis involved testing each VP location for its visibility coverage by creating a view shed point 1.5m in height (to represent the height of the observer) on a map using 10 metre contours terrain data. The relative height of forestry and its effects on visibility is also accounted for in the analysis. Using the ZTV software, a viewshed of 360 degrees was produced calculating an area 25m from ground level up to a two-kilometre radius. The resulting viewshed image was then cropped to 180 degrees to give the viewshed from each VP location in line with SNH (2017).

3.2.2 Breeding Walkover Surveys

Breeding walkover surveys were undertaken to determine the presence of bird species of conservation concern and identify areas of possible, probable, or confirmed breeding territories for bird species observed within the study area. The survey methodology followed an adapted version of the Brown and Shepherd method for upland sites as outlined in Gilbert et al. (1998). The study area for these surveys was the wind farm site and to a 500m survey radius.

Transect routes were devised to ensure coverage of different habitat complexes between vantage point locations within the study area. Transects were selected in order to survey all areas of suitable breeding/ foraging habitat to within 100m, where access allowed. Target species included waders, raptors, waterbirds, gulls, and other birds of conservation concern. Along with target species, all additional species observed were recorded to inform the evaluation of supporting habitat.

Walkover surveys were carried out during daylight hours, during the core breeding season months of April, May, June, and July (2022), with the wind farm site being visited four days per month on each occasion. Following all survey visits, the field maps were analysed to determine the number and location of breeding territories. All non-breeding individuals and species encountered were also recorded.

Survey effort, including details of survey duration and weather condition and results are presented in Appendix 1. Figure 2.0 in Appendix 2 shows the survey area, while bird observations are shown in Figure 2.1 to Figure 2.7.

3.2.3 Breeding Raptor Surveys

Breeding raptor surveys (i.e., birds of prey) were undertaken within the study area and its immediate surroundings. The aim of these surveys was to identify occupied territories and ascertain whether breeding was successful. Methodology followed Hardey *et al.* (2013). Raptor surveys were undertaken onsite and to a 5km radius during the core breeding season period (April to August 2022). Survey effort and results are provided in Appendix 1. Bird observations are shown in Figure 3.0 to Figure 3.4.

3.2.4 Breeding Woodcock Surveys

Breeding season surveys for woodcock were undertaken in accordance with Gilbert et.al (1998). The survey area extended 500m beyond the wind farm site. All surveys were undertaken in areas of suitable breeding habitat during May and June 2022. Surveys commenced one hour before sunset and continue for an hour after sunset or until it was too dark to see. The aim of the survey was to record the presence of roding (displaying) male woodcock and thereby establish the distribution and abundance of the species in the study

area. This survey method also allowed the observer to survey for owls, i.e., barn owls and long-eared owls. Survey effort is presented in Appendix 1, including details of survey duration and weather conditions and results. Figure 4.0 in Appendix 2 shows survey area, while bird observations are shown in Figure 4.1.

3.3 Project Team

This report has been prepared by Andrew O'Donoghue (B.Sc.) Project Ornithologist with MKO. The field surveys were undertaken in the 2022 breeding season by Andrew O'Donoghue, Kate Bismilla and Niall McHugh all of whom are competent bird surveyors.

3.4 Survey Limitations

A comprehensive suite of bird surveys was undertaken at the site between April and September 2022, as detailed in this report. Results from the 2022 breeding season are derived from a continuous six months of surveying undertaken in accordance with best practice guidance (SNH, 2017). The survey duration and scope are considered entirely satisfactory.

4. RESULTS

4.1.1 Method of Identification of Target Species

Following a comprehensive desk study by MKO, initial site visit and consultation, a list of "Target species" likely to occur at the site was compiled. The survey work carried out at the wind farm site was specifically designed to survey for these identified target species in accordance with SNH guidance (2017). The target species list was drawn from:

- Annex I of the EU Birds Directive
- Red listed birds on the BoCCI
- SCIs of SPAs within the zone of likely significant effects
- Raptor species sensitive to wind farm developments.

4.2 Field survey results

4.2.1 Introduction

The following bird species were recorded during the 2022 breeding season and observations are described in detail in subsequent sections below. The list is ordered in accordance with conservation significance: Annex I species, SCIs of SPAs, Red listed species, and raptors:

- Hen harrier (Annex I)
- White-tailed eagle (Annex I)
- Golden plover (Annex I)
- Merlin (Annex I)
- Red grouse (BoCCI Red Listed)
- Kestrel (BoCCI Red Listed)
- Snipe (BoCCI Red Listed)
- Meadow pipit (BoCCI Red Listed)
- Swift (BoCCI Red Listed)
- Grey wagtail (BoCCI Red Listed)
- Sparrowhawk (Raptor)
- Buzzard (Raptor)

The following sections describe the observations of each target species under the individual survey headings. Raw data and maps are provided in Appendix 1 and Appendix 2, respectively. Confidential Appendix 3 contains sensitive data relating to hen harrier and should not be publicly disseminated.

4.2.2 Vantage Point Survey Results

Vantage point surveys were undertaken at the site between April and September 2022 inclusive. Summary results from vantage point surveys are presented below in Table 4-1 and discussed in further detail in Section 5 of this report.

Table 4-1 Vantage Point Survey Results

Species	Total number of observations recorded during this survey type	Total Number of Bird Seconds at PCH	Number of observations on site/within 500m	Activity of note	Figure
Hen harrier	24	105	24	All observations involved adult male birds flying, hunting, and foraging. On both the 22nd and 23rd of June, males were observed hunting, catching and consuming prey. On the 11th of July two males were observed foraging in the same location.	Appendix 2, Figure 1.1
Golden plover	3	370	3	In September flocks of up to 17 birds were observed in flight over site and within 500m of the site. Birds flew towards Dough Mountain area.	Appendix 2, Figure 1.2
Merlin	1	0	1	In September a single bird was observed in flight near Tawnyfeacle on site.	Appendix 2, Figure 1.3
Red grouse	1	0	1	In September a single bird was observed in flight at Killea, within 500m of the site.	Appendix 2, Figure 1.4
Woodcock	1	0	1	A single bird observed travelling at Killea in May within 500m of the site.	Appendix 2, Figure 1.5
Snipe	16	145	16	In June and July birds were observed drumming (displaying) near Killea. In July a flock of nine bird were observed calling in flight near Tawnyfeacle. Oher observations involved smaller flocks or single birds in flight or calling.	Appendix 2, Figure 1.6
Kestrel	11	585	7	On the 11th of August two recently fledged birds were observed foraging and interacting within 500m of the site at Dough Mountain. Other observations involved single adult male, female or juvenile birds foraging, hovering, or flying.	Appendix 2, Figure 1.7
Buzzard	11	1935	11	Observations included single birds or pairs soaring, travelling, or foraging in both the northern and southern sections of the site.	Appendix 2, Figure 1.8
Sparrowhawk	3	0	3	All observations involved single birds flying over, foraging, or perched. Recorded west of Killea and at Dough Mountain.	Appendix 2, Figure 1.9
Swift	1	-	1	Three birds in flight on site.	-

Species	Total number of observations recorded during this survey type	Total Number of Bird Seconds at PCH	Number of observations on site/within 500m	Activity of note	Figure
Meadow pipit	34	-	34	Recorded across the survey area. Peak flock size of 44 birds in July, average flock size of 11.	-

4.2.3 Breeding Walkover Survey Results

Breeding walkover surveys were carried out during the 2022 breeding season: April to July. Summary results from these surveys are presented below in Table 4-2 and discussed in more detail in Section 5 of this report.

Table 4-2 Breeding Walkover Survey Results

Species	Total number of observations recorded during survey type	Number of observations on site/ within 500m	Activity of note	Breeding Status	Figure
Hen harrier	13	13	In April an adult pair were observed sky dancing and in display flight over the southern section of the site in vicinity of the 2019,2020 and 2021 nest sites. On the 20th of April an adult pair were observed in courtship flight over the 2020 and 2021 nest location in the northern section of the site. A male from the southern pair was observed flying towards the displaying pair at the same time. On 19th of July a nest was confirmed at [redacted] approx. 1km southwest of site. An adult female was observed carrying prey into nest site and alarming.	**Confirmed breeding.**	Appendix 2, Figure 2.1
White-tailed eagle	3	1	On the 20th of April an immature tagged bird was observed perched on ground within 500m of the site. It was later observed flying west off site when disturbed by surveyor. On the 7th of July an unaged/sexed bird was observed approx. 1km north of site flying towards Lough Melvin.	**Non-Breeding.**	Appendix 2, Figure 2.2
Red grouse	2	2	In April a single bird was observed at both Killea and Saddle hill, both of which were within 500m of the site boundary.	**Probable breeding.**	Appendix 2, Figure 2.3
Snipe	5	5	Birds were observed drumming on site east of Lisdarush and within 500m of site at Dough Mountain.	**Probable breeding**	Appendix 2, Figure 2.4
Kestrel	1	1	A single bird was observed foraging within 500m of the site at Dough Mountain in April.	**Non-breeding**	Appendix 2, Figure 2.5
Sparrowhawk	6	5	On the 28th of June a male was observed carrying prey in the southern section of site west of Boleyboy. On the 7th of July a female was flushed from a nest, alarm calling on site east of Saddle Hill. On	**Confirmed breeding.**	Appendix 2, Figure 2.6

			the 14th of July a male was observed feeding three chicks at a nest site west of Raheelin approx. 1km from site.		
Buzzard	10	10	Observations included single birds or pairs soaring, travelling, or foraging in both the northern and southern sections of the site.	**Possible breeding.**	Appendix 2, Figure 2.7
Swift	1	1	Single bird in flight on site.	**Non-breeding.**	-
Meadow pipit	32	32	Recorded across the site with a peak flock size of twelve birds in July.	**Confirmed breeding.**	-
Grey wagtail	3	3	Single birds recorded on site and within 500m of site.	**Possible breeding.**	-

4.2.4 Breeding Raptor Survey Results

Breeding Raptor surveys were carried out during the 2022 breeding season: April to August. Summary results from these surveys are presented below in Table 4-3 and discussed in more detail in Section 5 of this report.

Table 4-3 Breeding Raptor Survey Results

Species	Total number of observations recorded during survey type	Number of observations on site/within 500m	Activity of note	Breeding Status	Figure
Hen harrier	30	8	On the 26th of July a female was recorded carrying prey at the nest site at [redacted]. On the 30th of July two adult females were observed at the nest site, one bringing prey to unseen chicks and another circling the area. Again on 2nd of August two adult females were recorded at the nest site along with a single fledgling. On the 3rd of August an adult female was observed bringing prey to two fledged chicks at the same nest.	**Confirmed breeding.**	Appendix 2, Figure 3.0
White-tailed eagle	2	0	On the 27th of May and immature bird was observed perched and in flight at Sandy Lough approx. 2km west of site.	**Non-Breeding**	Appendix 2, Figure 3.1
Kestrel	7	6	On the 3rd of August two young birds were observed at Saddle Hill approx. 1km off site. A young bird was also observed foraging on the 26th of August at Dough Mountain within 500m of site.	**Confirmed breeding.**	Appendix 2, Figure 3.2
Sparrowhawk	19	8	On the 30th of May a displaying bird was recorded at Tawnymanus approx. 4km south of site, indicating probable breeding here. On the 30th of June a male was observed carrying prey at Saddle hill towards a historic nest site on site confirming breeding here. On the 20th of July begging calls were recorded at Thur Mountain approx. 2.5km east of site confirming breeding here. On the 9th of August a recently fledged young bird was observed on site west of Killea, near a historic nest site occupied in 2020 and 2021. On the 10th of August recently fledged young were observed in flight near the nest approx. 1km north of site confirming breeding here.	**Confirmed breeding.**	Appendix 2, Figure 3.3
Buzzard	19	2	On the 10th of August five birds including recently fledged young were observed circling over the southern section of the site. Other	**Confirmed breeding.**	Appendix 2, Figure 3.4

Species	Total number of observations recorded during survey type	Number of observations on site/within 500m	Activity of note	Breeding Status	Figure
			observations involved one or two birds flying, soaring or foraging across the survey area.		

4.2.5 Breeding Woodcock Survey Results

Breeding woodcock surveys were carried out during the 2022 breeding season: May to June. In May a single bird was observed roding on site at Tawnylust to the south of the site. In June a single bird was observed roding on site near Killea to the north of the site. Observations are mapped in Appendix 2 Figure 4.1.

4.2.6 Incidentals

Several incidental observations of target species were recorded during the survey period. The most significant of these observations are detailed in Table 4- below and discussed in further detail in Section 5 of this report.

Table 4-4 Incidental Observations

Species	Survey Type(s)	No. of Observations	Activity of note	Figure
Hen harrier	Breeding Walkover Survey	1	Single adult male foraging at Faughry in April approx. 500m for the site.	Appendix 2, Figure 5.0
Golden plover	Vantage Point Survey	1	On 11th of August a single bird was observed calling in flight low on Dough Mountain approx. 1km from site.	Appendix 2, Figure 5.1
Woodcock	Breeding Raptor and Vantage Point Surveys	3	In May a bird was observed roding (displaying) off site at Thur Mountain approx. 3 km from site. Also, in May two birds were flushed form the track within 500m of site near Killea.	Appendix 2, Figure 5.2
Snipe	Breeding Raptor and Vantage Point Surveys	14	In May and June birds were observed drumming at Killea and Dough Mountain both within 500m of the site. Drumming birds were also recorded at Thur Mountain approx. 2km from site.	Appendix 2, Figure 5.3
Swift	Breeding Raptor Surveys	3	In June nine birds were observed feeding approx. 1km from site on Dough Mountain. Single birds were observed feeding over site also.	-
Meadow pipit	Breeding Raptor Surveys	21	Recorded across the survey area. Peak flock size of 38 birds in July.	-
Grey wagtail	Breeding Raptor Surveys	2	Single adult bird recorded foraging on site. Adult with two recently fledged young recorded approx. 1km southeast of site at Tawnylust Barr.	-

4.2.7 Target Species Breeding Status Summary

While breeding status is assigned according to the evidence obtained during individual breeding bird survey types in Tables 4-1 to 4-4 above, Table 4-5 below summarises the breeding status of target species observed during breeding season surveys (2022) at Lissinagroagh Wind Farm.

Table 4-5 Target Species Breeding Status Summary

Species	Overall breeding status
Hen harrier	**Confirmed breeding -** one breeding territory, which was successful and fledged at least two chicks at [redacted] approx. 1km southwest of the site. See Figure 6.0
White-tailed eagle	**Non-breeding -** Immature bird(s) present in the area.
Golden plover	**Non-breeding -** Birds present likely early/late wintering.
Merlin	**Non-breeding -** Bird recorded on migration.
Red grouse	**Probable breeding -** Two breeding territories identified within 500m of the site.
Woodcock	**Probable breeding -** Two breeding territories identified on site.
Kestrel	**Confirmed breeding - T**he presence of recently fledged young indicates successful breeding in the wider area; however, a nest of origin was not located.
Snipe	**Probable breeding -** Breeding territories recorded on and off site.
Buzzard	**Confirmed breeding -** The presence of recently fledged young indicates successful breeding in the wider area; however, a nest of origin was not located.
Sparrowhawk	**Confirmed breeding -** Two confirmed nests on eon one off site and confirmed breeding in other areas.
Swift	**Non-breeding.**
Meadow pipit	**Confirmed breeding.**
Grey wagtail	**Confirmed breeding.**

5. DISCUSSION

The following section provides a synopsis of the findings of the surveys undertaken during the 2022 breeding season (April 2022 to September 2022) for each of the target species recorded.

5.1 Hen harrier

In July, a nest was confirmed approx. 1km southwest of the site at [redacted]. At least two chicks were confirmed successfully fledged from this nest site. This breeding pair is believed to be the pair that previously nested in the southern section of the site in 2019, 2020 and 2021 as nesting was not recorded at these on-site historic locations.
In August, two adult females were observed at the confirmed nest site at [redacted] on two occasions indicating this second female may have bred in the wider area.

In April, a pair were observed in courtship flight over historic nest site in the northern section of the site in 2020 and 2021. However, breeding was not confirmed at this location.

No hen harrier were recorded at the historic nest site approx. 2km northeast of the site boundary near [redacted]. Ongoing forestry operations at this location during the core breeding months may have caused disturbance in this area.

Adult female, male, and recently fledged birds were observed. Birds were observed travelling, foraging, hunting, prey carrying, displaying, and engaged in courtship behaviour. Observations of multiple adults simultaneously indicate at least two pairs were possibly present in the wider area, however only one nest site was located.

5.2 White-tailed eagle

This species was recorded five times during surveys. On the 20th of April an immature tagged bird was observed perched on ground within 500m of the site. It was later observed flying west off site when disturbed by surveyor. On the 7th of July an unaged/sexed bird was observed approx. 1km north of site flying towards Lough Melvin. On the 27th of May and immature bird was observed perched and in flight at Sandy Lough approx. 2km west of site.

5.3 Golden plover

Golden plover were recorded on four occasions. In September flocks of up to 17 birds were observed in flight over site and within 500m of the site. Birds flew towards Dough Mountain area. On 11th of August a single bird was observed calling in flight low on Dough Mountain approx. 1km from site. This bird was likely an early returning migratory bird, however given the suitable habitat on Dough Mountain, future surveys would aim to examine if breeding possible for this species in the wider area.

5.4 Merlin

There was one observation of this species during surveys. On the 9th of September a single bird was observed in flight on site at Tawnyfeacle. This was likely a bird passing through the area given the time of year and lack of other observations.

5.5 Red grouse

Red grouse were recorded on three occasions. In April a single bird was observed at both Killea and Saddle hill, both of which were within 500m of the site boundary. In September a single bird was observed in flight at Killea, on site. This follows on from the two breeding territories confirmed in these same two areas during red grouse species specific surveys undertaken in March 2022.

5.6 Woodcock

A single bird observed travelling at Killea in May within 500m of the site. In May a bird was observed roding (displaying) off site at Thur Mountain approx. 3 km from site. Also in May, two birds were flushed form the track within 500m of site near Killea. In May a single bird was observed roding on site at Tawnylust to the south of the site. In June a single bird was observed roding on site near Killea to the north of the site.

5.7 Snipe

Snipe were recorded on 35 occasions during surveys. In May, June and July birds were observed drumming (displaying) near Killea. Birds were also observed drumming on site east of Lisdarush on site. In May and June birds were observed drumming at Dough Mountain within 500m of the site. Drumming birds were also recorded at Thur Mountain approx. 2km from site. In July a peak flock size of nine birds were observed calling in flight near Tawnyfeacle within 500m of site.

5.8 Kestrel

Kestrel were observed on nineteen occasions during the survey period. On the 11th of August two recently fledged birds were observed foraging and interacting within 500m of the site at Dough Mountain. Other observations involved single adult male, female or juvenile birds foraging, hovering, or flying. On the 3rd of August two young birds were observed at Saddle Hill approx. 1km off site. A young bird was also observed foraging on the 26th of August at Dough Mountain within 500m of site. This confirms breeding in the wider area, but a nest of origin was not located.

5.9 Sparrowhawk

Sparrowhawk were recorded on 28 occasions during the survey period. Breeding was confirmed on site at Saddle Hill, and within 500m of site at Raheelin. Breeding off site was confirmed at Thur Mountain.

On the 30th of June a male was observed carrying prey east of Saddle hill towards a historic nest site on site confirming breeding here. On the 7th of July a female was flushed from alarming from this same nest.

On the 14th of July a male was observed feeding three chicks at a nest site west of Raheelin approx. 1km from site. On the 10th of August recently fledged young were observed in flight near the same nest.

On the 20th of July begging calls were recorded at Thur Mountain approx. 2.5km east of site confirming breeding here.

Breeding was also confirmed or probable without nests of origin being located in the following general locations: On the 28th of June a male was observed carrying prey in the southern section of site west of Boleyboy. On the 9th of August a recently fledged bird was observed on site west of Killea, near a historic nest site occupied in 2020 and 2021. On the 30th of May a displaying bird was recorded at Tawnymanus approx. 4km south of site, indicating probable breeding here.

5.10 Buzzard

There were 40 observations of buzzard during surveys. On the 10th of August five birds including recently fledged young were observed circling and calling over the southern section of the site at Tawnyfeacle, confirming breeding in this general area. Other observations involved one or two birds flying, soaring, or foraging across the survey area.

5.11 Red listed passerines

Meadow pipit were regularly recorded across the site in suitable open habitat with breeding confirmed in several areas and a peak flock size of 38 birds. Swift were present on site during the breeding season with small flocks of up to nine birds recorded foraging on site, no breeding activity recorded. Grey wagtail were present on site in low numbers in suitable habitat, with possible breeding in three locations on site. Breeding confirmed off site at Tawnylust Barr.

6. CONCLUSION

Key impacts resulting from the proposed development for local avian receptors could include habitat loss, disturbance, displacement, and collision risk.

There is a resident population of hen harrier, red grouse, woodcock, snipe, kestrel, sparrowhawk, and buzzard at the wind farm site. The proposed development could result in habitat loss and disturbance/displacement impacts on these species. These potential impacts should be considered in greater detail at the assessment stage. A full two years of survey data will be required to provide a robust assessment of these impacts.

There was a breeding territory identified for hen harrier approx. 1km off site at [redacted]. It is considered likely these birds are one of the pairs that bred on site in previous years. As the birds in this area have been shown to re-locate nest site each year, all findings should be considered in the context of multiple years.

Breeding territories for red grouse, woodcock, snipe, sparrowhawk, and buzzard were located at or within 500m of, the wind farm site. There is the potential for direct habitat loss of nest sites for these species based on the 2022 breeding season surveys.

Collision risk should be a key consideration at the assessment stage for hen harrier and buzzard. However, until the collision risk analysis is undertaken this impact cannot be considered in any detail. All findings should be considered in the context of two full years of surveys (i.e., two breeding seasons and two non-breeding seasons), as two years of flight activity data is required to inform a robust collision risk analysis.

White-tailed eagle and golden plover were recorded commuting over, and utilising habitats within 500m of the wind farm site during the breeding season. Given the number of birds recorded and the frequency of observations, it is likely that these impacts will not be significant. Future surveys will aim to establish the importance of the site to these species.

BIBLIOGRAPHY

Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. & Fuller, R.J. (2013) *Bird Atlas 2007-11: The breeding and wintering birds of Britain and Ireland*. BTO Books, Thetford.

Bibby, C.J., Burgess, N.D., Hill, D.A., and Mustoe, S. (2000) *Bird Census Techniques*. Academic Press, London.

Council Directive 92/43/EEC 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31992L0043

Council Directive 2009/147/EC 30 November 2009 on the conservation of wild birds. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32009L0147

Gilbert, G., Gibbons, D.W. and Evans, J. (1998) *Bird Monitoring Methods.* Bedfordshire, England: Pelagic Publishing, Royal Society for the protection of Birds.

Gilbert, G., Stanbury, A. and Lewis, A. (2021). Birds of Conservation Concern in Ireland 4: 2020-2026. *Irish Birds,* 43:1-22. Available at: https://birdwatchireland.ie/birds-of-conservation-concern-in-ireland/

Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. and Thompson, D. (2013) *Raptors. A field Guide for Surveys and Monitoring*. The Stationary Office, Edinburgh.

SNH (2016). Assessing connectivity with Special Protection Areas (SPAs). Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2018-08/Assessing%20connectivity%20with%20special%20protection%20areas.pdf

SNH (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms. Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2018-06/Guidance%20Note%20-%20Recommended%20bird%20survey%20methods%20to%20inform%20impact%20assessment%20of%20onshore%20windfarms.pdf

APPENDIX 1

BIRD SURVEY DATA

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Appendix 1 Table 1 Survey Effort

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
13/04/2022	Breeding Walkover Survey	500m Radius	4:00 starting at 13:00	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
14/04/2022	Breeding Walkover Survey	500m Radius	6:00 starting at 14:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
20/04/2022	Breeding Walkover Survey	500m Radius	5:00 starting at 14:15	Visibility: good; Wind speed and direction: fresh breeze NE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
23/04/2022	Breeding Walkover Survey	500m Radius	6:00 starting at 12:00	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
29/04/2022	Breeding Walkover Survey	500m Radius	3:00 starting at 11:30	Visibility: good; Wind speed and direction: light breeze SE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
11/05/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 12:00	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		KB
11/05/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 15:30	Visibility: good; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		KB
18/05/2022	Vantage Point Survey	VP2	3:00 starting at 04:23	Visibility: good; Wind speed and direction: fresh breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KB
18/05/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 07:53	Visibility: good; Wind speed and direction: fresh breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		KB
19/05/2022	Vantage Point Survey	VP1	3:00 starting at 04:21	Visibility: good; Wind speed and direction: fresh breeze S; Cloud cover and height: 33-66% <150m; Rain: none; Frost: none; Snow: none		KB

19/05/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 08:00	Visibility: good; Wind speed and direction: fresh breeze S; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		KB
24/05/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 16:00	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KB
24/05/2022	Breeding Walkover Survey	500m Radius	3:00 starting at 17:45	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD
24/05/2022	Vantage Point Survey	VP2	3:00 starting at 19:44	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		KB
24/05/2022	Breeding Woodcock Survey	WK1	2:00 starting at 20:45	Visibility: moderate; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD
25/05/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 13:00	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 33-66% 150-500m; Rain: light showers; Frost: none; Snow: none		KB
25/05/2022	Breeding Walkover Survey	500m Radius	6:00 starting at 14:30	Visibility: good; Wind speed and direction: strong breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
25/05/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 16:30	Visibility: good; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		KB
26/05/2022	Vantage Point Survey	VP3	3:00 starting at 04:12	Visibility: limited; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none		KB
26/05/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 07:42	Visibility: moderate; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		KB
26/05/2022	Breeding Walkover Survey	500m Radius	6:00 starting at 14:30	Visibility: good; Wind speed and direction: strong breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD

26/05/2022	Breeding Woodcock Survey	WK2	2:00 starting at 20:30	Visibility: good; Wind speed and direction: fresh breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
27/05/2022	Vantage Point Survey	VP4	3:00 starting at 04:10	Visibility: good; Wind speed and direction: light air NW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		KB
27/05/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 07:45	Visibility: good; Wind speed and direction: light air NW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		KB
27/05/2022	Breeding Walkover Survey	500m Radius	6:00 starting at 13:30	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
30/05/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 16:10	Visibility: good; Wind speed and direction: moderate breeze N; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		KB
30/05/2022	Breeding Walkover Survey	500m Radius	3:00 starting at 17:30	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none		AOD
30/05/2022	Vantage Point Survey	VP3	3:00 starting at 19:53	Visibility: good; Wind speed and direction: gentle breeze N; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		KB
31/05/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 16:24	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		KB
31/05/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 19:54	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		KB
01/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 16:20	Visibility: good; Wind speed and direction: light air NE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		KB
01/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 19:55	Visibility: good; Wind speed and direction: light air NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		KB

13/06/2022	Vantage Point Survey	VP1	3:00 starting at 09:30	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		KB
13/06/2022	Vantage Point Survey	VP1	3:00 starting at 13:00	Visibility: moderate; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		KB
14/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 07:15	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		KB
14/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 10:45	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KB
15/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 13:30	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		KB
15/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 17:00	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		KB
16/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 09:30	Visibility: moderate; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none		KB
16/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 13:00	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KB
17/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 09:20	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		KB
17/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 12:50	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KB
20/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 14:30	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		KB

20/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 18:00	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		KB
20/06/2022	Breeding Walkover Survey	500m Radius	2:00 starting at 18:45	Visibility: moderate; Wind speed and direction: light breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
20/06/2022	Breeding Woodcock Survey	WK1	2:00 starting at 21:10	Visibility: moderate; Wind speed and direction: light breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
21/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 10:15	Visibility: poor; Wind speed and direction: calm W; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		KB
21/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 13:45	Visibility: good; Wind speed and direction: calm W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KB
21/06/2022	Breeding Walkover Survey	500m Radius	2:00 starting at 18:45	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
21/06/2022	Breeding Woodcock Survey	WK2	2:00 starting at 21:10	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
22/06/2022	Vantage Point Survey	VP3	3:00 starting at 11:00	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KB
23/06/2022	Vantage Point Survey	VP2	3:00 starting at 15:50	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none		AOD
23/06/2022	Vantage Point Survey	VP3	3:00 starting at 17:30	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		KB
23/06/2022	Breeding Walkover Survey	500m Radius	2:00 starting at 18:50	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none		AOD

24/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 08:30	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		KB
24/06/2022	Breeding Walkover Survey	500m Radius	5:00 starting at 11:30	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none		AOD
24/06/2022	Breeding Raptor Survey	5km Radius	2:00 starting at 12:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KB
27/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 14:30	Visibility: moderate; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none		KB
27/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 18:00	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none		KB
27/06/2022	Breeding Walkover Survey	500m Radius	2:00 starting at 18:30	Visibility: moderate; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
27/06/2022	Breeding Woodcock Survey	WK1	2:00 starting at 21:00	Visibility: moderate; Wind speed and direction: fresh breeze SE; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD
28/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 14:00	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none		KB
28/06/2022	Breeding Walkover Survey	500m Radius	5:00 starting at 16:15	Visibility: good; Wind speed and direction: strong breeze SE; Cloud cover and height: 33-66% >500m; Rain: light showers; Frost: none; Snow: none		AOD
28/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 17:30	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 33-66% >500m; Rain: light showers; Frost: none; Snow: none		KB
28/06/2022	Breeding Woodcock Survey	WK2	2:00 starting at 21:15	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD

29/06/2022	Vantage Point Survey	VP2	3:00 starting at 15:15	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
29/06/2022	Vantage Point Survey	VP4	3:00 starting at 18:15	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
30/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 07:30	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		KB
30/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 11:00	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		KB
30/06/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 14:30	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KB
01/07/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 08:00	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KB
01/07/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 11:40	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KB
01/07/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 15:10	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		KB
07/07/2022	Breeding Walkover Survey	500m Radius	6:00 starting at 15:20	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
08/07/2022	Vantage Point Survey	VP4	3:00 starting at 14:30	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
11/07/2022	Vantage Point Survey	VP2	3:00 starting at 07:30	Visibility: good; Wind speed and direction: fresh breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KB

11/07/2022	Breeding Walkover Survey	500m Radius	4:00 starting at 08:00	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
11/07/2022	Vantage Point Survey	VP2	3:00 starting at 11:00	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		KB
11/07/2022	Breeding Walkover Survey	500m Radius	2:00 starting at 13:30	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
12/07/2022	Vantage Point Survey	VP3	3:00 starting at 08:30	Visibility: moderate; Wind speed and direction: light air NW; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		KB
12/07/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 12:00	Visibility: moderate; Wind speed and direction: light breeze NW; Cloud cover and height: 66-101% <150m; Rain: none; Frost: none; Snow: none		KB
13/07/2022	Breeding Walkover Survey	500m Radius	3:00 starting at 08:30	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
13/07/2022	Vantage Point Survey	VP3	3:00 starting at 08:45	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		KB
13/07/2022	Vantage Point Survey	VP1	3:00 starting at 13:00	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		KB
14/07/2022	Breeding Walkover Survey	500m Radius	3:00 starting at 14:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
14/07/2022	Breeding Walkover Survey	500m Radius	2:00 starting at 18:00	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
15/07/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 07:00	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		KB

15/07/2022	Vantage Point Survey	VP1	3:00 starting at 10:30	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KB
15/07/2022	Breeding Walkover Survey	500m Radius	3:00 starting at 17:30	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
18/07/2022	Vantage Point Survey	VP4	3:00 starting at 13:30	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		KB
19/07/2022	Vantage Point Survey	VP4	3:00 starting at 11:15	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		KB
19/07/2022	Breeding Walkover Survey	500m Radius	5:00 starting at 11:30	Visibility: moderate; Wind speed and direction: light air N; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		AOD
19/07/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 14:45	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		KB
19/07/2022	Breeding Walkover Survey	500m Radius	2:00 starting at 17:30	Visibility: moderate; Wind speed and direction: light air N; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		AOD
19/07/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 18:15	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KB
20/07/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 10:00	Visibility: moderate; Wind speed and direction: light breeze NW; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		KB
20/07/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 13:30	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KB
21/07/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 08:00	Visibility: good; Wind speed and direction: light breeze N; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		KB

21/07/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 11:30	Visibility: good; Wind speed and direction: light breeze N; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KB
25/07/2022	Vantage Point Survey	VP1	3:00 starting at 09:20	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		KB
25/07/2022	Vantage Point Survey	VP4	6:30 starting at 11:00	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: 33-66% >500m; Rain: drizzle; Frost: none; Snow: none	Largely overcast with occasional clear and bright spells. Occasional drizzle closing in which caused temporary loss of visibility. Moderate W breeze, 14 - 19°C	NM
25/07/2022	Vantage Point Survey	VP1	3:00 starting at 12:50	Visibility: good; Wind speed and direction: fresh breeze NW; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		KB
26/07/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 10:00	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KB
26/07/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 13:30	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KB
28/07/2022	Breeding Raptor Survey	Extra HH Breeding Raptor Survey	6:00 starting at 12:45	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
28/07/2022	Vantage Point Survey	VP3	6:30 starting at 15:00	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	14 - 22°C	NM
29/07/2022	Vantage Point Survey	VP2	6:30 starting at 13:00	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Largely clear and bright with high drifting clouds. Light breeze from the W. Humid and warm, 15 - 21°C	NM

30/07/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 12:30	Visibility: good; Wind speed and direction: calm W; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		KB
02/08/2022	Breeding Raptor Survey	5km Radius	3:00 starting at 12:30	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KB
02/08/2022	Breeding Raptor Survey	Extra HH Breeding Raptor Survey	3:00 starting at 16:00	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
03/08/2022	Breeding Raptor Survey	Extra HH Breeding Raptor Survey	4:00 starting at 14:00	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
05/08/2022	Breeding Raptor Survey	Extra HH Breeding Raptor Survey	6:00 starting at 10:30	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
09/08/2022	Breeding Raptor Survey	Extra HH Breeding Raptor Survey	4:00 starting at 08:00	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
10/08/2022	Breeding Raptor Survey	Extra HH Breeding Raptor Survey	6:00 starting at 11:20	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
11/08/2022	Vantage Point Survey	VP2	5:30 starting at 07:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD

22/08/2022	Vantage Point Survey	VP4	6:30 starting at 13:30	Visibility: moderate; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none	Entirely overcast and grey with mid-height clouds. Occasional flurry of drizzly showers blowing across. Moderate SW breeze, 10 - 16°C	NM
24/08/2022	Vantage Point Survey	VP1	6:30 starting at 06:30	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Clear and bright throughout with high drifting cloud. Chilly early on but it gradually got warmer as the morning went on, 7 - 15°C. Gentle S breeze	NM
25/08/2022	Vantage Point Survey	VP3	6:30 starting at 09:00	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Clear and bright throughout with ~20% c loud cover. Light S breeze, 11 - 18°C	NM
26/08/2022	Vantage Point Survey	VP2	1:00 starting at 12:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
26/08/2022	Breeding Raptor Survey	Extra HH Breeding Raptor Survey	7:00 starting at 13:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
07/09/2022	Vantage Point Survey	VP3	2:00 starting at 14:55	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none	LIGHTNING CALLED OFF	AOD
08/09/2022	Vantage Point Survey	VP2	2:00 starting at 14:55	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none	LIGHTNING CALLED OFF	AOD
09/09/2022	Vantage Point Survey	VP3	1:00 starting at 14:45	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		AOD
09/09/2022	Vantage Point Survey	VP2	2:00 starting at 15:50	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		AOD

09/09/2022	Vantage Point Survey	VP3	3:00 starting at 18:20	Visibility: good; Wind speed and direction: light breeze SE; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		AOD
14/09/2022	Vantage Point Survey	VP2	5:00 starting at 16:00	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
16/09/2022	Vantage Point Survey	VP1	6:30 starting at 14:15	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		NM
19/09/2022	Vantage Point Survey	VP4	6:20 starting at 14:20	Visibility: limited; Wind speed and direction: moderate breeze SSW; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none		NM

Appendix 1 Table 2 Vantage Point Flight Observations

Report Ref.	Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	PCH (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
	2022-10-11T14:48:01.749	VP2	18/05/2022	05:02	Meadow Pipit	1	-	-	-	-	-	bogs; singing	KB
HH001	2022-10-11T14:50:19.406	VP2	18/05/2022	05:47	Hen Harrier	1	6	0	6	0	0	conifer plantation; foraging, adult male	KB
HH002	2022-10-11T14:50:19.406	VP2	18/05/2022	05:47	Hen Harrier	1	15	0	10	5	0	conifer plantation; foraging, adult male	KB
	2022-10-11T14:57:13.610	VP2	18/05/2022	06:58	Lesser Black-backed Gull	5	40	0	0	40	0	bogs and conifer plantation; travelling	KB
	2022-10-11T15:00:30.221	VP2	18/05/2022	07:09	Lesser Black-backed Gull	2	20	0	20	0	0	conifer plantation; travelling	KB
HH003	2022-10-11T14:29:49.199	VP1	19/05/2022	06:04	Hen Harrier	1	8	8	0	0	0	bogs and conifer plantation; foraging, adult male	KB
HH004	2022-10-11T14:32:37.661	VP1	19/05/2022	06:07	Hen Harrier	1	15	15	0	0	0	bogs and conifer plantation; foraging, adult male	KB
	2022-10-11T14:35:10.168	VP1	19/05/2022	06:20	Meadow Pipit	6	-	-	-	-	-	bogs; foraging	KB
HH005	2022-10-11T14:45:11.713	VP1	19/05/2022	07:14	Hen Harrier	1	40	30	10	0	0	conifer plantation and bogs; foraging	KB
	Not Mapped	VP2	24/05/2022	20:09	Meadow Pipit	4	-	-	-	-	-	bogs; foraging	KB
	2022-10-11T16:19:07.708	VP3	26/05/2022	04:43	Meadow Pipit	1	-	-	-	-	-	bogs and wet grassland; singing	KB
	2022-10-11T16:20:50.451	VP3	26/05/2022	04:49	Meadow Pipit	1	-	-	-	-	-	bogs; singing	KB
SN011	2022-10-11T16:22:03.753	VP3	26/05/2022	05:59	Snipe	1	-	-	-	-	-	bogs and wet grassland; chipping	KB
WK001	2022-10-11T16:24:16.785	VP3	26/05/2022	07:03	Woodcock	1	5	5	0	0	0	bogs and conifer plantation; travelling	KB
SN012	2022-10-11T16:26:42.739	VP2	26/05/2022	07:11	Snipe	1	-	-	-	-	-	bogs; chipping	KB
SN013	2022-12-21T15:58:42.976	VP3	30/05/2022	19:58	Snipe	1	-	-	-	-	-	bogs; chipping	KB

	2022-12-21T16:00:59.042	VP3	30/05/2022	20:12	Meadow Pipit	1	-	-	-	-	-	bogs; singing	KB
HH006	2022-12-21T15:43:40.803	VP3	30/05/2022	20:50	Hen Harrier	1	40	40	0	0	0	bogs; foraging, adult male	KB
SN001	2022-12-21T15:37:43.125	VP3	30/05/2022	20:50	Snipe	1	4	4	0	0	0	bogs; flushed by hh	KB
	2022-12-21T16:01:31.029	VP3	30/05/2022	20:50	Meadow Pipit	6	-	-	-	-	-	bogs; flushed - alarm calling	KB
HH007	2022-10-11T16:24:16.785	VP3	30/05/2022	20:54	Hen Harrier	1	20	20	0	0	0	bogs and conifer plantation; foraging, adult male	KB
SN014	2022-12-21T16:02:19.827	VP3	30/05/2022	20:57	Snipe	1	-	-	-	-	-	bogs; chipping	KB
	2022-12-21T16:08:30.147	VP3	30/05/2022	21:16	Meadow Pipit	1	-	-	-	-	-	bogs; singing	KB
HH008	2022-12-21T15:51:15.871	VP2	30/05/2022	21:20	Hen Harrier	1	25	25	0	0	0	bogs; foraging, adult male	KB
	2022-12-21T16:11:22.137	VP3	30/05/2022	21:31	Meadow Pipit	2	-	-	-	-	-	bogs; foraging	KB
SN015	2022-12-21T16:13:09.818	VP3	30/05/2022	21:48	Snipe	1	-	-	-	-	-	bogs; chipping	KB
	2022-12-21T16:21:28.785	VP1	31/05/2022	20:03	Meadow Pipit	5	-	-	-	-	-	bogs; foraging	KB
	2022-12-21T16:22:12.706	VP1	31/05/2022	20:04	Meadow Pipit	1	-	-	-	-	-	bogs; singing	KB
HH009	2022-12-21T16:24:38.841	VP1	31/05/2022	20:11	Hen Harrier	1	4	4	0	0	0	bogs and conifer plantation; foraging, adult male	KB
	2022-12-21T16:41:00.924	VP4	01/06/2022	20:31	Meadow Pipit	3	-	-	-	-	-	bogs; foraging	KB
	2022-12-21T16:29:55.109	VP4	01/06/2022	21:54	Grey Heron	1	30	15	15	0	0	bogs, wet grassland and conifer plantation; travelling	KB
SN002	2022-12-21T16:31:00.921	VP4	01/06/2022	22:29	Snipe	1	10	0	10	0	0	bogs and conifer plantation; travelling	KB
	2022-12-01T14:11:55.870	VP1	13/06/2022	09:40	Meadow Pipit	6	-	-	-	-	-	bogs; foraging	KB
HH010	2022-12-01T12:53:05.168	VP3	22/06/2022	12:10	Hen Harrier	1	40	40	0	0	0	bogs; foraging, adult male	KB
SN003	2022-12-01T12:54:34.355	VP3	22/06/2022	12:13	Snipe	1	120	10	10	100	0	bogs; drumming	KB
HH011	2022-12-01T12:55:30.005	VP3	22/06/2022	13:37	Hen Harrier	1	20	20	0	0	0	bogs; foraging, adult male	KB
	2022-12-01T14:15:02.986	VP3	22/06/2022	13:40	Meadow Pipit	9	-	-	-	-	-	bogs; 6 foraging, 3 singing	KB

HH012	2022-12-01T12:56:11.692	VP3	22/06/2022	13:43	Hen Harrier	1	6	6	0	0	0	bogs; foraging - landed back down, adult male	KB
HH013	2022-12-01T12:56:44.411	VP3	22/06/2022	13:45	Hen Harrier	1	8	8	0	0	0	bogs; took up with prey, circled and relanded, plucking prey, adult male	KB
HH014	2022-12-01T12:57:23.389	VP3	22/06/2022	13:47	Hen Harrier	1	5	5	0	0	0	bogs; took up, circled and landed back down, adult male	KB
HH015	2022-12-01T12:58:59.288	VP3	22/06/2022	13:48	Hen Harrier	1	90	30	60	0	0	bogs and conifer plantation; foraging - no prey visible in tallons, adult male	KB
	2022-12-01T14:27:54.932	VP3	23/06/2022	17:34	Meadow Pipit	12	-	-	-	-	-	bogs; 9 foraging, 3 singing	KB
SN016	2022-12-01T14:28:29.446	VP3	23/06/2022	19:56	Snipe	1	-	-	-	-	-	bogs; chipping	KB
HH016	2022-06-23T17:39:24.077	VP2	23/06/2022	17:39	Hen Harrier	1	950	600	100	100	150	wet grassland; foraging, male caught prey and cnsumed.possibly flew to nest area but seemed to not be carrying prey	AOD
BZ001	2022-06-23T18:43:56.300	VP2	23/06/2022	18:43	Buzzard	1	30	0	30	0	0	conifer plantation; fly, flew between trees	AOD
	2022-12-19T10:29:45.925	VP2	11/07/2022	07:25	Meadow Pipit	5	-	-	-	-	-	bogs; fledgelings on track	KB
	2022-12-19T10:31:47.193	VP2	11/07/2022	08:00	Meadow Pipit	11	-	-	-	-	-	bogs; foraging	KB
	2022-12-19T10:32:53.656	VP2	11/07/2022	08:56	Meadow Pipit	1	-	-	-	-	-	bogs; singing	KB
HH017	2022-12-19T10:35:38.553	VP2	11/07/2022	10:24	Hen Harrier	2	6	6	0	0	0	bogs; first bird travelling/foraging followed by a second bird a few seconds later along same flight path, 2x adult males	KB
	2022-12-19T10:40:02.832	VP3	12/07/2022	08:53	Meadow Pipit	8	-	-	-	-	-	bogs; foraging	KB
	2022-12-19T10:41:59.977	VP3	12/07/2022	09:11	Swift	3	-	-	-	-	-	bogs; foraging	KB
HH018	2022-12-19T10:44:49.129	VP3	12/07/2022	10:08	Hen Harrier	1	15	15	0	0	0	bogs; foraging, adult male	KB

HH019	2022-12-19T10:48:08.040	VP3	13/07/2022	08:54	Hen Harrier	1	240	120	120	0	0	conifer plantation, bogs and scrub; foraging, adult male	KB
	2022-12-19T10:50:49.459	VP3	13/07/2022	09:02	Meadow Pipit	5	-	-	-	-	-	bogs; foraging	KB
HH020	2022-12-19T10:53:19.016	VP3	13/07/2022	10:34	Hen Harrier	1	8	8	0	0	0	bogs and conifer plantation; foraging, adult male	KB
SN004	2022-12-19T10:56:03.084	VP3	13/07/2022	10:41	Snipe	1	30	0	0	30	0	bogs; drumming	KB
	2022-12-19T11:02:47.290	VP1	13/07/2022	13:02	Meadow Pipit	33	-	-	-	-	-	bogs; foraging	KB
	2022-12-19T11:04:50.016	VP1	15/07/2022	10:35	Meadow Pipit	44	-	-	-	-	-	bogs; foraging	KB
	2022-12-19T11:07:56.029	VP4	18/07/2022	15:11	Meadow Pipit	1	-	-	-	-	-	bogs; foraging	KB
	2022-12-19T11:09:26.058	VP4	19/07/2022	12:30	Meadow Pipit	2	-	-	-	-	-	bogs; foraging	KB
	2022-12-19T11:11:47.612	VP1	25/07/2022	11:11	Meadow Pipit	42	-	-	-	-	-	bogs; foraging	KB
	2022-11-01T10:16:52.990	VP4	25/07/2022	11:15	Meadow Pipit	23	500	380	120	0	0	improved agricultural grassland, semi-natural grassland and conifer plantation; flying and calling over grassland - highly active in vp area throughout survey, max. flock - 23	NM
SN005	2022-11-01T10:03:25.903	VP4	25/07/2022	11:19	Snipe	2	55	35	20	0	0	improved agricultural grassland, semi-natural grassland and mixed conifer woodland; flushed from rushy grassland, alarm calling flying away ne	NM
SN006	2022-11-01T10:14:11.642	VP4	25/07/2022	12:11	Snipe	9	155	0	140	15	0	conifer plantation, improved agricultural grassland and semi-natural grassland; flying	NM

												erratically in group and alram calling over vp area	
	2022-11-01T10:12:47.227	VP4	25/07/2022	13:19	Lesser Black-backed Gull	18	90	0	0	90	0	conifer plantation, improved agricultural grassland and scrub; flying sw across forestry	NM
BZ002	2022-11-01T10:05:59.888	VP4	25/07/2022	15:18	Buzzard	2	380	0	0	300	80	conifer plantation and scrub; pair soaring and calling over forestry	NM
K001	2022-11-01T10:10:33.829	VP4	25/07/2022	15:32	Kestrel	1	245	0	220	25	0	improved agricultural grassland and scrub; hunting and hovering over farmland	NM
BZ003	2022-11-01T10:07:51.731	VP4	25/07/2022	16:47	Buzzard	1	250	0	30	220	0	improved agricultural grassland and conifer plantation; flying over forestry and upland farmland	NM
SH001	2022-12-19T11:21:41.123	VP1	26/07/2022	14:04	Sparrowhawk	1	30	15	15	0	0	conifer plantation and wet grassland; foraging	KB
	2022-11-01T10:40:48.185	VP3	28/07/2022	16:04	Lesser Black-backed Gull	36	640	70	380	190	0	lakes and ponds and improved agricultural grassland; swirling over l. melvin for a long period in mid-afternoon	NM
	2022-11-01T10:45:59.867	VP3	28/07/2022	18:28	Lesser Black-backed Gull	9	260	0	0	180	80	conifer plantation, semi-natural grassland and bogs; flying nw across upland and forestry	NM
	2022-11-01T10:48:37.420	VP3	28/07/2022	18:30	Black-headed Gull	28	210	0	0	90	120	conifer plantation, scrub and bogs; flying nw across n area of site and 500m buffer	NM
K002	2022-11-01T10:37:59.267	VP3	28/07/2022	18:48	Kestrel	1	240	0	60	180	0	improved agricultural grassland, scrub and hedgerows; hunting and	NM

												hovering over scrubby farmland to ene of vp	
	2022-11-01T10:44:22.931	VP3	28/07/2022	19:32	Meadow Pipit	7	135	0	135	0	0	bogs and heath; calling and flying across bog	NM
HH021	2022-11-01T10:34:58.555	VP3	28/07/2022	21:19	Hen Harrier	1	75	75	0	0	0	bogs, wet heath and conifer plantation; flying low across upland bog and along forestry fringes - disappeared within 'avenue' of forestry	NM
	2022-11-01T11:44:00.925	VP2	29/07/2022	13:29	Meadow Pipit	7	45	0	45	0	0	semi-natural grassland, bogs and improved agricultural grassland; calling across upland grassland	NM
BZ004	2022-11-01T11:33:51.495	VP2	29/07/2022	16:21	Buzzard	2	345	0	0	150	195	conifer plantation, semi-natural grassland and scrub; soaring over forestry on site	NM
	2022-11-01T11:42:52.785	VP2	29/07/2022	17:06	Wheatear	5	110	110	0	0	0	semi-natural grassland and bogs; flying low and foraging over upland grassland	NM
BZ005	2022-11-01T11:49:00.198	VP2	29/07/2022	17:58	Buzzard	1	490	0	0	370	120	conifer plantation, scrub and mixed conifer woodland; soaring and circling over forestry of site before flying away sw	NM
K003	2022-11-01T11:47:03.492	VP2	29/07/2022	18:37	Kestrel	1	340	40	20	220	60	semi-natural grassland, bogs and scrub; hunting and hovering along forestry / scrub edges of grassland	NM
BZ006	2022-11-01T11:40:00.406	VP2	29/07/2022	18:49	Buzzard	2	475	0	0	350	125	improved agricultural grassland and conifer plantation; pair soaring over forestry and scrubby farmland	NM

	2022-11-01T11:45:23.131	VP2	29/07/2022	19:03	Meadow Pipit	18	350	245	105	0	0	bogs and semi-natural grassland; calling and flying across upland - very active in area in evening	NM
K004	2022-11-01T11:41:48.431	VP2	29/07/2022	19:12	Kestrel	1	240	0	150	90	0	semi-natural grassland, conifer plantation and scrub; hunting and hovering over upland grassland	NM
SH003	2022-11-01T11:51:13.806	VP2	29/07/2022	19:30	Sparrowhawk	1	-	-	-	-	-	semi-natural grassland, scrub and bogs; perched on fence post within shallow but wide gully running downhill	NM
K005	2022-08-11T10:19:18.679	VP2	11/08/2022	07:40	Kestrel	2	200	150	50	0	0	montane heath; foraging, two young recently fledged birds foragingvand interacting	AOD
K006	2022-08-11T10:25:18.882	VP2	11/08/2022	10:25	Kestrel	1	23	0	23	0	0	montane heath; foraging, young bird foraging	AOD
	2022-11-01T12:49:31.221	VP4	22/08/2022	14:32	Lesser Black-backed Gull	14	200	0	0	200	0	improved agricultural grassland, hedgerows and scrub; flying sw across rough farmland to w of vp (way outside 500m buffer)	NM
BZ007	2022-11-01T12:41:12.731	VP4	22/08/2022	15:29	Buzzard	2	320	0	0	300	0	conifer plantation, improved agricultural grassland and scrub; soaring over forestry and scrubby farmland - moving steadily se	NM
	2022-11-01T12:56:36.141	VP4	22/08/2022	16:36	Meadow Pipit	9	100	50	50	0	0	conifer plantation, semi-natural grassland and improved agricultural grassland; flying across vp	NM

	2022-11-01T12:51:32.659	VP4	22/08/2022	18:03	Lesser Black-backed Gull	2	275	0	50	225	0	improved agricultural grassland, conifer plantation and scrub; flying ne - starting over farmland and flying uphill and over forestry on site	NM
	2022-11-01T12:46:42.378	VP4	22/08/2022	18:43	Grasshopper Warbler	3	-	-	-	-	-	semi-natural grassland and conifer plantation; calling for a long period in the evening within rushy grassland in between forestry	NM
SN007	2022-11-01T12:53:51.874	VP4	22/08/2022	18:52	Snipe	6	240	0	240	0	0	conifer plantation, improved agricultural grassland and semi-natural grassland; flying in loose formation and calling over forestry fringes and adjacent grassland	NM
BZ008	2022-11-01T12:44:35.302	VP4	22/08/2022	18:56	Buzzard	1	260	0	120	140	0	conifer plantation; soaring and circling over forestry - began to descend slowly but was lost behind forestry	NM
K011	2022-11-01T12:47:47.423	VP4	22/08/2022	19:41	Kestrel	1	-	-	-	-	-	scrub, conifer plantation and improved agricultural grassland; perched within willow band at edge of forestry for a long period - flew away eventually low and e	NM
K007	2022-11-01T13:40:23.989	VP1	24/08/2022	06:41	Kestrel	1	350	100	250	0	0	scrub, semi-natural grassland and bogs; hunting and hovering relatively low across upland grassland and scrub	NM

	2022-11-01T13:45:56.813	VP1	24/08/2022	06:58	Meadow Pipit	32	1230	1090	140	0	0	bogs and semi-natural grassland; highly active in vp area for a long period early in the morning	NM
HH022	2022-11-01T13:27:22.966	VP1	24/08/2022	07:07	Hen Harrier	1	245	190	55	0	0	conifer plantation, scrub and semi-natural grassland; commuting across forestry and scrubby edges before plunging downhill flying very low along forestry, male. turned sharply at the bottom and disappeared into scrub	NM
HH023	2022-11-01T13:30:57.045	VP1	24/08/2022	07:34	Hen Harrier	1	190	190	0	0	0	scrub, semi-natural grassland and conifer plantation; emerging from scrub at edge of forestry, flying low across grassland and appeared to be hunting, male. disappeared into forestry once again. possibly the same individual as was 30mins previously	NM
BZ009	2022-11-01T13:36:30.875	VP1	24/08/2022	08:16	Buzzard	1	345	0	300	45	0	conifer plantation, improved agricultural grassland and scrub; flying across forestry - not far from tops of trees	NM
	2022-11-01T13:49:09.408	VP1	24/08/2022	09:47	Meadow Pipit	7	135	20	80	35	0	semi-natural grassland, bogs and improved agricultural grassland; flying and calling across upland moorland	NM
	2022-11-01T13:33:27.419	VP1	24/08/2022	11:06	Grey Heron	2	250	0	0	40	210	conifer plantation, scrub and improved agricultural grassland; soaring high over forestry on and off site - moving wsw	NM

BZ010	2022-11-01T13:38:03.661	VP1	24/08/2022	11:58	Buzzard	1	370	0	0	0	370	conifer plantation, recently-felled woodland and scrub; soaring and circling high across forestry	NM
	2022-11-01T13:42:36.859	VP1	24/08/2022	12:52	Lesser Black-backed Gull	6	470	0	230	140	0	conifer plantation, improved agricultural grassland and hedgerows; flying across forestry on part of site before turning s and flying over farmland	NM
	2022-11-01T13:00:23.754	VP3	25/08/2022	09:32	Wheatear	3	50	50	0	0	0	bogs, heath and semi-natural grassland; flying low and perching with heather bog and grassland	NM
	2022-11-01T13:03:15.455	VP3	25/08/2022	10:19	Meadow Pipit	22	890	740	150	0	0	heath, bogs and conifer plantation; flying and calling across vp area - highly active for a 30 min period before moving away sw	NM
BZ011	2022-11-01T13:05:57.660	VP3	25/08/2022	11:01	Buzzard	1	130	20	50	60	0	conifer plantation, improved agricultural grassland and scrub; flying low up from scrubby farmland and disappeared into area of forestry	NM
	2022-11-01T13:01:47.240	VP3	25/08/2022	12:44	Wheatear	1	35	35	0	0	0	heath, bogs and semi-natural grassland; flying low across heather moorland	NM
SN008	2022-11-01T13:07:51.917	VP3	25/08/2022	15:23	Snipe	3	175	35	140	0	0	bogs, semi-natural grassland and conifer plantation; flushed from wet heather and grassland - flew away across forestry of site and alarm calling	NM

SH002	2022-09-09T17:56:40.090	VP3	09/09/2022	17:56	Sparrowhawk	1	45	0	45	0	0	conifer plantation; flying, no sex age. flying over	AOD
K008	2022-09-09T17:57:41.985	VP3	09/09/2022	17:57	Kestrel	1	36	16	20	0	0	conifer plantation; foraging, young bird foraging	AOD
RG001	2022-09-09T20:51:52.651	VP3	09/09/2022	20:51	Red Grouse	1	8	8	0	0	0	montane heath; fly, silent	AOD
SN009	2022-09-09T20:52:48.921	VP3	09/09/2022	20:52	Snipe	6	27	10	17	0	0	montane heath; fly /call, at least 6 birds calling in flight and from ground	AOD
	2022-09-14T20:10:17.952	VP2	14/09/2022	19:10	Meadow Pipit	28	-	-	-	-	-	wet grassland; fly, flock	AOD
K009	2022-09-14T20:09:00.281	VP2	14/09/2022	17:09	Kestrel	1	60	0	60	0	0	wet grassland; foraging, female or juv	AOD
GP001	2022-10-10T14:15:26.141	VP1	16/09/2022	16:06	Golden Plover	5	325	40	100	185	0	mixed conifer woodland, upland blanket bog and semi-natural grassland; small group flying over uplands and calling	NM
HH024	2022-10-10T14:13:29.107	VP1	16/09/2022	17:32	Hen Harrier	1	160	150	10	0	0	mixed conifer woodland, semi-natural grassland and upland blanket bog; flying low along edge of forestry, going downhill along forestry edge before disappearing into wood, male	NM
GP002	2022-10-10T14:18:08.583	VP1	16/09/2022	18:57	Golden Plover	17	110	0	0	110	0	mixed conifer woodland, semi-natural grassland and heath; flying n across site	NM
SN010	2022-10-10T14:11:11.129	VP1	16/09/2022	19:50	Snipe	2	45	0	45	0	0	upland blanket bog, heath and semi-natural grassland; flying across bog, calling	NM
ML001	2022-10-10T14:03:35.686	VP4	19/09/2022	15:24	Merlin	1	28	28	0	0	0	semi-natural grassland, mixed conifer woodland and scrub; flying and rapidly along edges of scrub and woodland, +	NM

												along wooded corridors within young forestry	
GP003	2022-10-10T14:06:17.300	VP4	19/09/2022	17:17	Golden Plover	8	75	0	0	75	0	mixed conifer woodland and scrub; flying across sw 500m buffer + calling	NM
K010	2022-10-10T14:08:22.606	VP4	19/09/2022	18:44	Kestrel	1	200	25	105	70	0	semi-natural grassland, heath and scrub; hunting and hovering over boggy farmland	NM

Appendix 1 Table 3 Breeding Walkover Observations

Report Ref.	Ref.	Date	Time	Species	Number	Habitat and activity	Surveyor
HH025	2022-04-13T14:37:58.533	13/04/2022	13:55	Hen Harrier	1	conifer plantation; soaring, male circling above 2020 nest1 (suitable nesting habitat; possible breeder)	AOD
HH026	2022-04-13T14:38:46.740	13/04/2022	14:38	Hen Harrier	1	conifer plantation; soaring, female soaring high above 2020 nest1 (suitable nesting habitat; possible breeder)	AOD
HH027	2022-04-13T14:51:32.924	13/04/2022	14:51	Hen Harrier	1	wet grassland and conifer plantation; display, likely same female sky dancing and calling from dough mtn down to 2020 nest1 area.lost in trees (courtship and display; probable breeding)	AOD
	2022-04-13T14:56:48.123	13/04/2022	14:56	Meadow Pipit	6	wet grassland; fly, across area (suitable nesting habitat; possible breeder)	AOD
BZ012	2022-04-13T16:08:05.786	13/04/2022	16:08	Buzzard	1	conifer plantation; call, call unseen (suitable nesting habitat; possible breeder)	AOD
HH028	2022-04-14T18:46:30.373	14/04/2022	18:46	Hen Harrier	1	montane heath; foraging, male foraging (suitable nesting habitat; possible breeder)	AOD
	2022-04-14T18:47:11.059	14/04/2022	18:47	Meadow Pipit	5	montane heath; fly (suitable nesting habitat; possible breeder)	AOD
RG001	2022-04-14T18:47:33.065	14/04/2022	18:47	Red Grouse	1	montane heath; flushed, flushed (suitable nesting habitat; possible breeder)	AOD
	2022-04-14T18:48:02.115	14/04/2022	18:48	Meadow Pipit	6	montane heath; fly, across area (suitable nesting habitat; possible breeder)	AOD
WE001	2022-04-20T17:34:09.899	20/04/2022	16:30	White-tailed Eagle	1	montane heath; perched/fly, immature wte green tag left wing flushed from ground lost behind hill (suitable nesting habitat; possible breeder)	AOD
WE002	2022-04-20T17:35:17.928	20/04/2022	17:05	White-tailed Eagle	1	montane heath; fly/soar, same immature wte mobbed by 6lb soaring high near lb colony (suitable nesting habitat; possible breeder)	AOD
	2022-04-20T17:36:17.135	20/04/2022	17:06	Lesser Black-backed Gull	6	montane heath and lakes and ponds; mobbing/fly, adults mobbing wte at colony (agitated behaviour; probable breeding)	AOD
BZ013	2022-04-20T17:41:13.228	20/04/2022	17:09	Buzzard	1	conifer plantation; soaring, soared breifly (suitable nesting habitat; possible breeder)	AOD
HH029	2022-04-20T17:38:10.212	20/04/2022	17:26	Hen Harrier	1	wet grassland; flying/interacting, male flew to 2nd male then alsoflew with female breifly (suitable nesting habitat; possible breeder)	AOD
HH030	2022-04-20T17:39:22.152	20/04/2022	17:26	Hen Harrier	2	conifer plantation; display/courtship, male and female flying together in courtship flight. female flew breifly to2nd male and returned to 1st male soaring high over hh nest2 from 2020 and 2021 (courtship and display; probable breeding)	AOD

SN017	2022-04-20T20:07:25.350	20/04/2022	19:07	Snipe	1	montane heath; drumming, drumming on site (courtship and display; probable breeding)	AOD
RG002	2022-04-20T20:08:03.266	20/04/2022	20:08	Red Grouse	1	montane heath; flushed, on site new area for rg (suitable nesting habitat; possible breeder)	AOD
SH004	2022-04-20T20:17:51.127	20/04/2022	20:17	Sparrowhawk	1	conifer plantation; fly, flying (suitable nesting habitat; possible breeder)	AOD
	2022-04-23T17:39:45.614	23/04/2022	17:39	Grey Wagtail	1	conifer plantation; fly, adult (suitable nesting habitat; possible breeder)	AOD
	2022-04-23T17:40:21.460	23/04/2022	17:40	Meadow Pipit	8	wet grassland; fly, across area (suitable nesting habitat; possible breeder)	AOD
HH031	2022-04-29T11:52:04.070	29/04/2022	11:52	Hen Harrier	1	conifer plantation; fly, male near 2021 nest1 flying south mobbed by hc (suitable nesting habitat; possible breeder)	AOD
K012	2022-04-29T14:01:40.386	29/04/2022	14:01	Kestrel	1	montane heath and conifer plantation; foraging, foraging (suitable nesting habitat; possible breeder)	AOD
BZ014	2022-04-29T14:02:16.068	29/04/2022	14:02	Buzzard	1	conifer plantation; fly, soaring (suitable nesting habitat; possible breeder)	AOD
	2022-04-29T14:02:48.080	29/04/2022	14:02	Meadow Pipit	8	montane heath; fly, across area (suitable nesting habitat; possible breeder)	AOD
	2022-04-29T14:03:25.976	29/04/2022	14:03	Meadow Pipit	7	montane heath; fly, across area (suitable nesting habitat; possible breeder)	AOD
HH032	2022-04-29T14:19:37.252	29/04/2022	14:19	Hen Harrier	1	conifer plantation; perched, perched male near 2020 and 2021 nests (suitable nesting habitat; possible breeder)	AOD
HH033	2022-05-24T18:53:54.220	24/05/2022	18:53	Hen Harrier	1	conifer plantation; sky dance/foraging, male foraging then dancing until lost at 2021 nest1 (courtship and display; probable breeding)	AOD
	2022-05-24T18:54:53.621	24/05/2022	18:54	Lesser Black-backed Gull	2	conifer plantation; fly, adults (suitable nesting habitat; possible breeder)	AOD
	2022-05-24T18:55:20.753	24/05/2022	18:55	Meadow Pipit	8	wet grassland; fly/display, across area (courtship and display; probable breeding)	AOD
	2022-05-25T15:16:37.792	25/05/2022	15:16	Meadow Pipit	2	conifer plantation; fly (courtship and display; probable breeding)	AOD
BZ015	2022-05-27T16:20:22.232	25/05/2022	16:20	Buzzard	1	conifer plantation; fly, flying low (suitable nesting habitat; possible breeder)	AOD
	2022-05-25T16:53:47.357	25/05/2022	16:53	Meadow Pipit	4	conifer plantation; fly (suitable nesting habitat; possible breeder)	AOD

	2022-05-26T15:24:40.886	26/05/2022	15:24	Meadow Pipit	9	wet grassland; fly (suitable nesting habitat; possible breeder)	AOD
BZ016	2022-05-26T15:25:14.951	26/05/2022	15:25	Buzzard	1	conifer plantation; fly (suitable nesting habitat; possible breeder)	AOD
SN018	2022-05-26T15:34:47.562	26/05/2022	15:34	Snipe	1	wet grassland; fly, flushed (suitable nesting habitat; possible breeder)	AOD
SH005	2022-05-26T16:39:33.682	26/05/2022	16:39	Sparrowhawk	1	conifer plantation; fly, female in flight fast above trees (suitable nesting habitat; possible breeder)	AOD
	2022-05-26T22:31:53.461	26/05/2022	22:31	Lesser Black-backed Gull	6	conifer plantation; fly, flock high travelling (suitable nesting habitat; possible breeder)	AOD
	2022-05-27T14:37:00.507	27/05/2022	14:37	Lesser Black-backed Gull	1	conifer plantation; fly, adult flying over low (suitable nesting habitat; possible breeder)	AOD
	2022-05-27T16:19:10.009	27/05/2022	16:19	Meadow Pipit	10	wet grassland; fly (suitable nesting habitat; possible breeder)	AOD
	2022-05-27T16:19:37.249	27/05/2022	16:19	Meadow Pipit	4	wet grassland; fly (suitable nesting habitat; possible breeder)	AOD
	2022-05-27T19:24:46.416	27/05/2022	19:24	Grey Wagtail	1	wet grassland; perch (suitable nesting habitat; possible breeder)	AOD
	2022-05-27T19:25:14.996	27/05/2022	19:25	Grey Wagtail	1	conifer plantation; fly (suitable nesting habitat; possible breeder)	AOD
BZ017	2022-05-27T19:26:06.174	27/05/2022	19:26	Buzzard	1	conifer plantation; fly, mobbed by hc (suitable nesting habitat; possible breeder)	AOD
	2022-05-30T18:06:52.370	30/05/2022	18:06	Meadow Pipit	4	wet grassland; fly (suitable nesting habitat; possible breeder)	AOD
	2022-05-30T18:07:36.017	30/05/2022	18:07	Meadow Pipit	2	wet grassland; fly (suitable nesting habitat; possible breeder)	AOD
	2022-05-30T20:11:45.527	30/05/2022	20:11	Meadow Pipit	3	wet grassland; fly (suitable nesting habitat; possible breeder)	AOD
	2022-06-24T15:47:25.685	24/06/2022	15:47	Meadow Pipit	6	upland blanket bog; fly (suitable nesting habitat; possible breeder)	AOD
	2022-06-24T15:47:49.300	24/06/2022	15:47	Meadow Pipit	4	upland blanket bog; fly (suitable nesting habitat; possible breeder)	AOD
	2022-06-24T15:48:18.832	24/06/2022	15:48	Meadow Pipit	10	upland blanket bog; fly/display, across area inc young (fledged young; confirmed breeding)	AOD

	2022-06-28T19:42:06.669	27/06/2022	19:42	Meadow Pipit	3	montane heath; fly (suitable nesting habitat; possible breeder)	AOD
BZ018	2022-06-28T19:43:05.195	27/06/2022	19:43	Buzzard	1	montane heath; fly (suitable nesting habitat; possible breeder)	AOD
	2022-06-28T19:40:44.809	28/06/2022	17:40	Meadow Pipit	8	wet grassland; fly, across area (suitable nesting habitat; possible breeder)	AOD
BZ019	2022-06-28T19:35:49.992	28/06/2022	18:35	Buzzard	1	conifer plantation; fly, fly over high (suitable nesting habitat; possible breeder)	AOD
	2022-06-28T19:19:36.277	28/06/2022	19:19	Meadow Pipit	5	montane heath; fly (suitable nesting habitat; possible breeder)	AOD
SH006	2022-06-28T19:36:47.648	28/06/2022	19:36	Sparrowhawk	1	conifer plantation; carrying prey, male carrying prey (adult carrying food/faecal sac; confirmed breeding)	AOD
HH034	2022-06-28T19:56:47.134	28/06/2022	19:56	Hen Harrier	1	conifer plantation; fly, male flying nest 2020 hh1 nest (suitable nesting habitat; possible breeder)	AOD
SH007	2022-06-28T19:57:31.978	28/06/2022	19:57	Sparrowhawk	1	conifer plantation; hunting, chasing passerine (suitable nesting habitat; possible breeder)	AOD
HH035	2022-06-29T20:38:45.066	29/06/2022	20:38	Hen Harrier	1	conifer plantation; foraging, male foraging (suitable nesting habitat; possible breeder)	AOD
SN019	2022-06-29T20:52:22.794	29/06/2022	20:52	Snipe	1	montane heath; drumming, drumming (courtship and display; probable breeding)	AOD
HH036	2022-07-07T21:04:37.396	07/07/2022	19:31	Hen Harrier	1	montane heath; foraging, male hunting north of saddle hill on site (suitable nesting habitat; possible breeder)	AOD
SH008	2022-07-07T21:05:31.521	07/07/2022	20:25	Sparrowhawk	1	conifer plantation; nest, female flushed from nest alarming (occupied nest; confirmed breeding)	AOD
WE003	2022-07-07T21:06:32.772	07/07/2022	20:45	White-tailed Eagle	1	wet grassland, conifer plantation and improved agricultural grassland; soaring, wte soaring high towards lough melvin.too far to sex/age (suitable nesting habitat; possible breeder)	AOD
BZ020	2022-07-08T14:35:04.529	08/07/2022	14:35	Buzzard	2	conifer plantation; soaring, pair soaring from site (suitable nesting habitat; possible breeder)	AOD
BZ021	2022-07-11T14:09:10.068	11/07/2022	11:09	Buzzard	1	montane heath; fly, flying low (suitable nesting habitat; possible breeder)	AOD
	2022-07-11T14:09:42.218	11/07/2022	11:11	Meadow Pipit	8	montane heath; fly, across area (suitable nesting habitat; possible breeder)	AOD
	2022-07-11T11:44:33.649	11/07/2022	11:44	Meadow Pipit	7	upland blanket bog; fly (suitable nesting habitat; possible breeder)	AOD

	2022-07-11T11:55:43.020	11/07/2022	11:55	Meadow Pipit	6	upland blanket bog; fly (suitable nesting habitat; possible breeder)	AOD
	2022-07-11T14:10:13.009	11/07/2022	14:10	Meadow Pipit	12	montane heath; fly, across area (suitable nesting habitat; possible breeder)	AOD
	2022-07-11T14:12:58.728	11/07/2022	14:12	Meadow Pipit	6	wet grassland; fly, across area (suitable nesting habitat; possible breeder)	AOD
SN020	2022-07-11T14:16:32.867	11/07/2022	14:16	Snipe	1	montane heath; flushed, flushed (suitable nesting habitat; possible breeder)	AOD
SH009	2022-07-14T18:43:17.495	14/07/2022	16:40	Sparrowhawk	4	conifer plantation; nest, male bringing prey into nest area.at least 3 chicks begging (occupied nest; confirmed breeding)	AOD
SN021	2022-07-14T20:00:34.729	14/07/2022	20:00	Snipe	1	montane heath and conifer plantation; drumming (courtship and display; probable breeding)	AOD
	2022-07-15T18:42:59.150	15/07/2022	18:42	Swift	1	conifer plantation; fly (flyover; non-breeding)	AOD
	2022-07-15T18:43:26.640	15/07/2022	18:43	Meadow Pipit	7	montane heath; fly (suitable nesting habitat; possible breeder)	AOD
	2022-07-19T16:21:13.132	19/07/2022	16:21	Meadow Pipit	4	conifer plantation; fly (suitable nesting habitat; possible breeder)	AOD
	2022-07-19T16:21:38.128	19/07/2022	16:21	Meadow Pipit	5	wet grassland; fly (suitable nesting habitat; possible breeder)	AOD
	2022-07-19T17:26:50.097	19/07/2022	17:26	Meadow Pipit	6	upland blanket bog; fly (suitable nesting habitat; possible breeder)	AOD
HH037	2022-07-19T18:14:43.533	19/07/2022	17:45	Hen Harrier	1	conifer plantation; carrying prey/alarming, female in with prey.alarming.nest located.young wd4 (adult carrying food/faecal sac; confirmed breeding)	AOD
	2022-07-19T18:25:15.386	19/07/2022	18:25	Meadow Pipit	7	wet grassland; fly (suitable nesting habitat; possible breeder)	AOD
	2022-07-19T18:25:34.360	19/07/2022	18:25	Meadow Pipit	6	wet grassland; fly (suitable nesting habitat; possible breeder)	AOD

Appendix 1 Table 4 Breeding Raptor Survey Observations

Report Ref.	Ref.	BR	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
HH038	2022-12-21T14:30:20.030	5km Radius	11/05/2022	13:05	Hen Harrier	1	bogs and conifer plantation, foraging, adult male	suitable nesting habitat; possible breeder	KB
BZ022	2022-12-21T14:32:45.708	5km Radius	11/05/2022	17:04	Buzzard	1	conifer plantation and bogs, foraging	suitable nesting habitat; possible breeder	KB
BZ023	2022-10-11T16:49:20.102	5km Radius	18/05/2022	10:18	Buzzard	1	bogs and conifer plantation, soaring	suitable nesting habitat; possible breeder	KB
SH010	2022-10-11T16:54:12.627	5km Radius	18/05/2022	10:45	Sparrowhawk	1	wet grassland and conifer plantation, foraging	suitable nesting habitat; possible breeder	KB
HH039	2022-10-11T17:13:16.882	5km Radius	24/05/2022	17:49	Hen Harrier	1	bogs, foraging, adult male	suitable nesting habitat; possible breeder	KB
BZ024	2022-10-27T09:54:07.508	5km Radius	25/05/2022	14:12	Buzzard	1	conifer plantation, hedgerows and highly modified/non-native woodland, foraging	suitable nesting habitat; possible breeder	KB
K013	2022-10-27T10:24:20.111	5km Radius	25/05/2022	14:21	Kestrel	1	wet grassland, scrub and semi-natural woodland, foraging, adult female	suitable nesting habitat; possible breeder	KB

BZ025	2022-10-27T10:28:27.501	5km Radius	25/05/2022	15:05	Buzzard	1	semi-natural grassland and hedgerows, soaring - landed in tree	suitable nesting habitat; possible breeder	KB
BZ026	2022-10-27T10:31:03.887	5km Radius	25/05/2022	15:49	Buzzard	1	semi-natural grassland and hedgerows, foraging	suitable nesting habitat; possible breeder	KB
BZ027	2022-10-27T10:46:49.555	5km Radius	25/05/2022	16:39	Buzzard	1	semi-natural grassland, foraging - landed in field	suitable nesting habitat; possible breeder	KB
WE004	2022-10-27T11:20:30.568	5km Radius	27/05/2022	09:12	White-tailed Eagle	1	bogs, foraging - low to ground, juvenile white-tailed sea eagle	flyover; non-breeding	KB
WE005	2022-10-27T11:24:09.325	5km Radius	27/05/2022	09:30	White-tailed Eagle	1	bogs, foraging - low to ground	flyover; non-breeding	KB
SH011	2022-10-27T11:30:31.502	5km Radius	30/05/2022	17:13	Sparrowhawk	1	conifer plantation, display flight	courtship and display; probable breeding	KB
BZ028	2022-10-27T11:32:22.690	5km Radius	30/05/2022	18:36	Buzzard	1	semi-natural grassland and hedgerows, soaring	suitable nesting habitat; possible breeder	KB
BZ029	2022-12-01T14:38:53.281	5km Radius	14/06/2022	07:59	Buzzard	1	conifer plantation, calling	suitable nesting habitat; possible breeder	KB

BZ030	2022-12-01T14:39:32.620	5km Radius	14/06/2022	08:24	Buzzard	1	conifer plantation, calling	suitable nesting habitat; possible breeder	KB
BZ031	2022-12-01T14:47:59.743	5km Radius	15/06/2022	13:30	Buzzard	1	bogs and conifer plantation, foraging	suitable nesting habitat; possible breeder	KB
BZ032	2022-12-01T14:48:55.519	5km Radius	15/06/2022	14:34	Buzzard	1	bogs and conifer plantation, foraging, second bird	suitable nesting habitat; possible breeder	KB
BZ033	2022-12-01T14:51:56.422	5km Radius	15/06/2022	17:02	Buzzard	1	semi-natural grassland, hedgerows and conifer plantation, soaring	suitable nesting habitat; possible breeder	KB
HH040	2022-12-01T15:02:34.866	5km Radius	16/06/2022	13:05	Hen Harrier	1	wet grassland, bogs and conifer plantation, foraging around saddle hill for 12 min	suitable nesting habitat; possible breeder	KB
HH041	2022-12-01T14:41:58.953	5km Radius	16/06/2022	13:42	Hen Harrier	1	bogs and conifer plantation, foraging male	suitable nesting habitat; possible breeder	KB
HH042	2022-12-01T15:12:28.145	5km Radius	24/06/2022	09:07	Hen Harrier	1	wet grassland and conifer plantation, foraging, adult male	suitable nesting habitat; possible breeder	KB
HH043	2022-12-01T15:13:47.962	5km Radius	24/06/2022	09:20	Hen Harrier	1	wet grassland and conifer plantation, foraging, adult male	suitable nesting habitat; possible breeder	KB

HH044	2022-12-01T15:15:26.862	5km Radius	28/06/2022	16:28	Hen Harrier	1	bogs, foraging, adult male	suitable nesting habitat; possible breeder	KB
SH012	2022-12-01T15:21:28.937	5km Radius	30/06/2022	16:13	Sparrowhawk	1	conifer plantation and bogs, carrying prey into stand of conifers	adult carrying food/faecal sac; confirmed breeding	KB
HH045	2022-12-01T15:48:10.952	5km Radius	01/07/2022	13:16	Hen Harrier	1	wet grassland, conifer plantation and bogs, foarging for 30min until out of sight, adult male	suitable nesting habitat; possible breeder	KB
HH046	2022-12-01T15:56:39.324	5km Radius	01/07/2022	16:44	Hen Harrier	1	wet grassland, bogs and conifer plantation, foraging, adult male	suitable nesting habitat; possible breeder	KB
HH047	2022-12-01T15:57:29.656	5km Radius	01/07/2022	17:01	Hen Harrier	1	conifer plantation, foraging, adult male	suitable nesting habitat; possible breeder	KB
SH013	2022-12-19T11:28:50.801	5km Radius	12/07/2022	12:04	Sparrowhawk	1	conifer plantation, foraging, male	suitable nesting habitat; possible breeder	KB
BZ034	2022-12-19T11:35:09.310	5km Radius	12/07/2022	12:45	Buzzard	1	bogs and conifer plantation, soaring	suitable nesting habitat; possible breeder	KB
SH014	2022-12-19T11:38:33.425	5km Radius	15/07/2022	08:42	Sparrowhawk	1	conifer plantation, bogs and wet grassland, foraging	suitable nesting habitat; possible breeder	KB

SH015	2022-12-19T11:51:41.813	5km Radius	20/07/2022	10:47	Sparrowhawk	1	bogs and conifer plantation, soaring	suitable nesting habitat; possible breeder	KB
SH016	2022-12-19T11:54:56.136	5km Radius	20/07/2022	11:11	Sparrowhawk		conifer plantation, begging calls heard in forestry	nest with young; confirmed breeding	KB
BZ035	2022-12-19T12:00:21.252	5km Radius	20/07/2022	12:15	Buzzard	2	bogs, soaring	suitable nesting habitat; possible breeder	KB
BZ036	2022-12-19T12:55:34.570	5km Radius	20/07/2022	13:36	Buzzard	1	conifer plantation, calling heard	suitable nesting habitat; possible breeder	KB
SH017	2022-12-19T13:48:43.165	5km Radius	20/07/2022	15:27	Sparrowhawk	1	bogs and conifer plantation, soaring and foraging	suitable nesting habitat; possible breeder	KB
SH018	2022-12-19T13:50:49.608	5km Radius	20/07/2022	15:27	Sparrowhawk		conifer plantation, begging calls heard in forestry	nest with young; confirmed breeding	KB
BZ037	2022-12-19T13:52:28.414	5km Radius	20/07/2022	15:46	Buzzard	1	conifer plantation, soaring	suitable nesting habitat; possible breeder	KB
SH019	2022-12-19T13:55:20.222	5km Radius	20/07/2022	15:57	Sparrowhawk	1	conifer plantation, foraging, came out of area chick begging calls were heard	suitable nesting habitat; possible breeder	KB

SH020	2022-12-19T14:03:33.146	5km Radius	21/07/2022	12:17	Sparrowhawk	1	conifer plantation, male foraging	suitable nesting habitat; possible breeder	KB
BZ038	2022-12-19T14:04:53.907	5km Radius	21/07/2022	14:22	Buzzard	1	conifer plantation, foraging	suitable nesting habitat; possible breeder	KB
HH048	2022-12-19T16:08:10:10	5km Radius	26/07/2022	10:10	Hen Harrier	1	conifer plantation and wet grassland, female alarm calling at nest	occupied nest; confirmed breeding	KB
BZ039	2022-12-19T14:15:00.770	5km Radius	26/07/2022	12:43	Buzzard	1	wet grassland and conifer plantation, soaring	suitable nesting habitat; possible breeder	KB
HH049	2022-07-28T13:14:06.928	BR1	28/07/2022	13:14	Hen Harrier	1	conifer plantation, prey carrying, female into nest wih prey	adult carrying food/faecal sac; confirmed breeding	AOD
HH050	2022-07-28T13:30:09.176	BR1	28/07/2022	13:30	Hen Harrier	1	conifer plantation and wet grassland, at nest, female up out of nest flew off towards site	occupied nest; confirmed breeding	AOD
SH021	2022-07-28T13:48:34.665	BR1	28/07/2022	13:48	Sparrowhawk	1	wet grassland, fly, soaring high	suitable nesting habitat; possible breeder	AOD
HH051	2022-07-28T14:13:58.557	BR1	28/07/2022	14:13	Hen Harrier	1	conifer plantation, prey carrying, female in to nest with prey	adult carrying food/faecal sac; confirmed breeding	AOD

HH052	2022-12-19T14:26:47.551	BR1	30/07/2022	13:13	Hen Harrier	1	conifer plantation and wet grassland, female carrying prey flew in from sw, dropped down and dissapeared from view. came back up, flew around, landed on perch then flew off westwards	occupied nest; confirmed breeding	KB
HH053	2022-12-19T14:28:57.669	BR1	30/07/2022	13:13	Hen Harrier	1	conifer plantation and wet grassland, second female came up from ground as first female flew in with prey - second female flew around, landed on perch, and then was lost from view as the surveyor was watching the first female	occupied nest; confirmed breeding	KB
HH054	2022-12-19T14:31:39.867	BR1	30/07/2022	13:26	Hen Harrier	1	conifer plantation and wet grassland, female flew in from west, dropped down and was lost from view	occupied nest; confirmed breeding	KB

HH055	2022-12-19T14:33:42.608	BR1	30/07/2022	13:31	Hen Harrier		conifer plantation, begging calls heard at nest	occupied nest; confirmed breeding	KB
HH056	2022-12-19T14:36:39.975	BR1	30/07/2022	13:53	Hen Harrier	1	conifer plantation, ringtail soaring over fields behind nest	suitable nesting habitat; possible breeder	KB
HH057	2022-12-19T14:38:41.978	BR1	30/07/2022	13:55	Hen Harrier	1	conifer plantation, ringtail soaring over fields behind nest and dropped down	suitable nesting habitat; possible breeder	KB
HH058	2022-12-19T14:40:25.635	BR1	30/07/2022	14:38	Hen Harrier	2	conifer plantation, 2x fledgelings flying low around nest site	nest with young; confirmed breeding	KB
HH059	2022-12-19T14:44:17.384	BR1	30/07/2022	14:39	Hen Harrier	1	conifer plantation and wet grassland, female flew around nest site and flew off towards wsw	occupied nest; confirmed breeding	KB
HH060	2022-12-19T16:01:51.874	BR1	02/08/2022	12:30	Hen Harrier	1	conifer plantation, ringtail in sky over nest (seen from car as driving past)	occupied nest; confirmed breeding	KB
HH061	2022-12-19T16:03:32.936	BR1	02/08/2022	12:46	Hen Harrier	1	conifer plantation, wet grassland and bogs, female foraging	suitable nesting habitat; possible breeder	KB

SH022	2022-12-19T16:05:10.244	BR1	02/08/2022	14:16	Sparrowhawk	1	conifer plantation, foraging	suitable nesting habitat; possible breeder	KB
HH062	2022-12-19T16:07:49.908	BR1	02/08/2022	14:57	Hen Harrier	1	wet grassland, bogs and conifer plantation, ringtail foraging	suitable nesting habitat; possible breeder	KB
SH023	2022-08-02T16:46:33.330	BR1	02/08/2022	16:46	Sparrowhawk	1	conifer plantation, foraging, flying very high stooped to tree level hunting	suitable nesting habitat; possible breeder	AOD
HH063	2022-08-02T18:25:06.432	BR1	02/08/2022	18:25	Hen Harrier	3	conifer plantation, circling nest, 2 adult females and at least one chick circling nest.one adult female left one stayed alarming until surveyor left the area	fledged young; confirmed breeding	AOD
	2022-08-03T15:38:13.360	BR1	03/08/2022	15:38	Lesser Black-backed Gull	1	conifer plantation, travelling, flying over adult	suitable nesting habitat; possible breeder	AOD
	2022-08-03T15:38:55.349	BR1	03/08/2022	15:38	Grey Heron	1	wet grassland, fly, flying low over wet fields	suitable nesting habitat; possible breeder	AOD
SH024	2022-08-03T15:39:32.208	BR1	03/08/2022	15:39	Sparrowhawk	1	conifer plantation, fly, juv flying low	suitable nesting habitat; possible breeder	AOD

K014	2022-08-03T15:55:21.319	BR1	03/08/2022	15:55	Kestrel	2	wet grassland and montane heath, forsging young, 2 young birds foraging	fledged young; confirmed breeding	AOD
HH064	2022-08-03T17:47:10.982	BR1	03/08/2022	16:54	Hen Harrier	1	conifer plantation, fly, young bird flew low at nest	fledged young; confirmed breeding	AOD
HH065	2022-08-03T17:48:14.074	BR1	03/08/2022	17:20	Hen Harrier	1	conifer plantation, chick w prey, chick with item in talons.no adult visible.landed in hedgrow	fledged young; confirmed breeding	AOD
HH066	2022-08-03T17:49:15.746	BR1	03/08/2022	17:39	Hen Harrier	3	conifer plantation, adult feeding young, female in with prey gave to unseen chick/nest another chick continued chasing adult.adult left area immeadiatly chicks settled.	fledged young; confirmed breeding	AOD
K015	2022-08-03T18:09:13.284	BR1	03/08/2022	18:09	Kestrel	1	wet grassland, foraging, female/imm bird foraging	suitable nesting habitat; possible breeder	AOD
HH067	2022-08-05T10:40:01.373	BR1	05/08/2022	10:40	Hen Harrier	1	conifer plantation and wet grassland, mobbing, hh chick mobbing	fledged young; confirmed breeding	AOD

							female sh contiued away from nest area		
SH025	2022-08-05T10:41:04.100	BR1	05/08/2022	10:41	Sparrowhawk	1	conifer plantation, foraging, female being mobbed by hh chick	suitable nesting habitat; possible breeder	AOD
K016	2022-08-05T11:56:02.461	BR1	05/08/2022	11:56	Kestrel	1	wet grassland, foraging, no age/sex foraging	suitable nesting habitat; possible breeder	AOD
SH026	2022-08-05T12:18:41.987	BR1	05/08/2022	12:18	Sparrowhawk	1	wet grassland, foraging, female foraging	suitable nesting habitat; possible breeder	AOD
K017	2022-08-05T13:52:51.179	BR1	05/08/2022	13:52	Kestrel	1	conifer plantation and montane heath, foraging, female foraging	suitable nesting habitat; possible breeder	AOD
SH027	2022-08-09T10:57:03.500	BR1	09/08/2022	10:57	Sparrowhawk	1	conifer plantation and montane heath, soaring, female soaring mobbed by passerines	suitable nesting habitat; possible breeder	AOD
SH028	2022-08-09T11:01:20.405	BR1	09/08/2022	11:01	Sparrowhawk	1	conifer plantation, fly, recently fledged bird flew between trees.possible chick from known sh nest nearby	fledged young; confirmed breeding	AOD

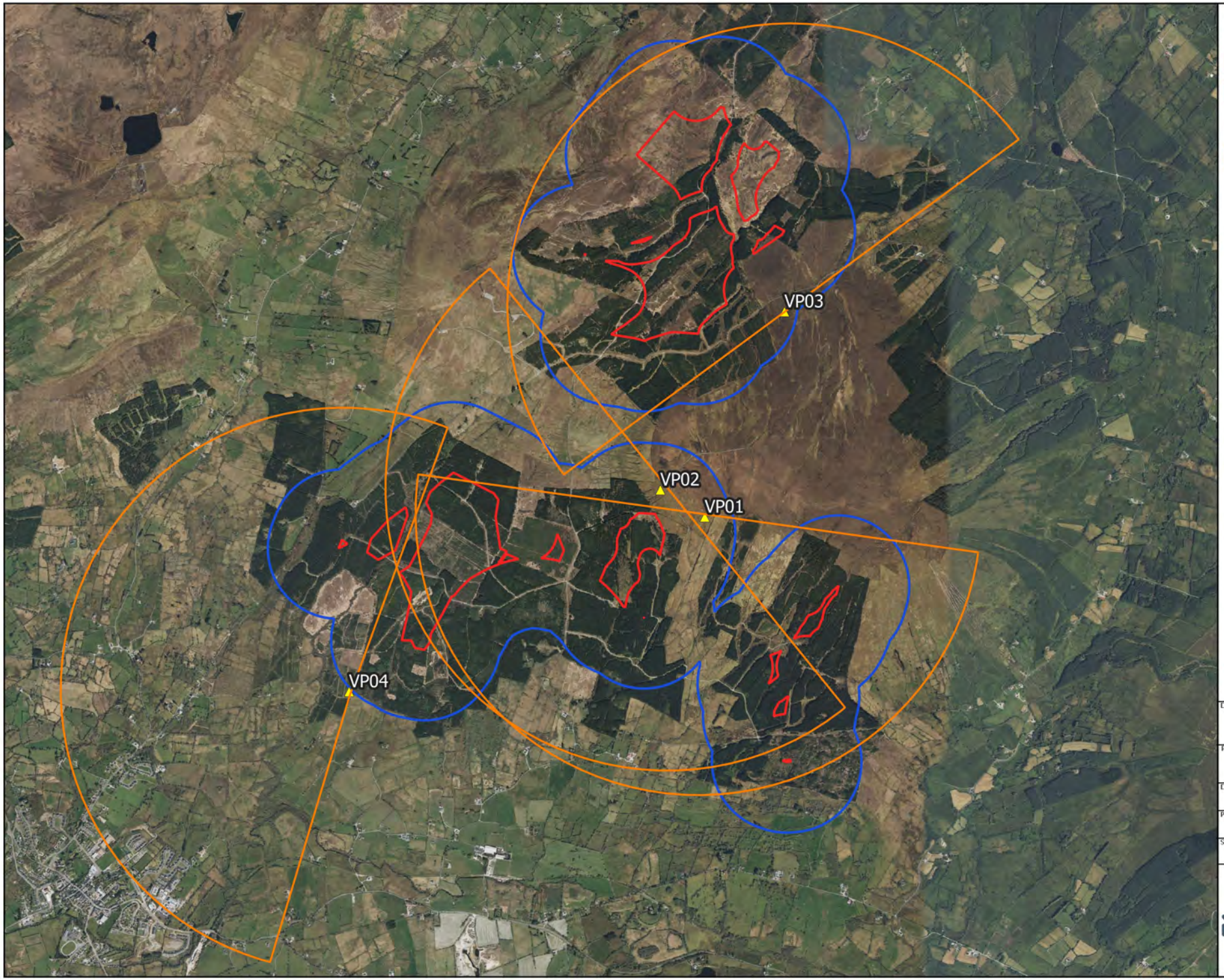
	2022-08-10T11:44:45.982	BR1	10/08/2022	11:44	Lesser Black-backed Gull	1	conifer plantation, fly, young bird flying over	fledged young; confirmed breeding	AOD
K018	2022-08-10T11:45:33.295	BR1	10/08/2022	11:45	Kestrel	1	montane heath, foraging, no age/sex foraging	suitable nesting habitat; possible breeder	AOD
BZ040	2022-08-10T11:57:01.440	BR1	10/08/2022	11:57	Buzzard	5	conifer plantation, soaring, soaring birds including some young birds.likely nest of origin on site	fledged young; confirmed breeding	AOD
SH029	2022-08-10T14:54:06.302	BR1	10/08/2022	13:54	Sparrowhawk	1	conifer plantation, fly, young bird flew low	fledged young; confirmed breeding	AOD
SH030	2022-08-10T14:55:08.453	BR1	10/08/2022	14:24	Sparrowhawk	1	conifer plantation and wet grassland, fly, juv flying	suitable nesting habitat; possible breeder	AOD
K019	2022-08-26T16:35:52.386	BR1	26/08/2022	16:35	Kestrel	1	conifer plantation, foraging, young bird	fledged young; confirmed breeding	AOD

Appendix 1 Table 5 Incidental Observations

Report Ref.	Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
SN022	2022-10-11T17:08:11.901	Breeding Raptor Survey; 5Km Radius	24/05/2022	17:12	Snipe	2	bogs; vociferous chipping and drumming/displaying in sky together	KB
SN023	2022-10-11T17:11:02.439	Breeding Raptor Survey; 5Km Radius	24/05/2022	17:18	Snipe	2	bogs; chipping and drumming	KB
SN024	2022-10-11T17:15:04.204	Breeding Raptor Survey; 5Km Radius	24/05/2022	18:00	Snipe	1	bogs; chipping	KB
SN025	2022-10-11T17:16:09.781	Breeding Raptor Survey; 5Km Radius	24/05/2022	18:27	Snipe	1	bogs; chipping	KB
SN026	2022-10-11T17:17:19.355	Breeding Raptor Survey; 5Km Radius	24/05/2022	18:34	Snipe	1	bogs; display flight	KB
SN027	2022-10-11T17:18:33.321	Breeding Raptor Survey; 5Km Radius	24/05/2022	18:59	Snipe	1	bogs; display flight	KB
SN028	2022-10-27T11:13:28.595	Breeding Raptor Survey; 5Km Radius	26/05/2022	07:44	Snipe	1	bogs; chipping	KB
SN029	2022-12-02T08:36:14.881	Breeding Raptor Survey; 5Km Radius	14/06/2022	07:48	Snipe	1	bogs; chipping	KB
SN030	2022-12-02T08:36:40.278	Breeding Raptor Survey; 5Km Radius	14/06/2022	09:50	Snipe	1	bogs; chipping	KB
SN031	2022-12-02T08:37:29.926	Breeding Raptor Survey; 5Km Radius	14/06/2022	10:48	Snipe	1	bogs; drumming	KB
SN032	2022-12-02T08:42:52.487	Breeding Raptor Survey; 5Km Radius	14/06/2022	11:32	Snipe	1	bogs; drumming	KB
SN033	2022-12-02T08:43:18.898	Breeding Raptor Survey; 5Km Radius	14/06/2022	13:39	Snipe	1	bogs; chipping	KB
SN034	2022-12-19T14:00:16.431	Breeding Raptor Survey; 5Km Radius	21/07/2022	08:11	Snipe	1	bogs; chipping	KB
SN035	2022-08-11T10:22:08.523	Vantage Point Survey; VP2	11/08/2022	09:22	Snipe	1	montane heath; fly	AOD

APPENDIX 2

FIGURES



Map Legend

- Site Boundary
- 500m Buffer of Site
- VP Locations
- Viewsheds

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Drawing Title
Vantage Point Locations and Viewsheds

Project Title
Lissinagroagh

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AO'D	
Project No.	Drawing No.
200217-g	Fig 1.0
Scale	Date
1:35000	27.04.23

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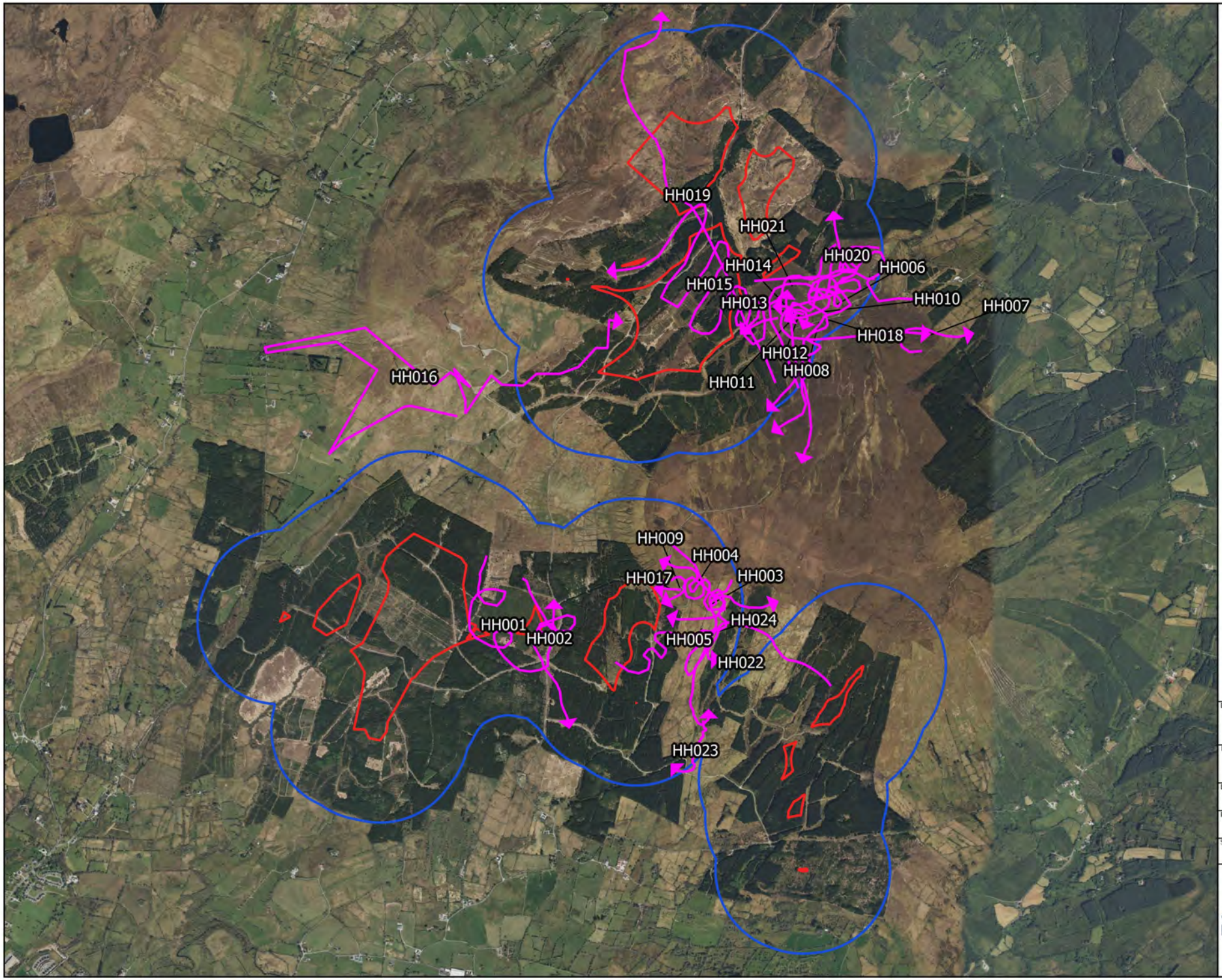

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Project Title	Lissinagroagh
Drawn By	AO'D
Project No.	200217-g
Drawing No.	Fig 1.1
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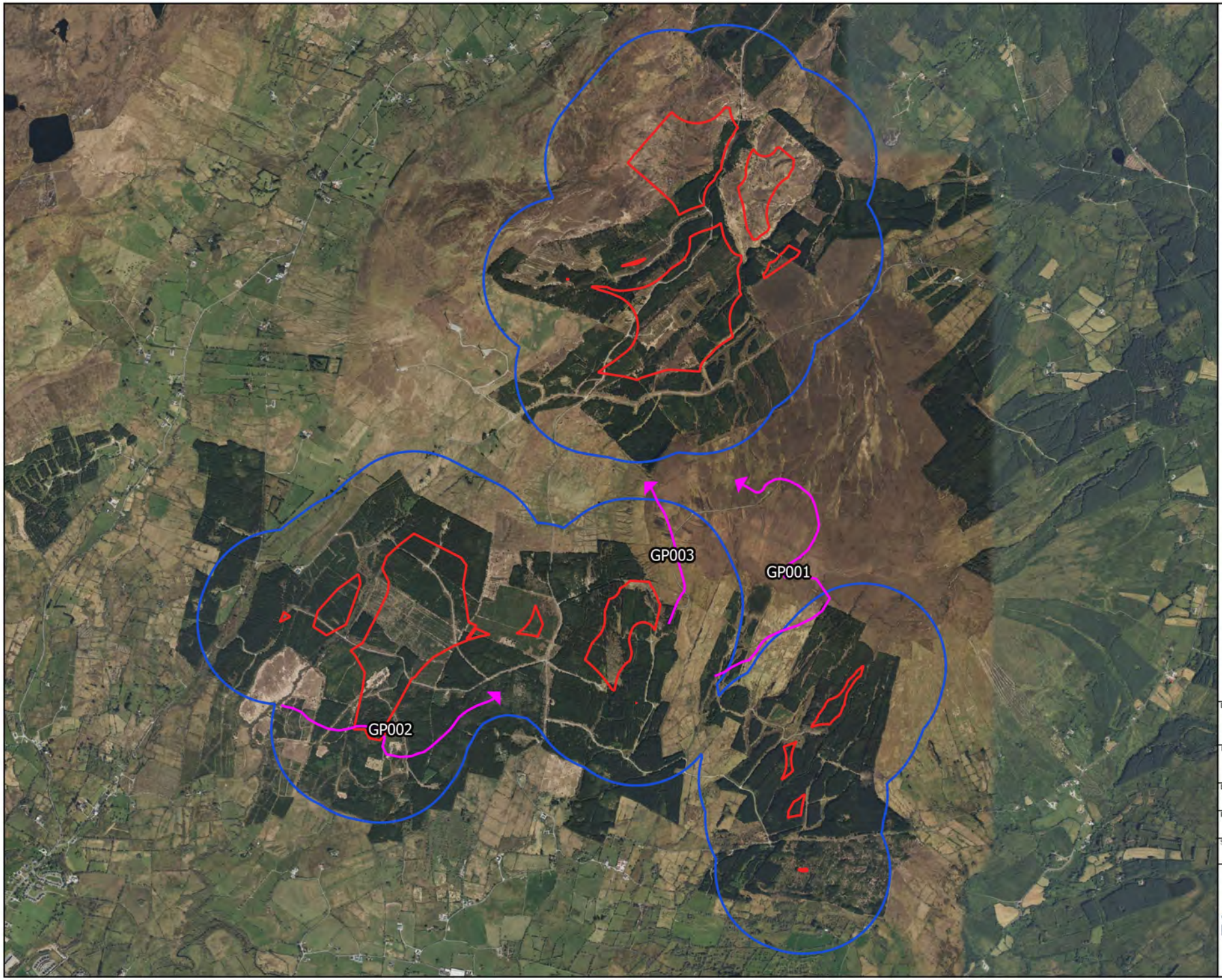

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Drawing Title
Golden plover
VP Observations

Project Title
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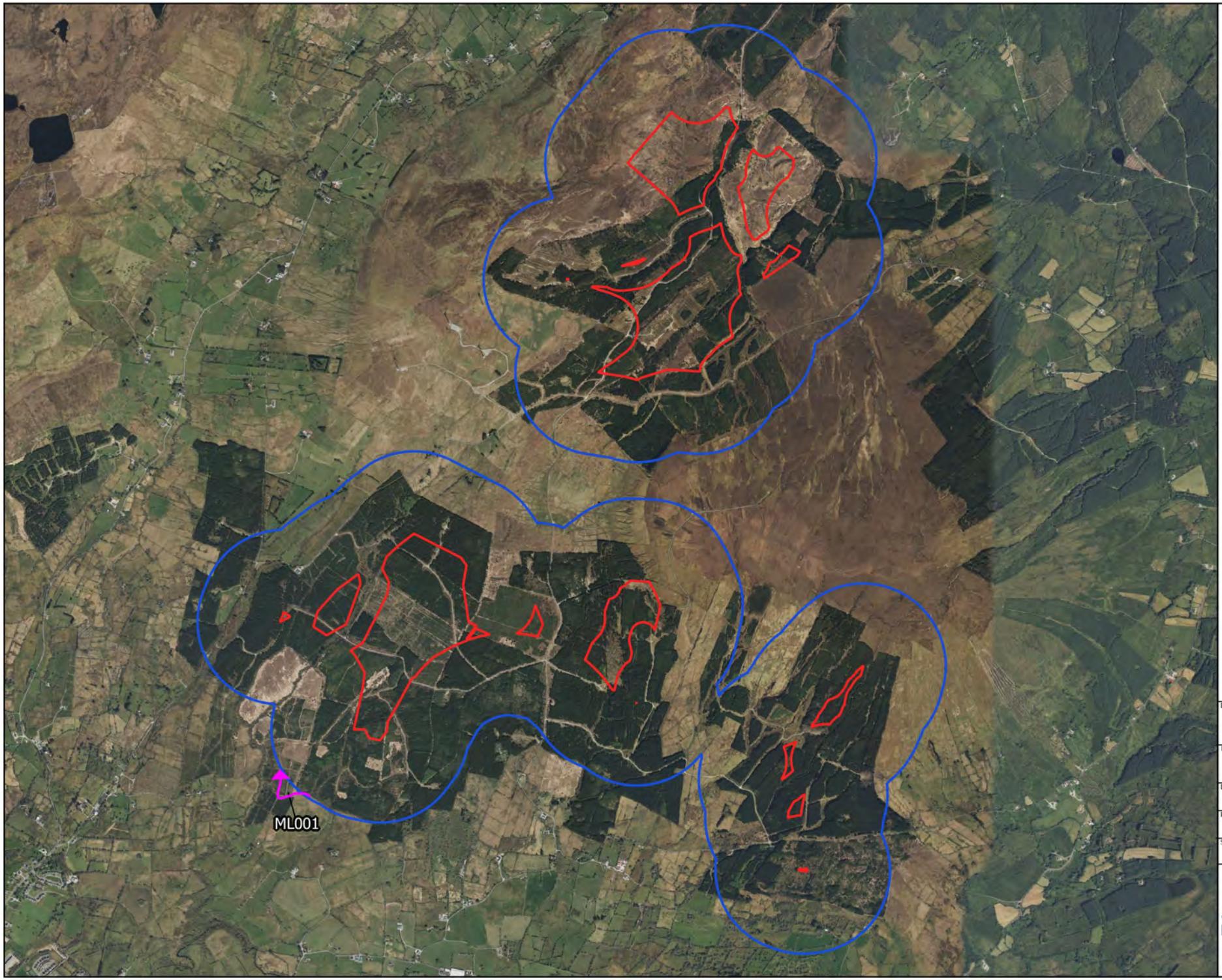

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Drawing Title
Merlin
VP Observations

Project Title
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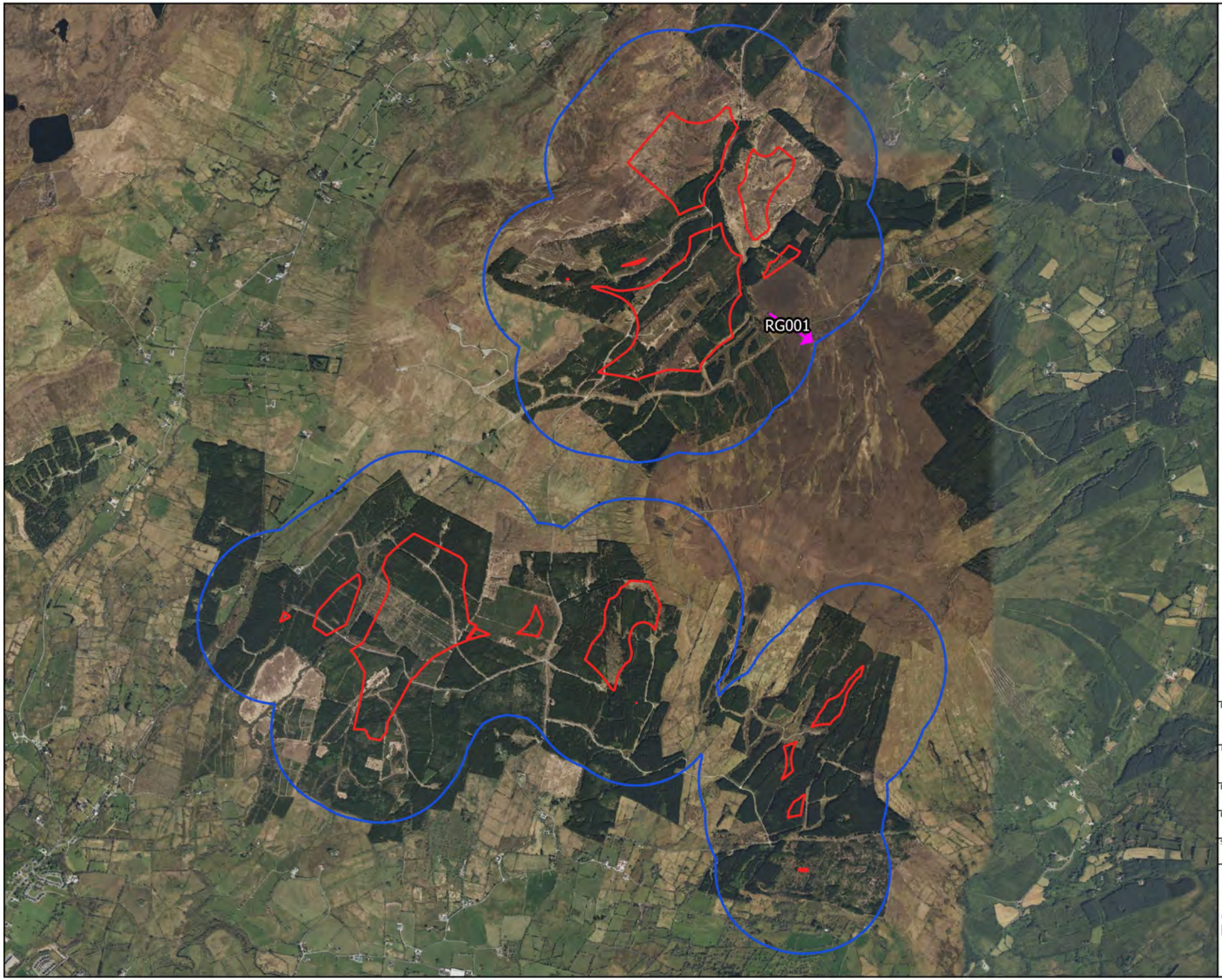

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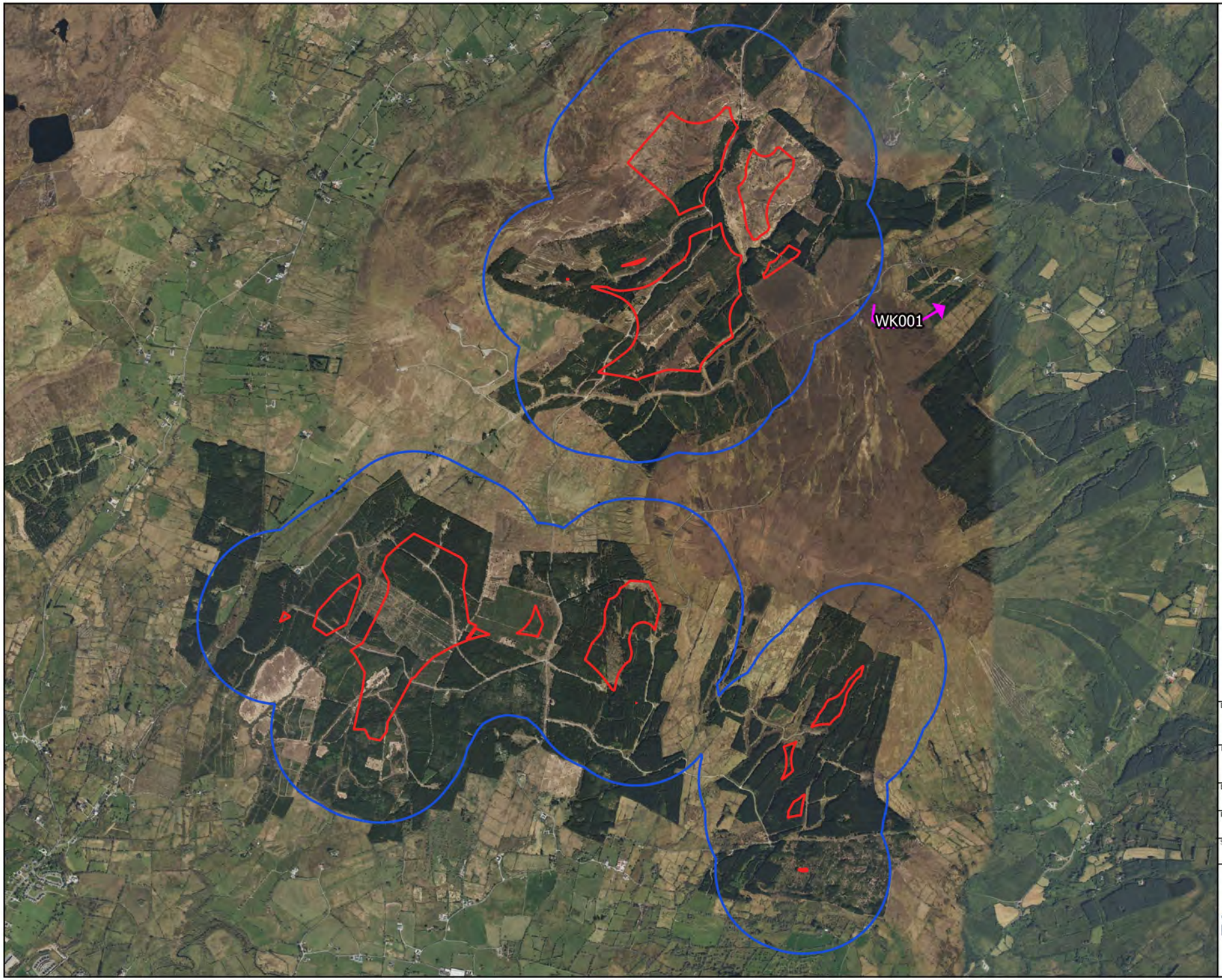

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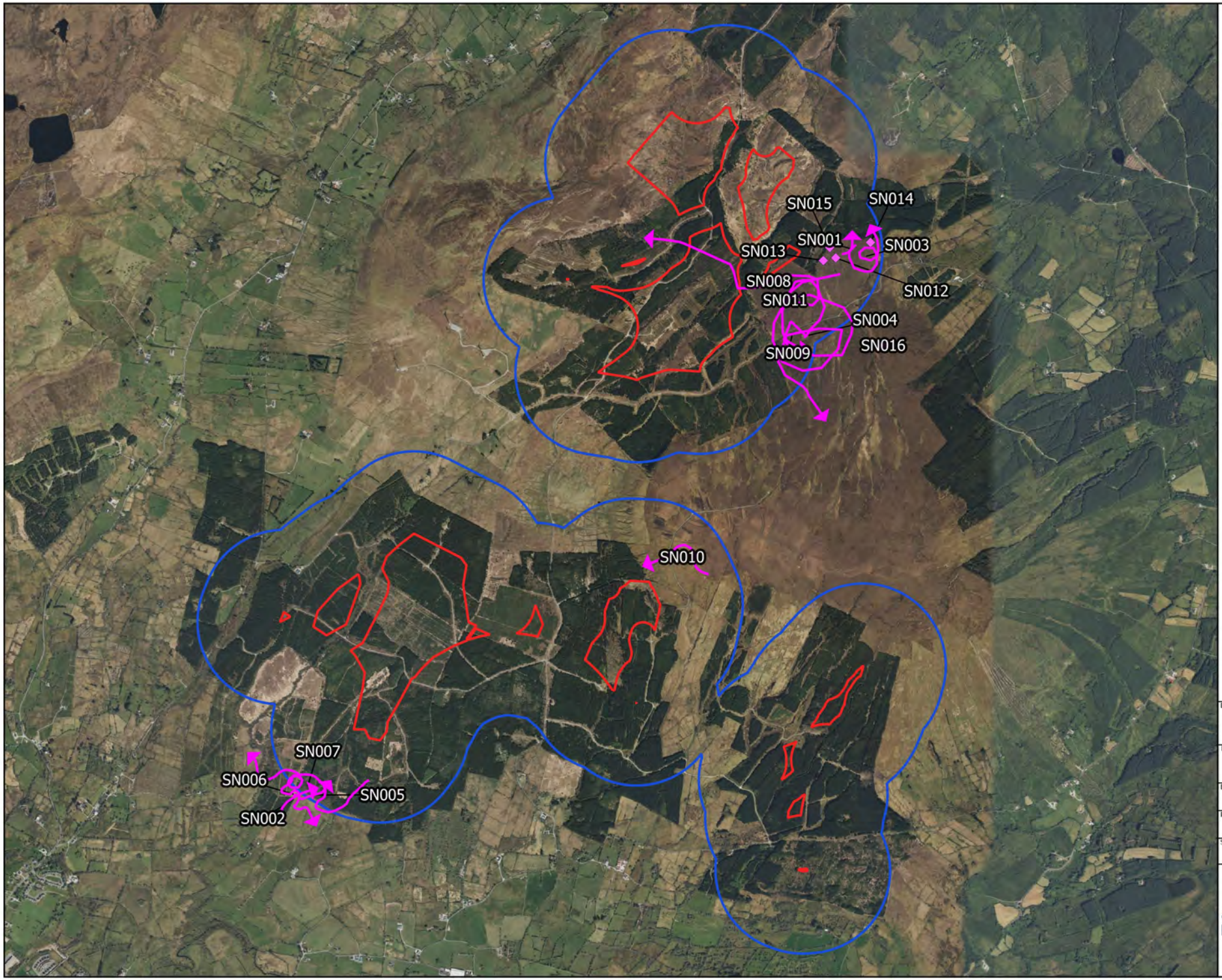

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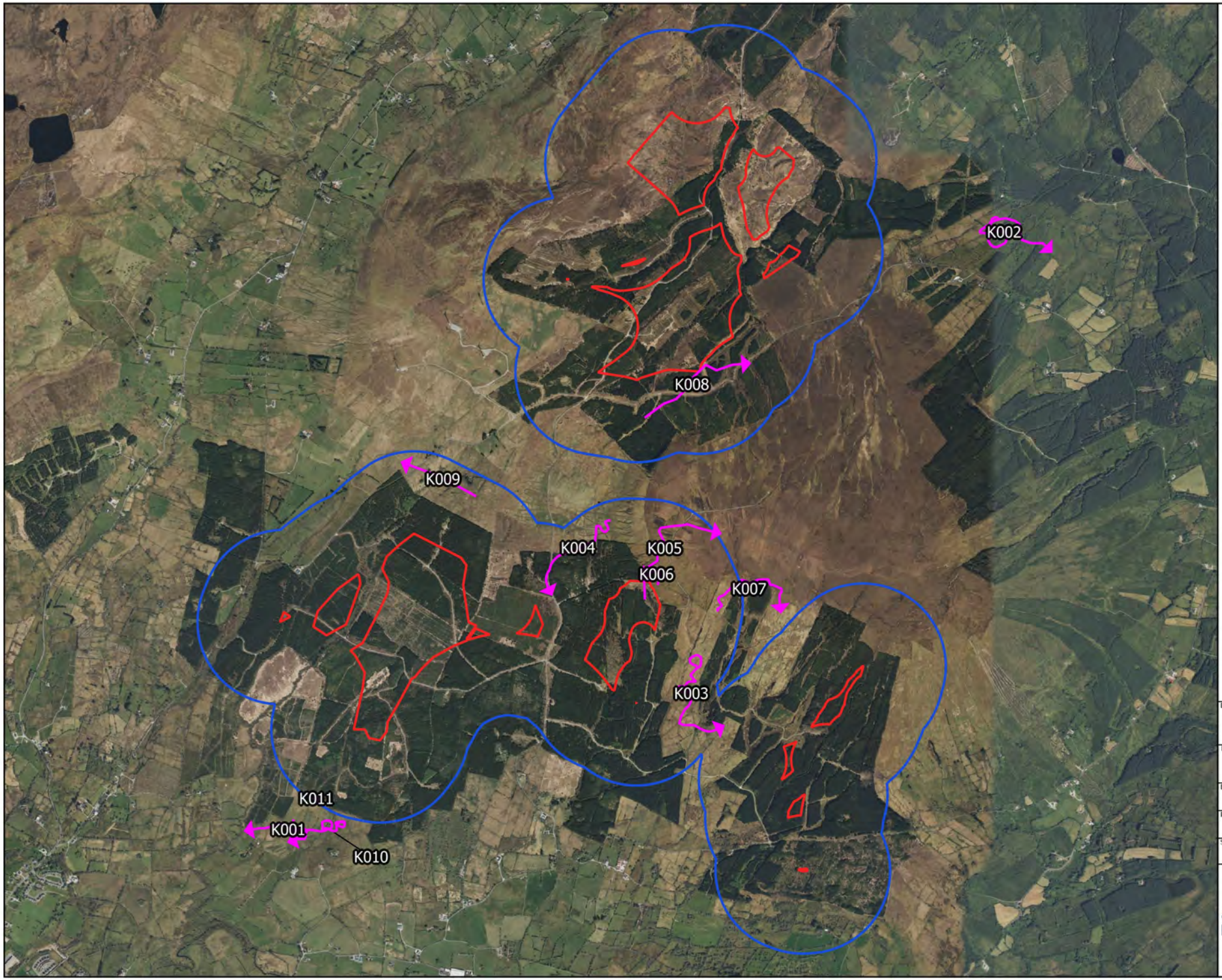

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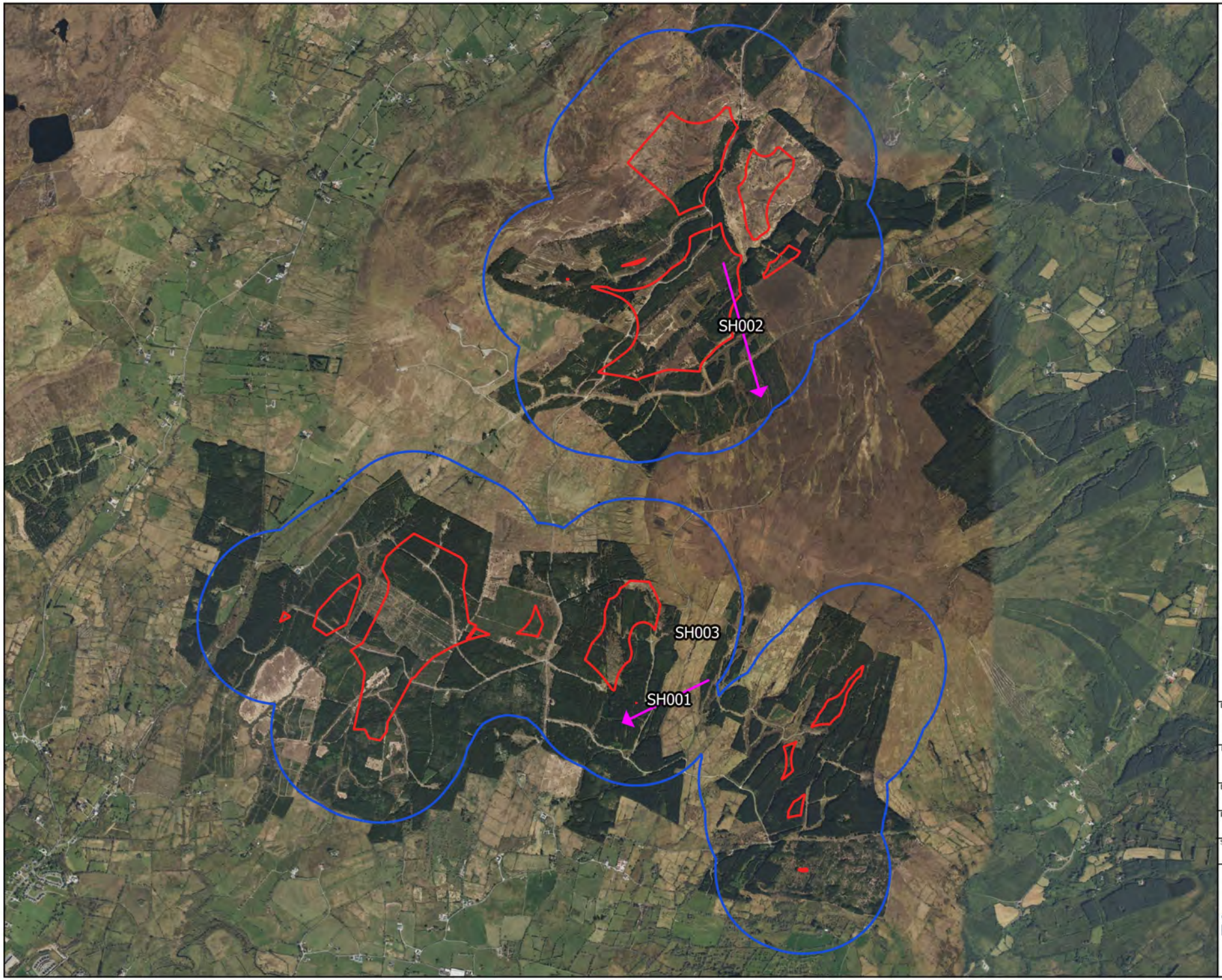

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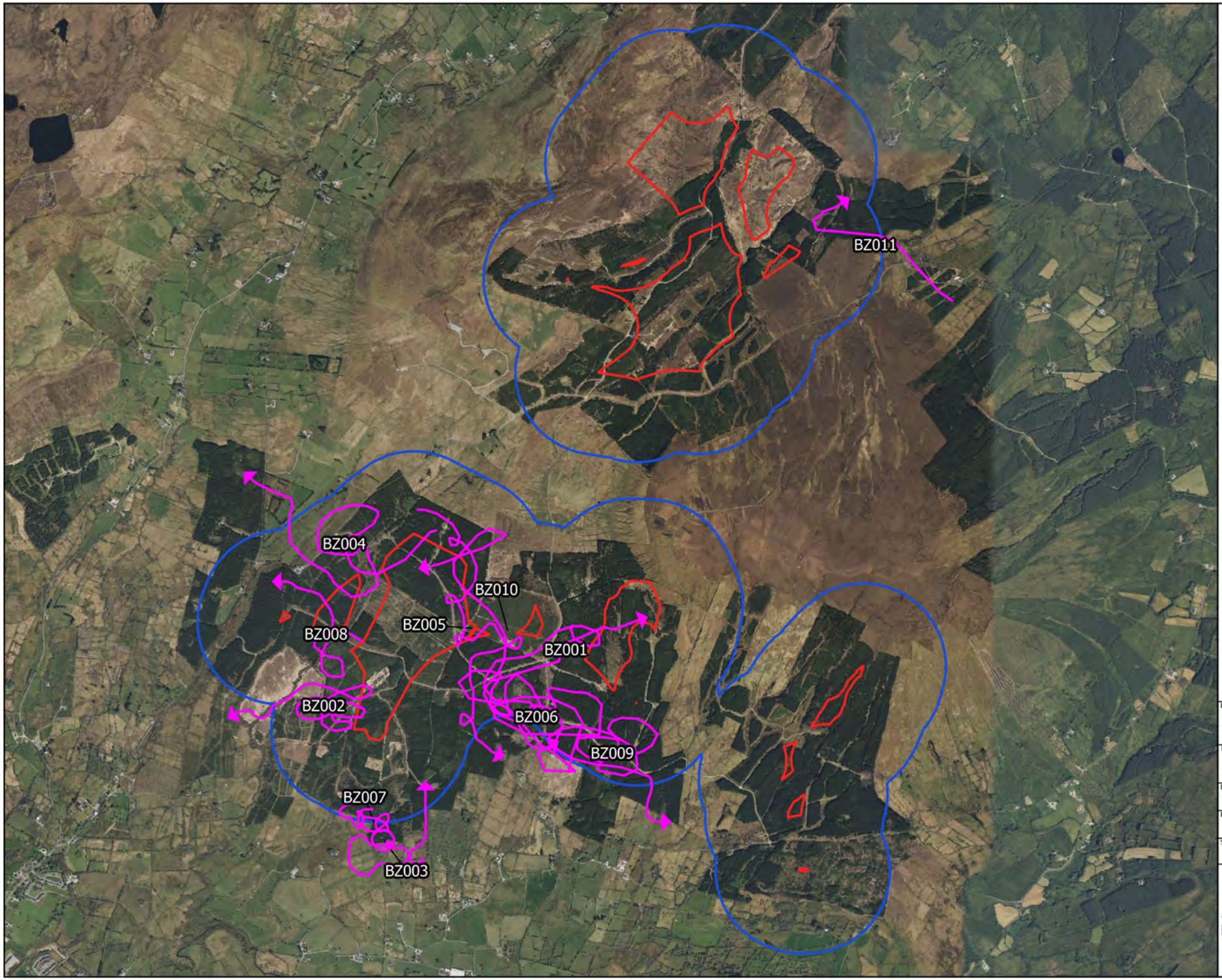

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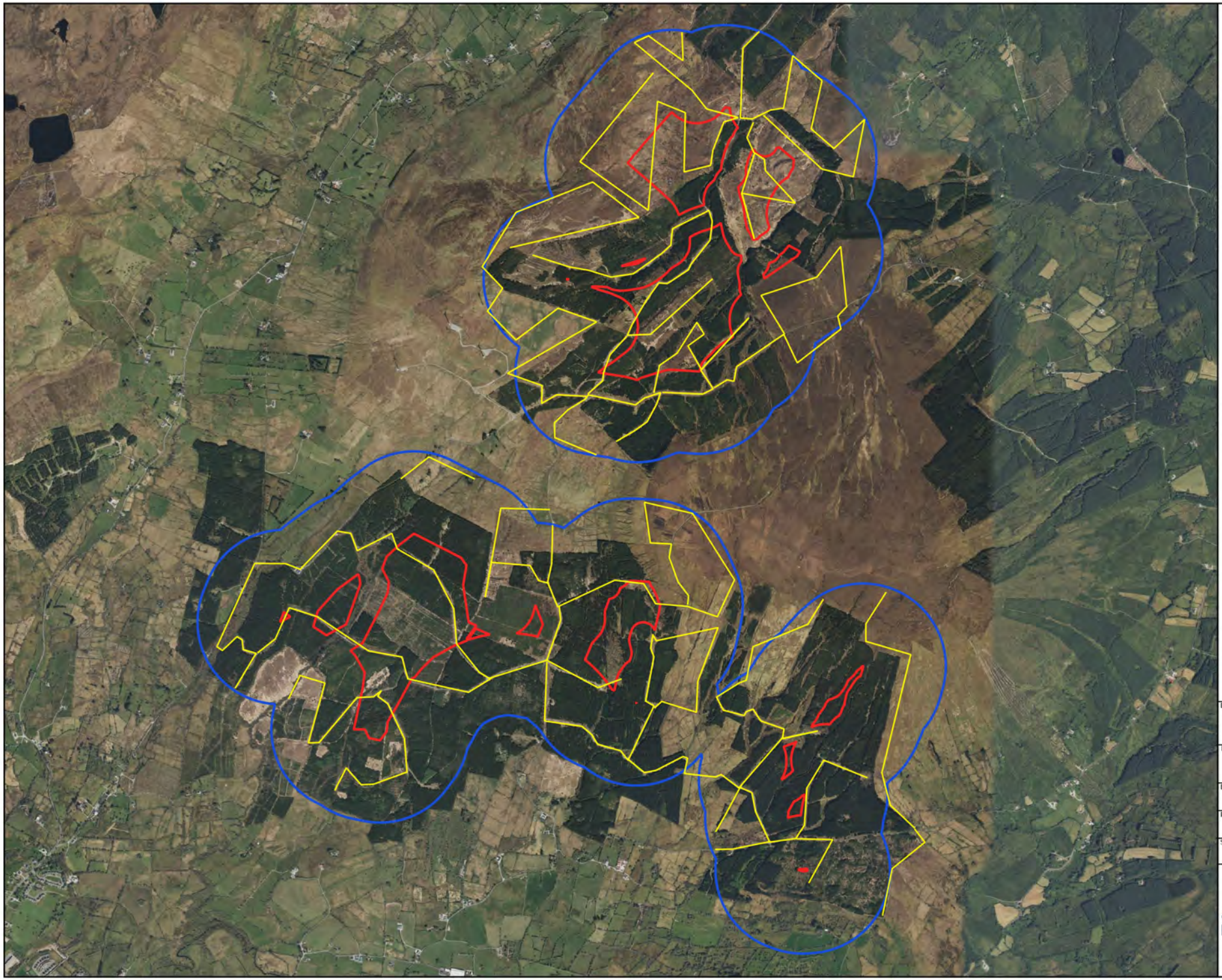

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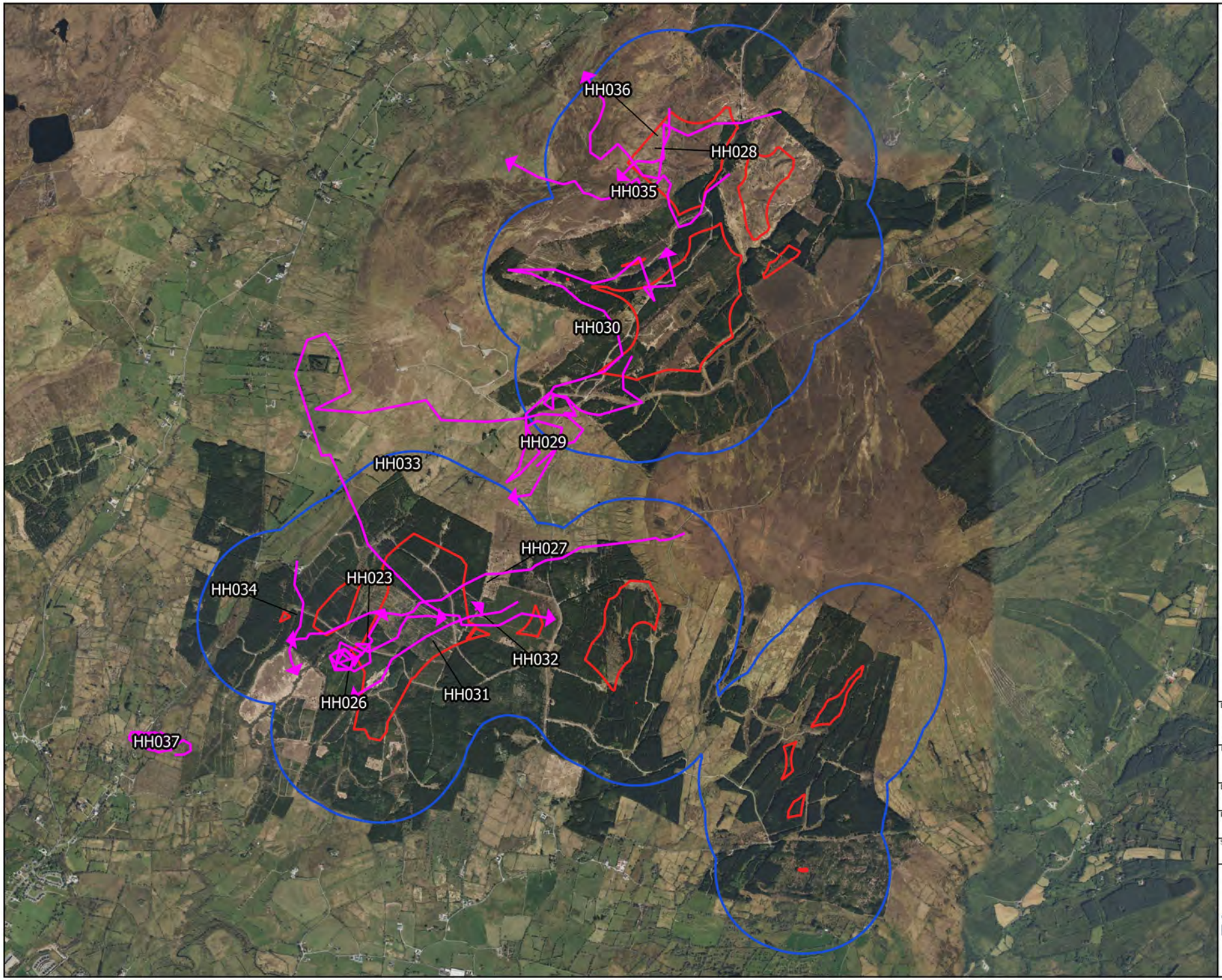

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Hen harrier
Breeding Walkover Observations

Project Title
Lissinagroagh

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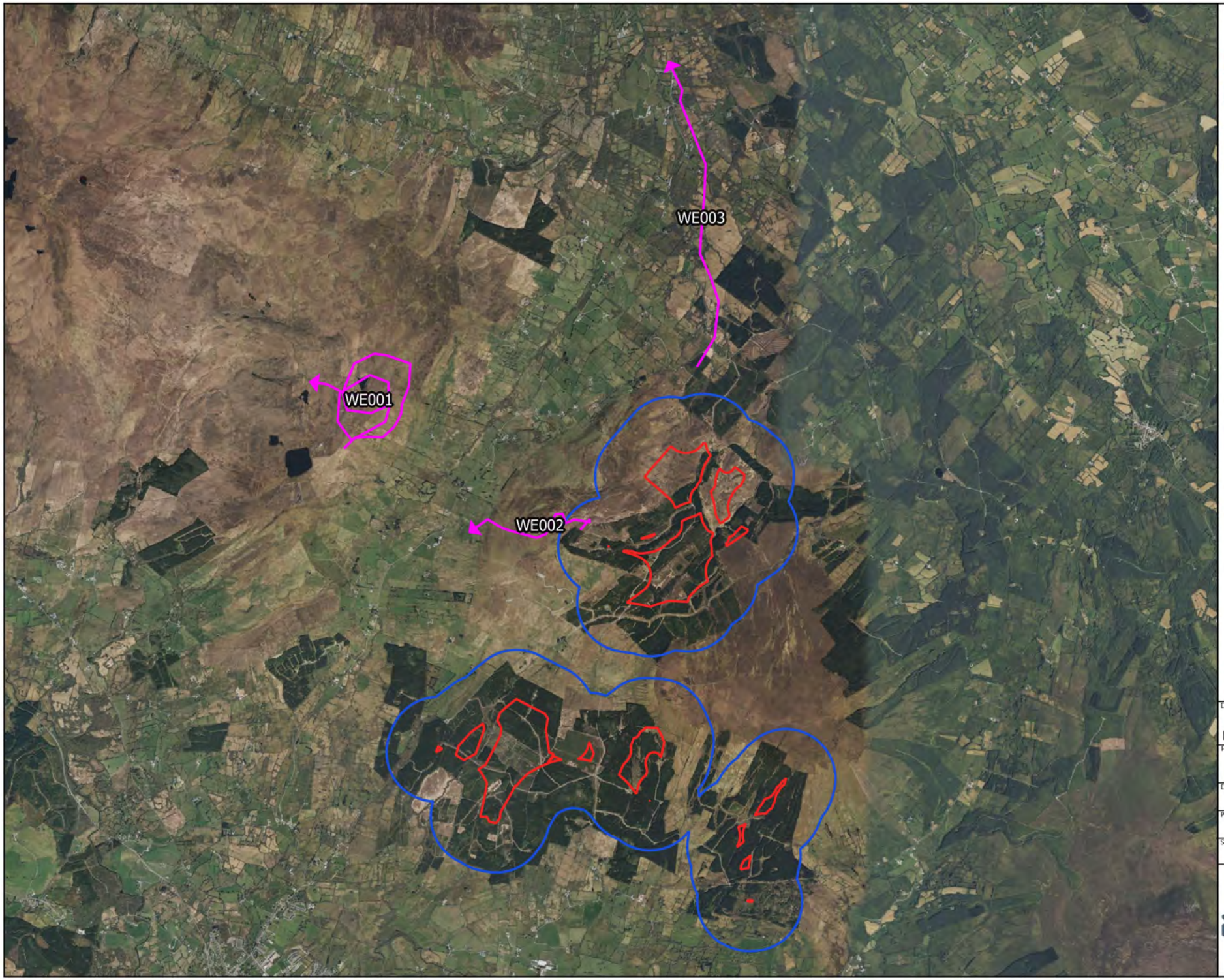

Map Legend

- Site Boundary
- 500m Buffer of Site
- Observation Flightline

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N

Drawing Title
White-tailed eagle
Breeding Walkover Observations

Project Title
Lissinagroagh

Drawn By	
AO'D	
Project No.	Drawing No.
200217-g	Fig 2.2
Scale	Date
1:50000	27.04.23

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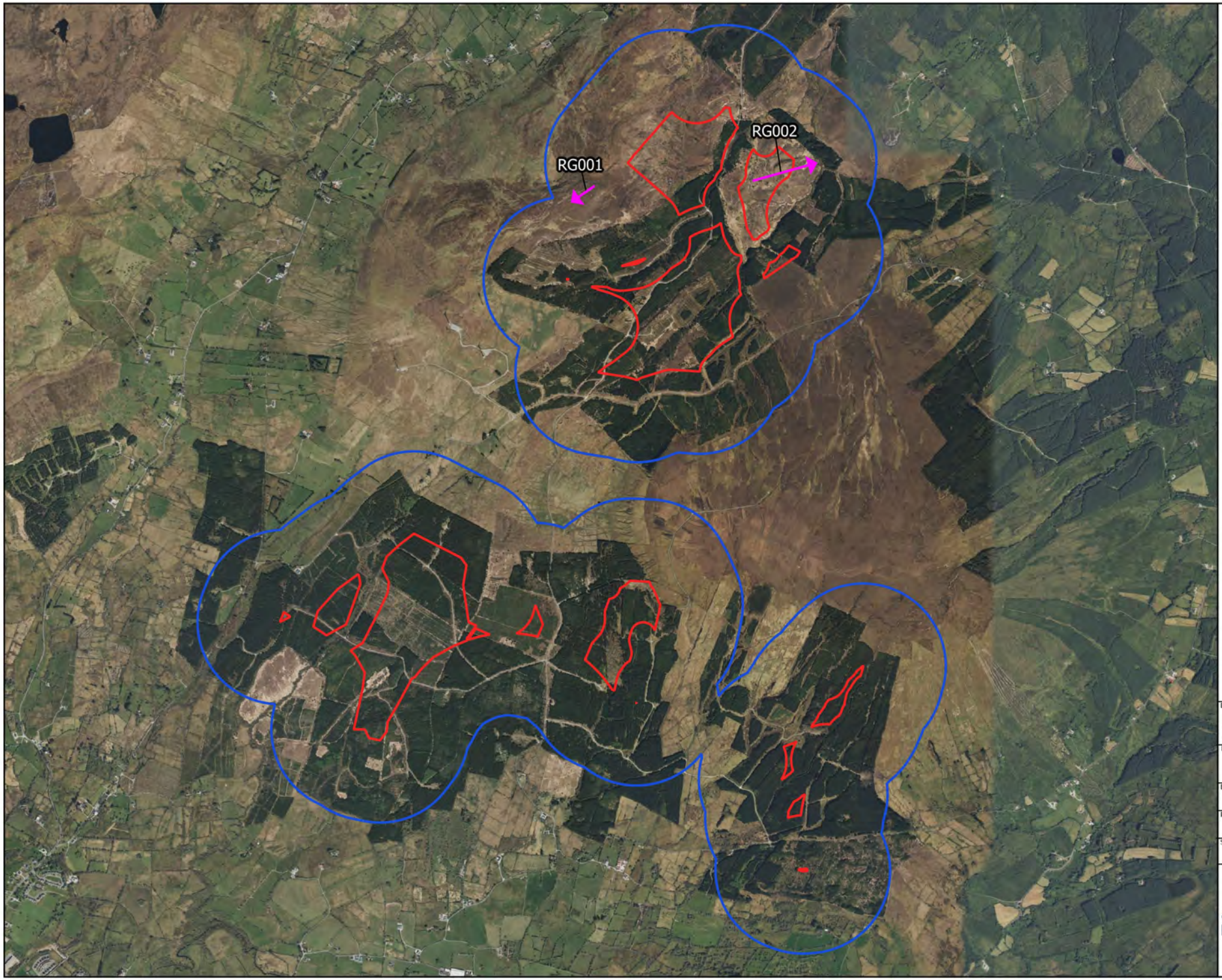

Map Legend

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- 500m Buffer of Site
- Observation Flightline

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Drawing Title
Red grouse
Breeding Walkover Observations

Project Title
Lissinagroagh

Drawn By	
AO'D	
Project No.	Drawing No.
200217-g	Fig 2.3
Scale	Date
1:30000	27.04.23

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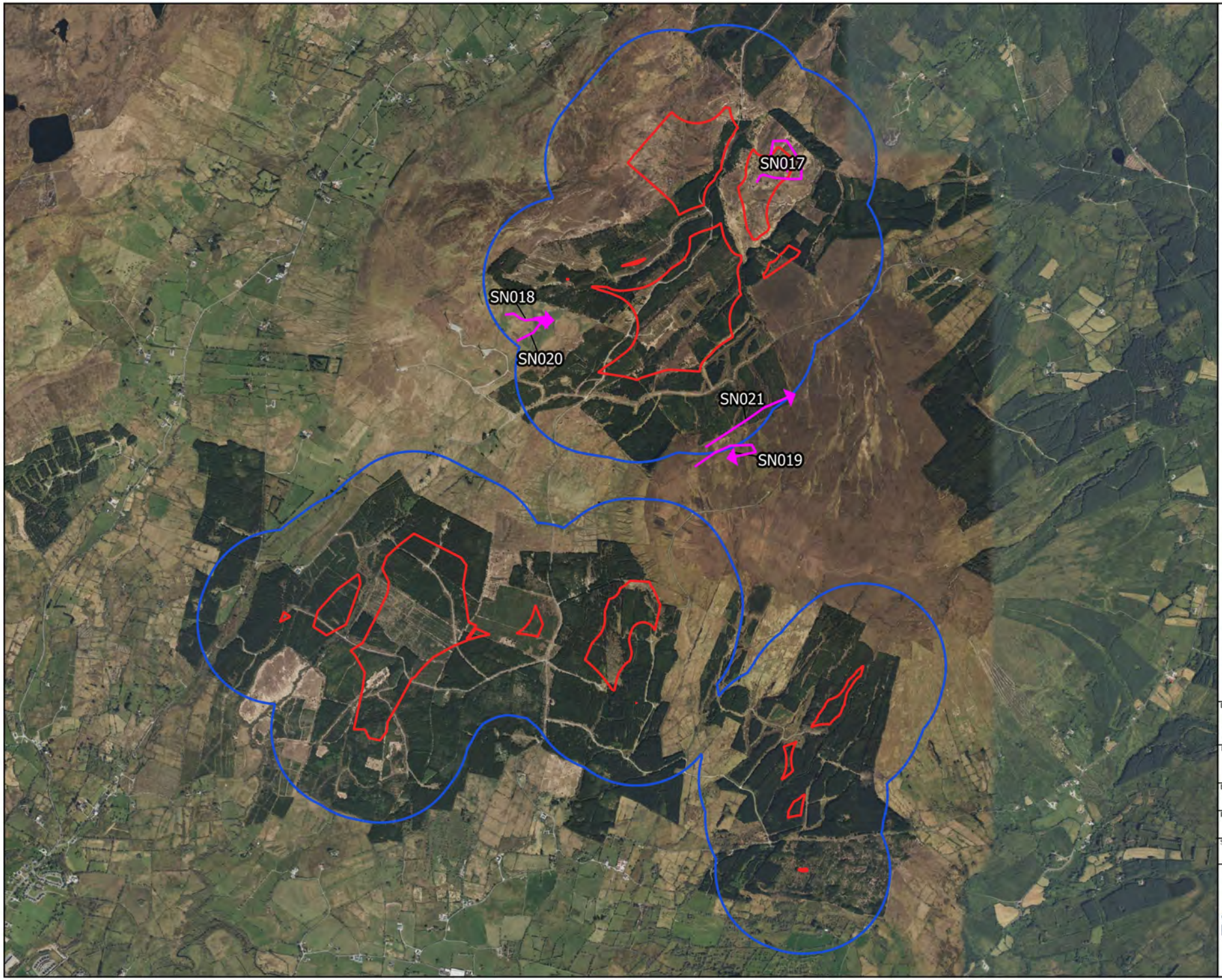

Map Legend

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- 500m Buffer of Site
- Observation Flightline

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Drawing Title
Snipe
Breeding Walkover Observations

Project Title
Lissinagroagh

Drawn By	
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Project No.	Drawing No.
200217-g	Fig 2.4
Scale	Date
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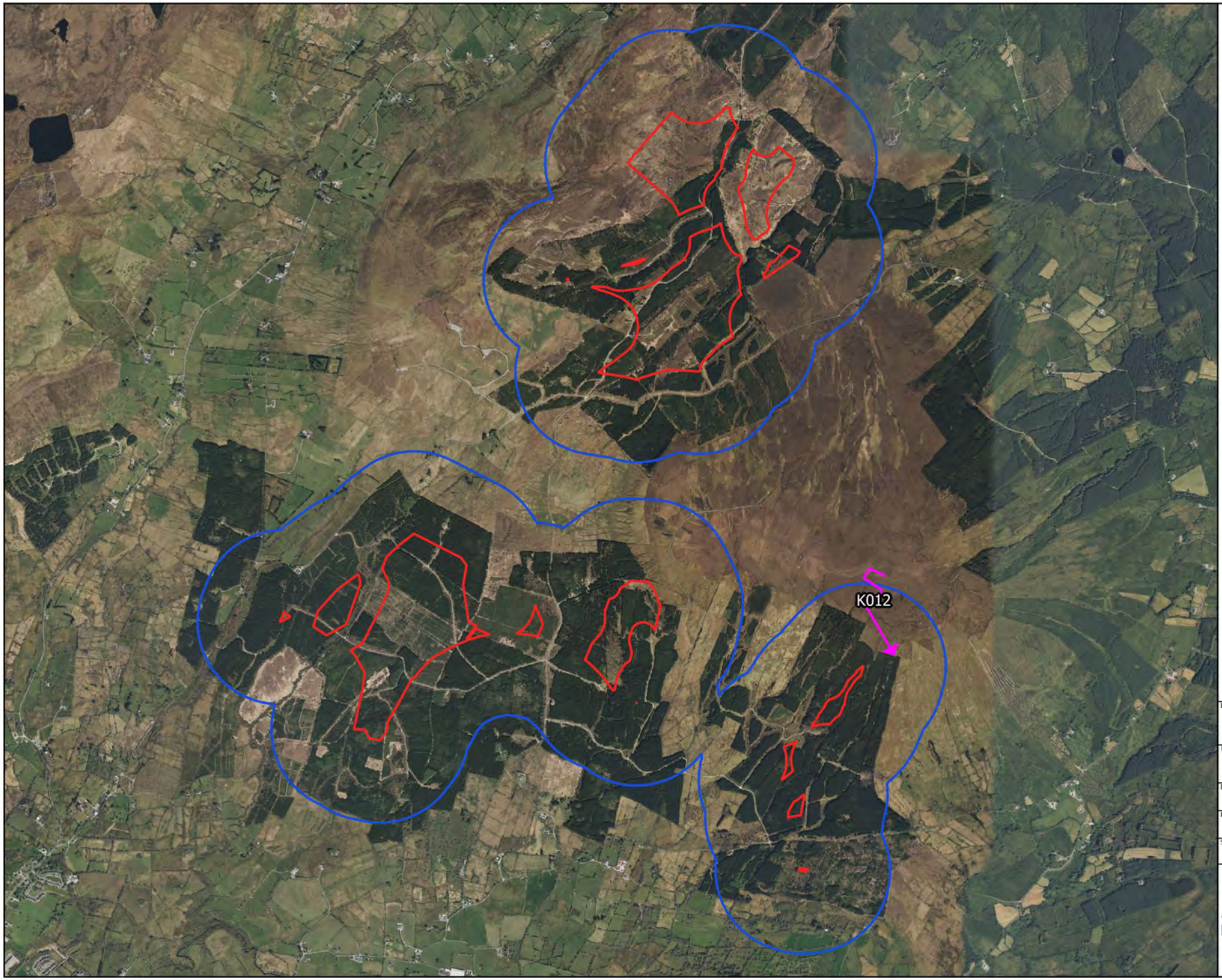

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- Observation Flightline

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Drawing Title
Kestrel
Breeding Walkover Observations

Project Title
Lissinagroagh

Drawn By	
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Project No.	Drawing No.
200217-g	Fig 2.5
Scale	Date
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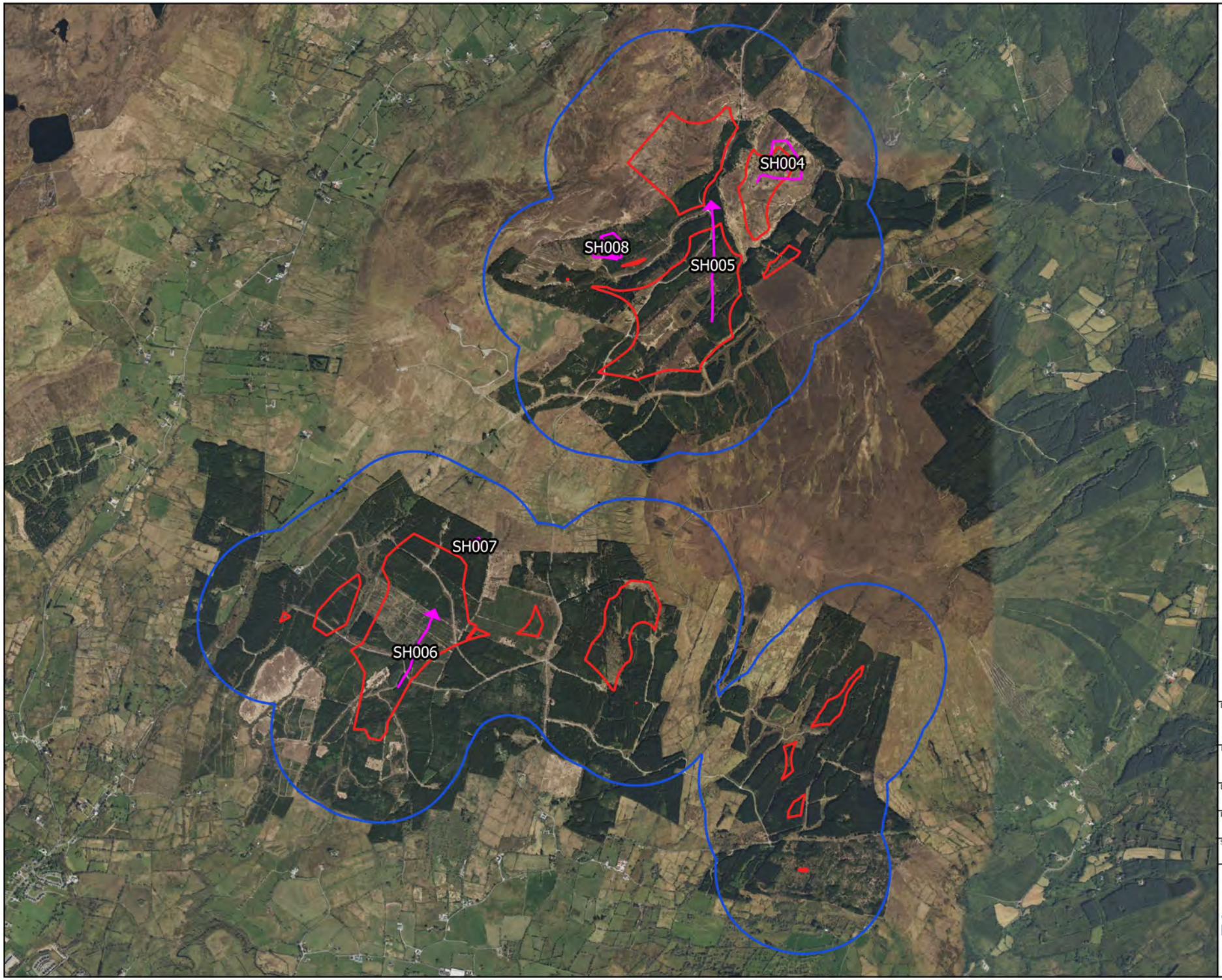

Map Legend

- Site Boundary
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- Observation Flightline

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Drawing Title
Sparrowhawk
Breeding Walkover Observations

Project Title
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Drawn By	
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Project No.	Drawing No.
200217-g	Fig 2.6
Scale	Date
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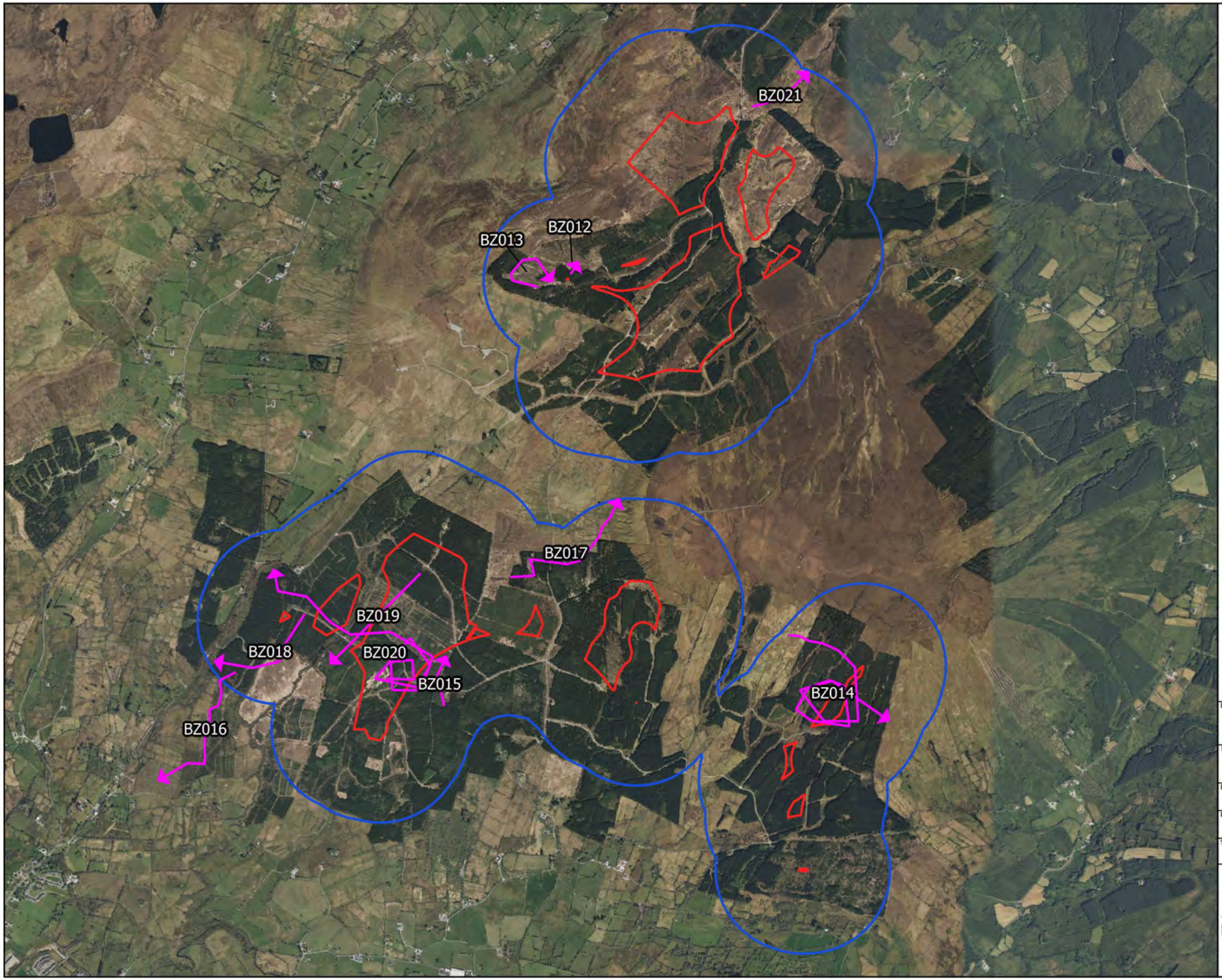

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- Observation Flightline

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Drawing Title
Buzzard
Breeding Walkover Observations

Project Title
Lissinagroagh

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Project No.	Drawing No.
200217-g	Fig 2.7
Scale	Date
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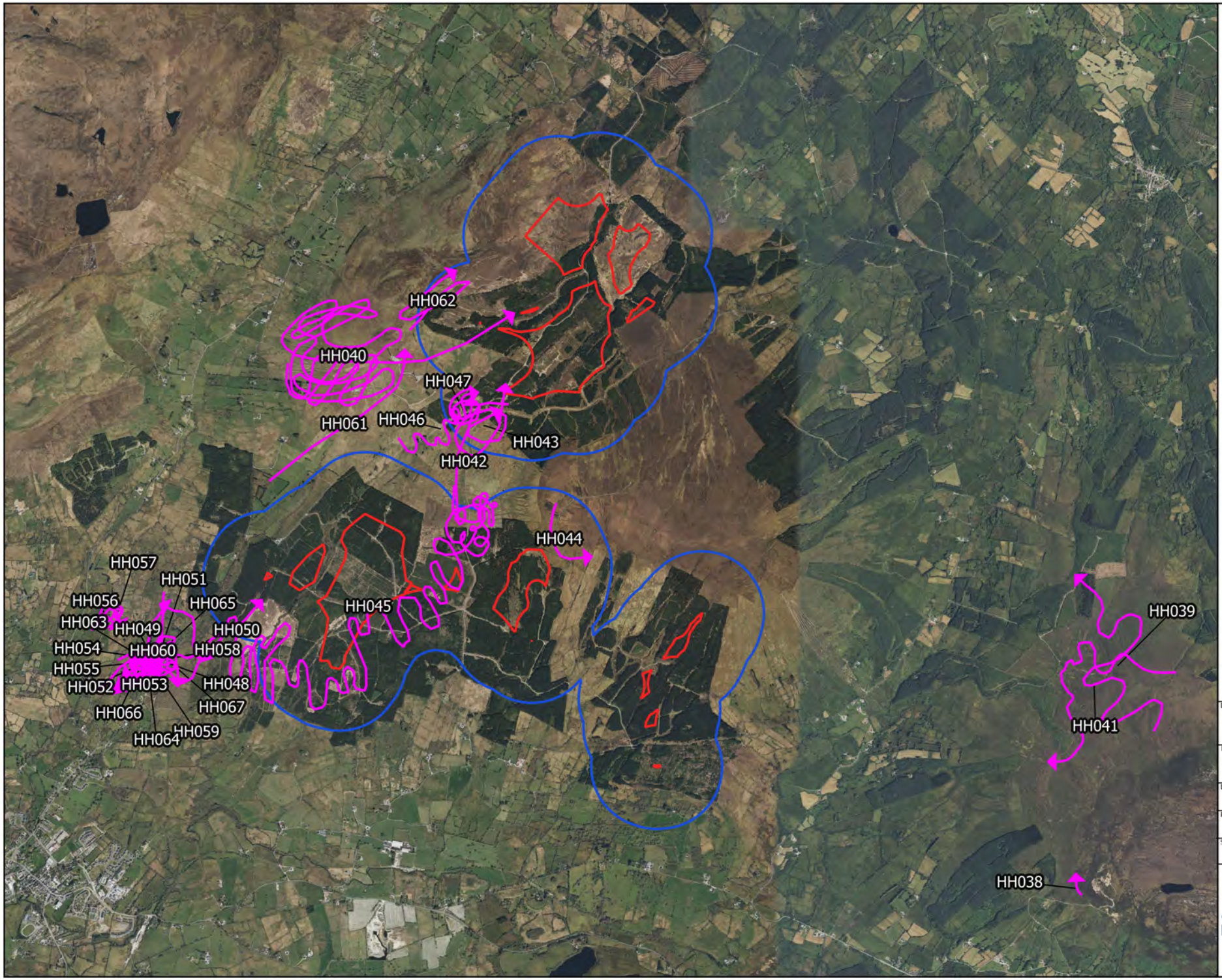

Map Legend

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- Observation Flightline

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Drawing Title	Hen harrier Breeding Raptor Surveys
Project Title	Lissinagroagh
Drawn By	AO'D
Project No.	200217-g
Drawing No.	Fig 3.0
Scale	1:40000
Date	27.04.23

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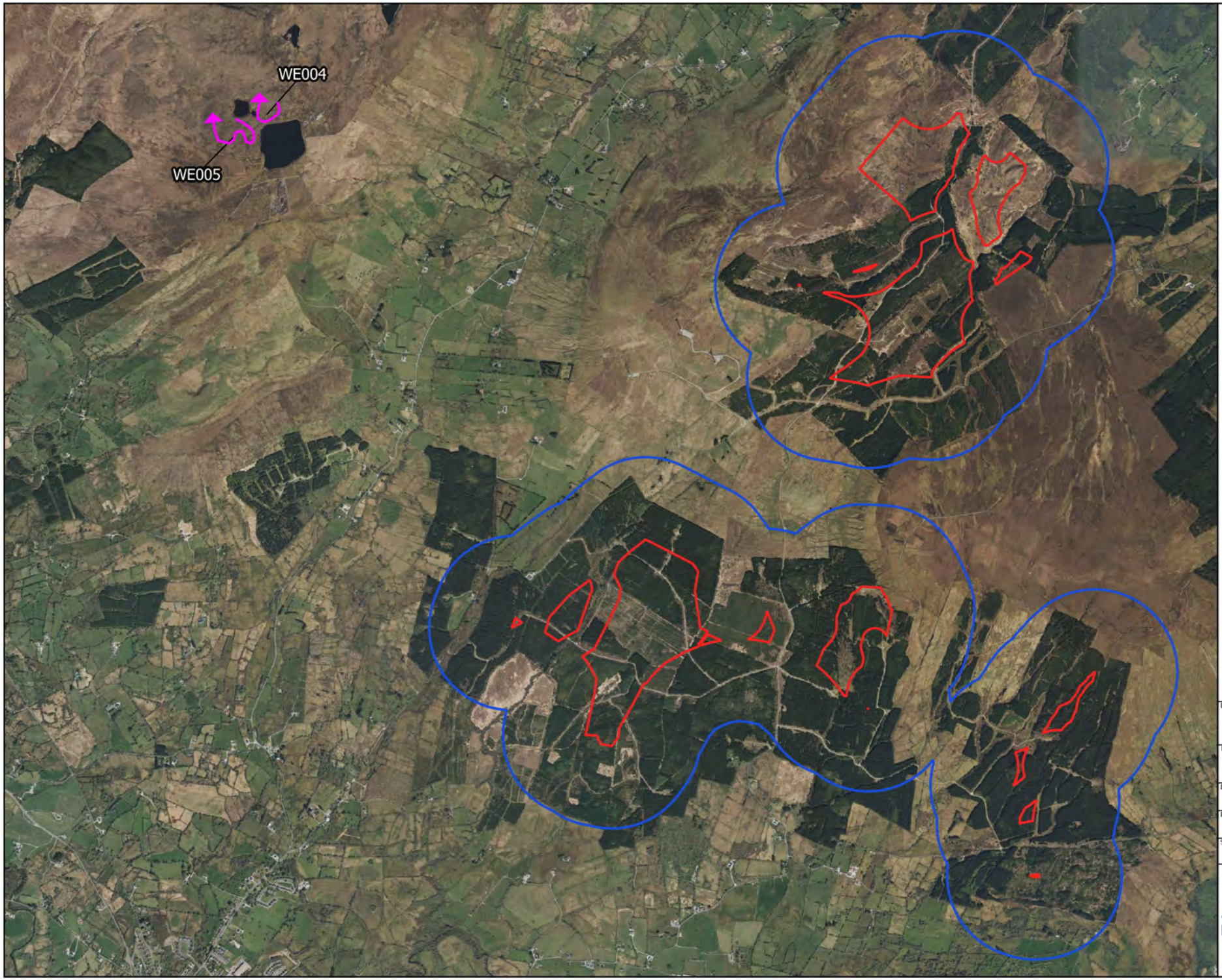

Map Legend

- Site Boundary
- 500m Buffer of Site
- Observation Flightline

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Drawing Title	White-tailed eagle Breeding Raptor Surveys
Project Title	Lissinagroagh
Drawn By	AO'D
Project No.	200217-g
Drawing No.	Fig 3.1
Scale	1:30000
Date	27.04.23

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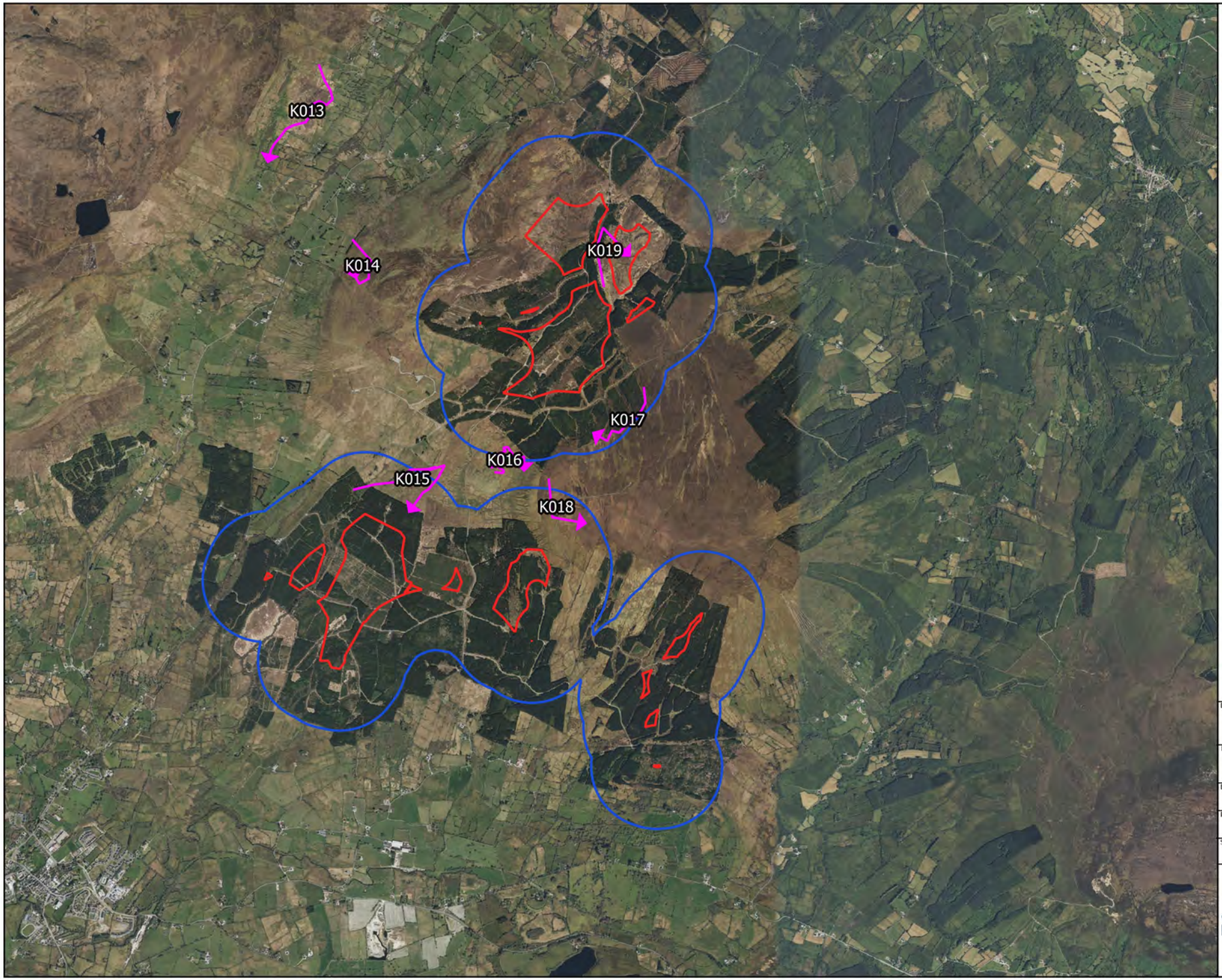

Map Legend

- Site Boundary
- 500m Buffer of Site
- Observation Flightline

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Drawing Title
Kestrel
Breeding Raptor Surveys

Project Title
Lissinagroagh

Drawn By	
AO'D	
Project No.	Drawing No.
200217-g	Fig 3.2
Scale	Date
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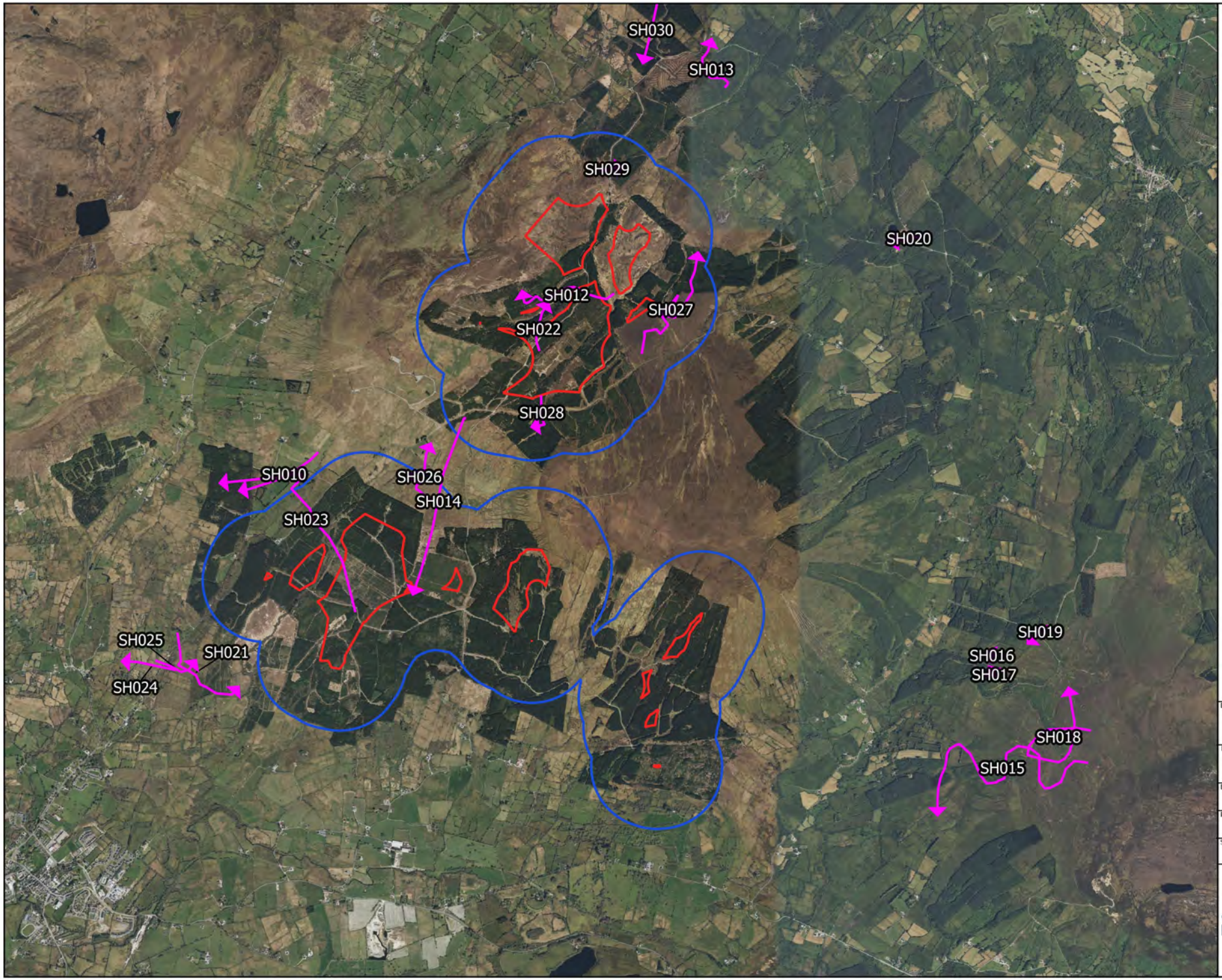

Map Legend

- Site Boundary
- 500m Buffer of Site
- Observation Flightline

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Drawing Title
Sparrowhawk
Breeding Raptor Surveys

Project Title
Lissinagroagh

Drawn By	
AO'D	
Project No.	Drawing No.
200217-g	Fig 3.3
Scale	Date
1:40000	27.04.23

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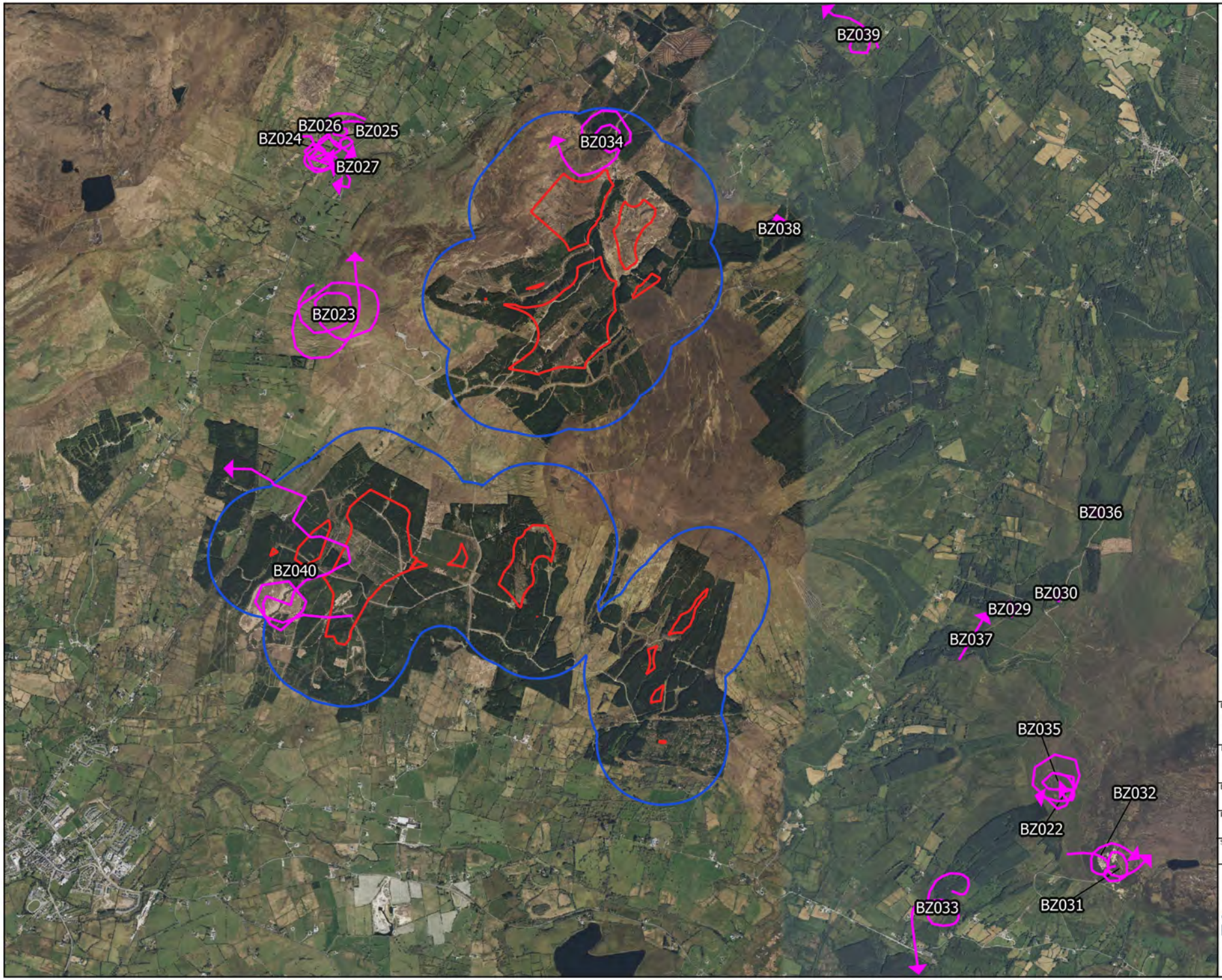

Map Legend

- Site Boundary
- 500m Buffer of Site
- Observation Flightline

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Drawing Title
Buzzard
Breeding Raptor Surveys

Project Title
Lissinagroagh

Drawn By	
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Project No.	Drawing No.
200217-g	Fig 3.4
Scale	Date
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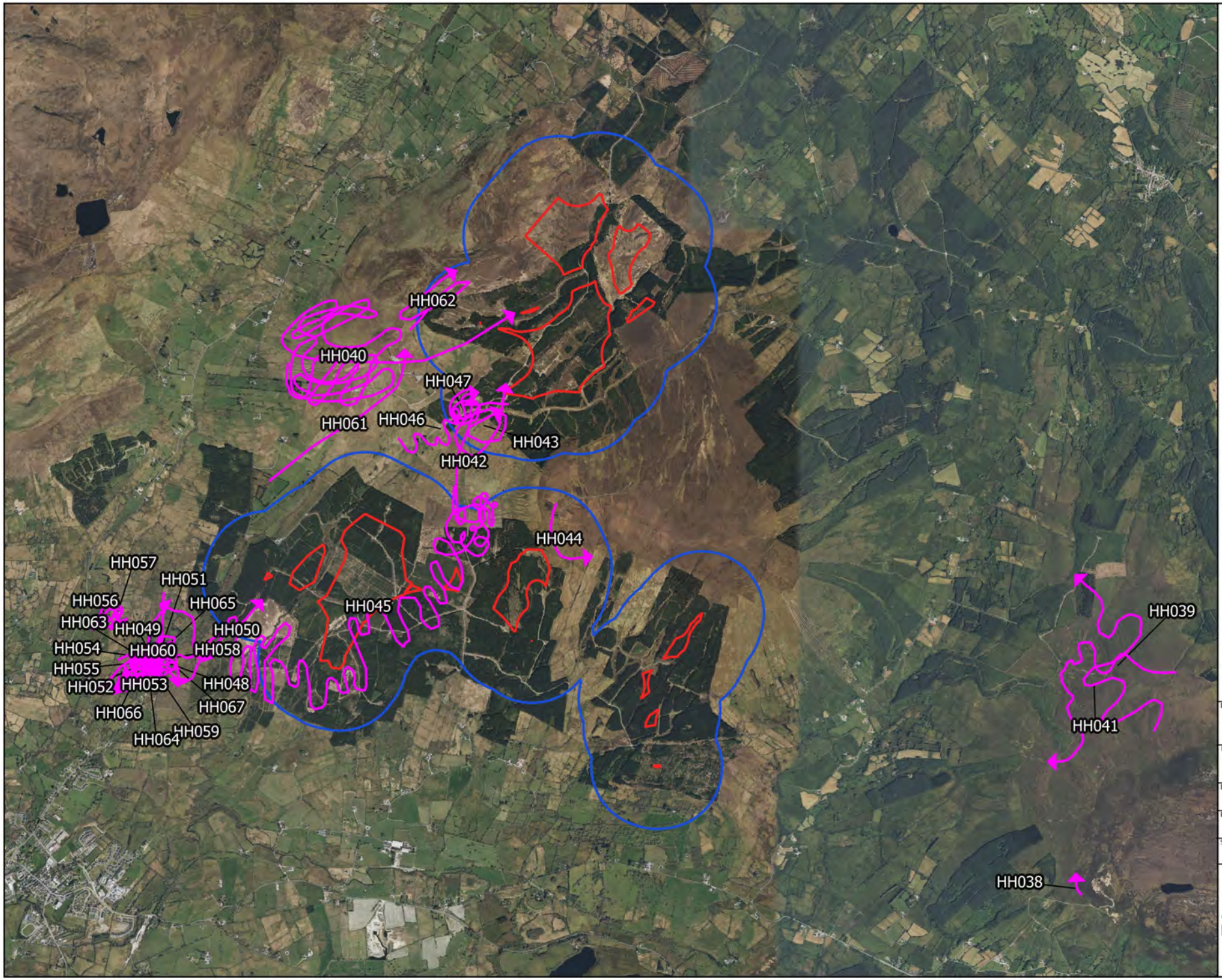

Map Legend

- Site Boundary
- 500m Buffer of Site
- Observation Flightline

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Drawing Title	Hen harrier Breeding Raptor Surveys
Project Title	Lissinagroagh
Drawn By	AO'D
Project No.	200217-g
Drawing No.	Fig 4.0
Scale	1:40000
Date	27.04.23

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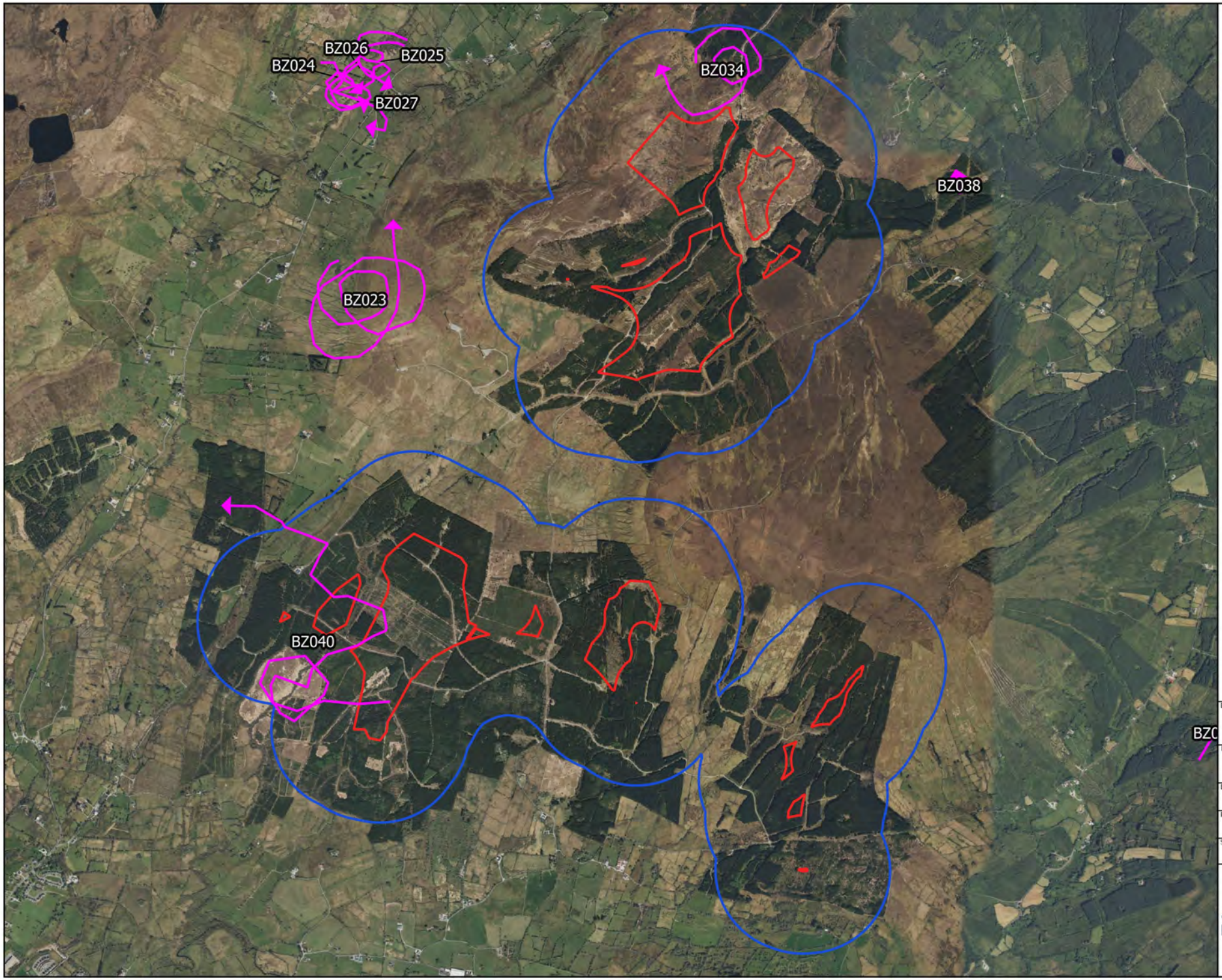

Map Legend

- Site Boundary
- 500m Buffer of Site
- Transects

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N

Drawing Title	Breeding Woodcock Survey Transects
Project Title	Lissinagroagh
Drawn By	AO'D
Project No.	200217-g
Drawing No.	Fig 4.0
Scale	1:30000
Date	27.04.23

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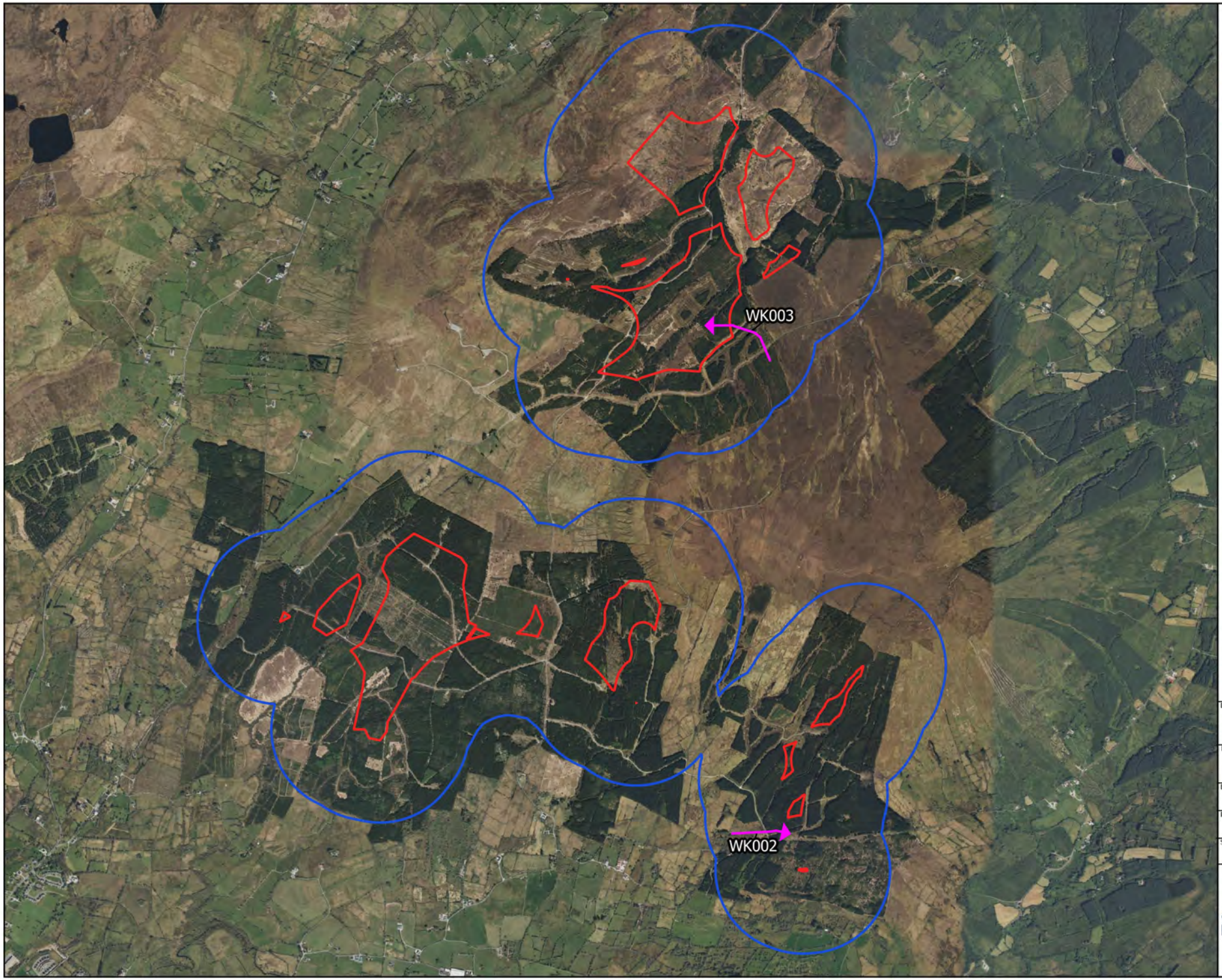

Map Legend

- Site Boundary
- 500m Buffer of Site
- Displaying Woodcock Flightline

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Drawing Title
Woodcock Observations
Breeding Woodcock Survey

Project Title
Lissinagroagh

Drawn By	
AO'D	
Project No.	Drawing No.
200217-g	Fig 4.1
Scale	Date
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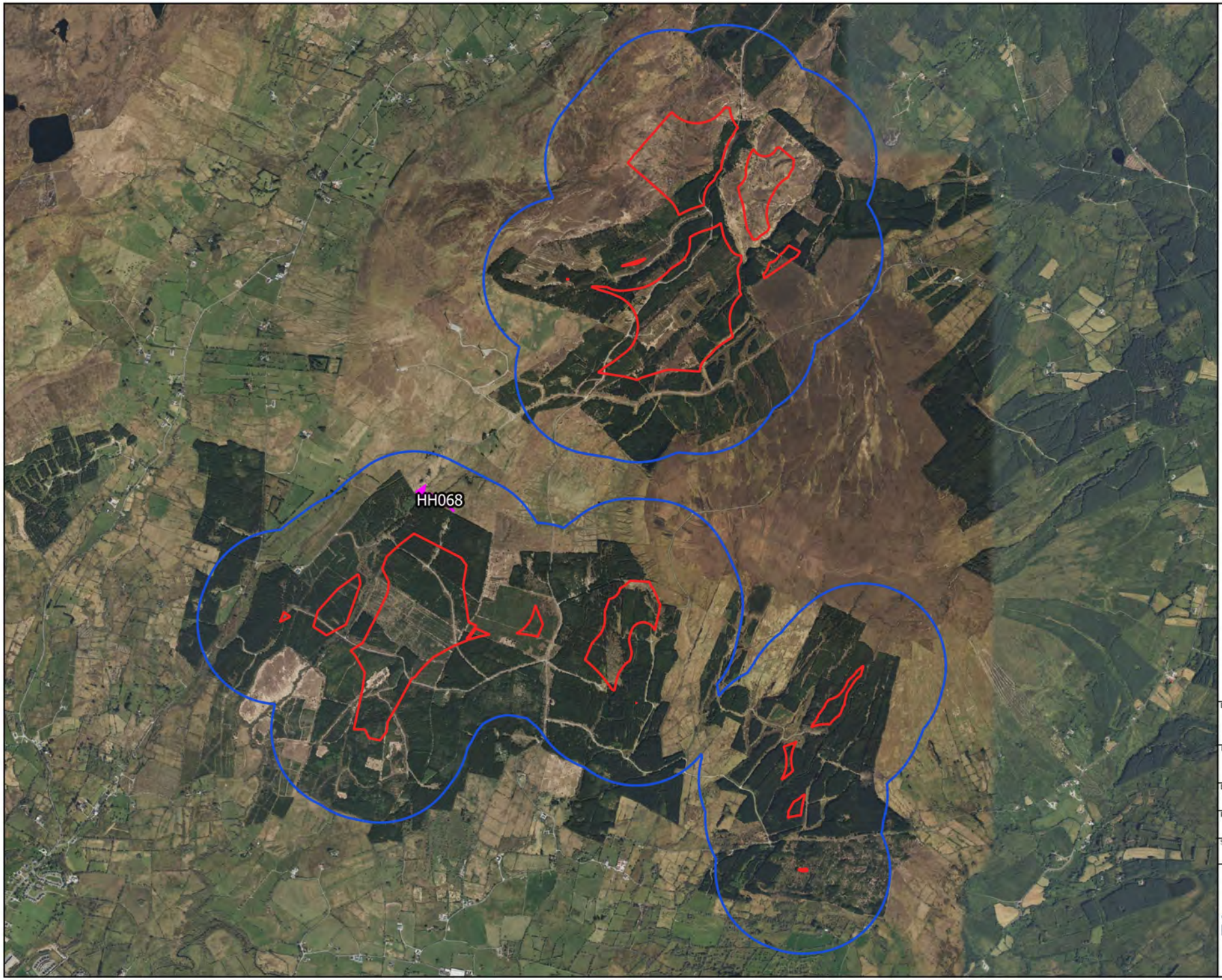

Map Legend

- Site Boundary
- 500m Buffer of Site
- Observation Flightline

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Drawing Title
Hen harrier
Incidental Observations

Project Title
Lissinagroagh

Drawn By	
AO'D	
Project No.	Drawing No.
200217-g	Fig 5.0
Scale	Date
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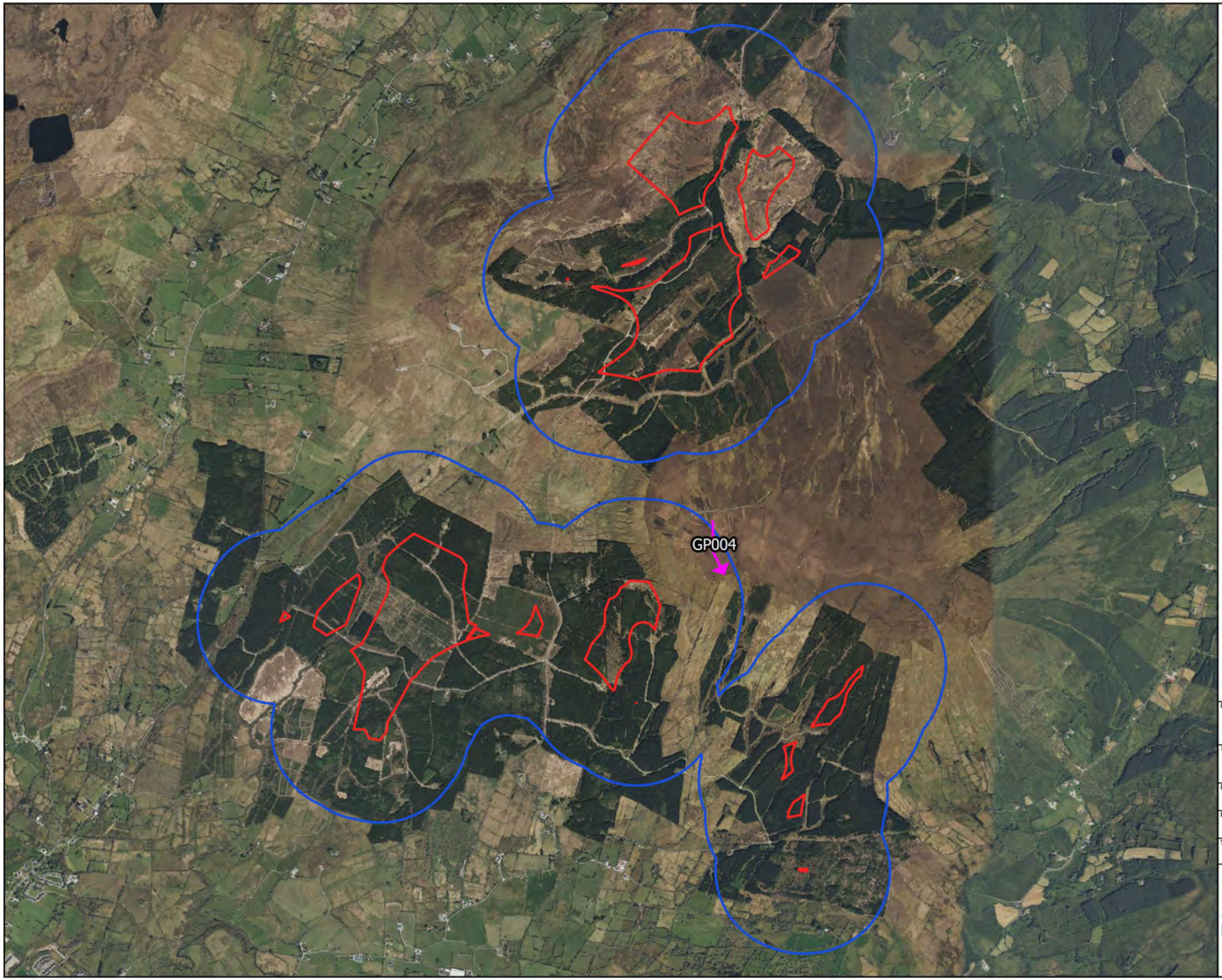

Map Legend

- Site Boundary
- 500m Buffer of Site
- Observation Flightline

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Drawing Title
Golden plover
Incidental Observations

Project Title
Lissinagroagh

Drawn By	
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Project No.	Drawing No.
200217-g	Fig 5.1
Scale	Date
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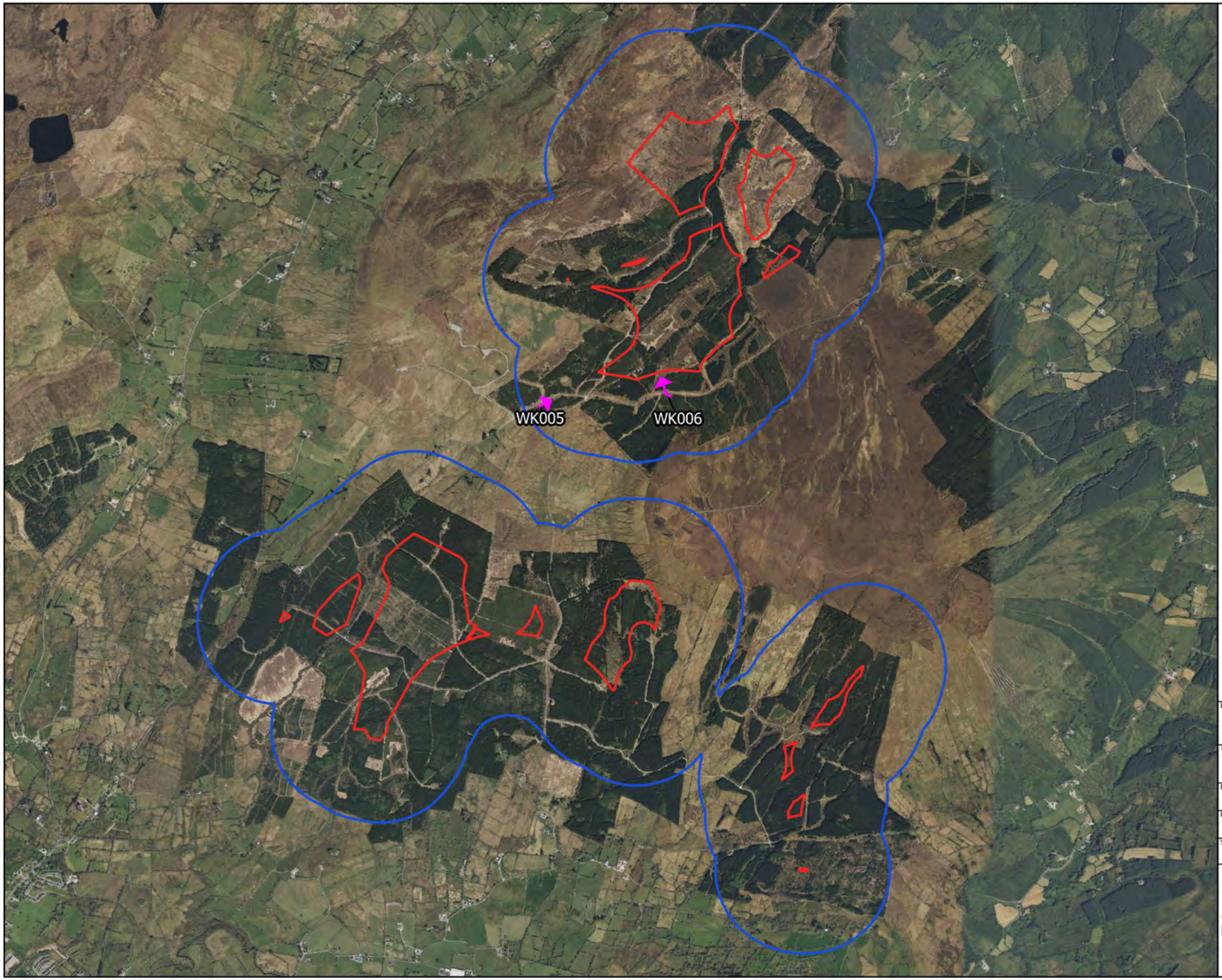

Map Legend

- Site Boundary
- 500m Buffer of Site
- Observation Flightline

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Drawing Title
Woodcock
Incidental Observations

Project Title
Lissinagroagh

Drawn By	
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Project No.	Drawing No.
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Scale	Date
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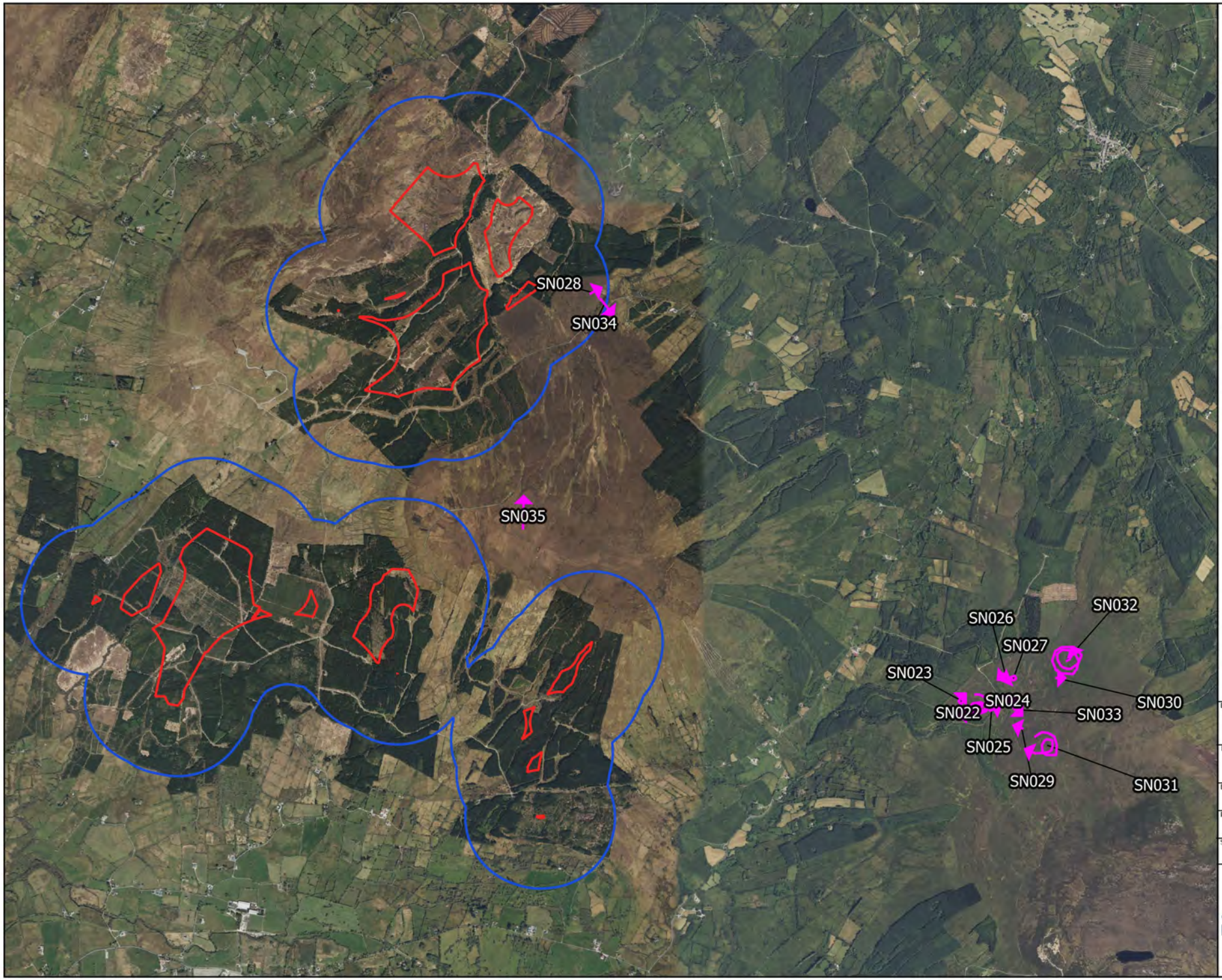

Map Legend

- Site Boundary
- 500m Buffer of Site
- Observation Flightline

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N

Drawing Title	Snipe Incidental Observations
Project Title	Lissinagroagh
Drawn By	AO'D
Project No.	200217-g
Drawing No.	Fig 5.3
Scale	1:35000
Date	27.04.23

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APPENDIX 3

CONFIDENTIAL APPENDIX

Appendix 6-7

Bird Survey Report Breeding 2023

Planning and Environmental Consultants

Breeding Bird Survey Report 2023

Lissinagroagh Wind Farm, Co. Leitrim



DOCUMENT DETAILS

Client:	**FuturEnergy Ireland**
Project Title:	**Lissinagroagh Wind Farm, Co. Leitrim**
Project Number:	**200217-h**
Document Title:	**Breeding Bird Survey Report 2023**
Document File Name:	**FEI Lissinagroagh Breeding Bird Surveys End of Season Report 2023 – F1- 24_10_24 200217-h**
Prepared By:	**MKO** **Tuam Road** **Galway** **Ireland** **H91 VW84**

Planning and Environmental Consultants

Rev	Status	Date	Author	Approved By
01	Final	24/10/24	AO'D	PC

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1. SUMMARY

Ornithological surveys have been undertaken at the site of Lissinagroagh Wind Farm, Manorhamilton, Co. Leitrim since 2018. This report outlines the findings from surveys completed during the 2023 breeding season. The following surveys were undertaken:

- Vantage Point Surveys (VPs)
- Breeding Raptor Surveys
- Foraging Vantage Point Surveys (FVPs)

The key observations during surveys relate to breeding hen harrier. Hen harrier was recorded frequently, with multiple birds present, and a pair were confirmed nesting approximately 800m from the site boundary. A second pair were also present in the study area with probable breeding behaviour recorded, however a second nest site was not identified.

2. INTRODUCTION

MKO was appointed to carry out ornithological surveys at Lissinagroagh Wind Farm, Manorhamilton, Co. Leitrim (hereafter "the site") for the 2023 breeding season. This report describes the survey methods and findings for the period April 2023 to September 2023 inclusive.

2.1 Site Description

The site is located north of Manorhamilton (Grid Ref: X 591484.00 Y 842226.00). The dominant habitat on site is forestry, upland blanket bog and rough grassland. The wider surroundings are predominantly upland blanket bog, rough grassland, forestry, and improved agricultural grassland.

2.2 Details of Proposed Development

Appendix 1 Figure 1-0 shows the wind farm site boundary, based on the most up to date 14 turbine layout.

2.3 Purpose of this Report

This report describes the ornithological survey methods employed, and survey data collected at Lissinagroagh Wind Farm for the period April 2023 to September 2023 inclusive. It does not include an assessment or discussion of the potential impacts of the proposed development on birds. Instead, this report aims to provide robust baseline ornithological survey data for the breeding period. This data will be used to inform a separate ecological impact assessment and appropriate assessment for the proposed wind farm.

2.4 Relevant Legislation

The following key legislative provisions are applicable to wild birds in Ireland: Irish Wildlife Acts 1976 to 2022.; the European Union Birds Directive (EU Directive 2009/147/EC on the conservation of wild birds); the European Communities (Birds and Natural Habitats) Regulations 2011, as amended (S.I. no. 477 of 2011) and the International Convention on Wetlands of International Importance (the Ramsar Convention), 1971.

3. METHODS

3.1 Scope

3.1.1 Description of Study Area

The ornithology study area was defined as a 500m radius of the viable area for turbines (see Figure 1.0). This boundary accounts for both detecting birds that use the wind farm site occasionally and spatial inaccuracies in observational data, as well as ancillary structures. The ornithology study area was used for vantage point surveys, following Scottish Natural Heritage (SNH; now NatureScot) 2017 guidance (SNH, 2017) that flight activity surveys encompass an area extending 500m beyond the potential outermost proposed turbines. A 5km radius of the ornithology study area boundary was used for breeding raptor surveys, based on the core foraging range of hen harrier, which this area is known to support. The novel foraging vantage point surveys (FVPs) were located at nest site/sites as they were located, irrespective of the windfarm site boundary.

3.1.2 Ecological Features Considered

Ecological features considered in the scope of the surveys were the habitats present on the site and hinterland, as reviewed by aerial photography and reconnaissance visits, and the Special Protection Areas (SPA) designated under the Birds and Habitats (92/43/EEC) Directives Natura 2000 network within foraging range for SCI species and/or 15km of the site. Bird species' of conservation interest were also considered, including those listed on Annex I of the Birds Directive that occur in Ireland, species that are a Special Conservation Interest (SCI) of SPAs within foraging range for SCI species and/or 15km of the site, species on the Red List of Birds of Conservation Concern in Ireland (Gilbert *et al.*, 2021) and all raptor species that occur in Ireland, because these species are particularly sensitive to wind farm developments.

3.1.3 Consultation

MKO undertook a consultation exercise to inform the scope of the surveys. Table 3-1 provides a list of the organisations consulted and notes where responses have been received.

Table 3-1 Consultation Response Summary

No.	Consultee	Response to Consultation
1	BirdWatch Ireland	No Response
2	National Parks and Wildlife Service (NPWS)	Initial response received 18/06/2018. Confirmation received 30/12/2019 from NPWS that no more recent information was available.

3.2 Desk Study

A comprehensive desk study was undertaken in 2019 to search for any relevant information on species of conservation concern which potentially use the site. The assessment included a thorough review of the available ornithological data including:

- Review of sites designated for birds.
- Review of breeding bird atlases (Balmer *et al.*, 2013).
- Review of Birds of Conservation Concern (BoCCI) in Ireland 2020-2026 (Gilbert *et al.* 2021).
- Review of specially requested records from the NPWS Rare and Protected Species Database. An information request was sent to the NPWS requesting records from the Rare and Protected Species Database.

- Review of the 2015 National Survey of Breeding Hen Harrier in Ireland Report (Ruddock *et al.*, 2016).

3.3 Field Surveys

The approach to breeding bird surveys for the proposed wind farm is based on recommendations given in SNH (2017). This guidance is recognised as standard good practice guidance throughout the UK and Ireland for surveying birds to inform impact assessment for onshore wind farms. Field surveys were undertaken from April 2023 to September 2023 inclusive. Individual survey types are described below.

3.3.1 Flight Activity Surveys

Vantage point surveys were undertaken following the guidance of SNH (2017) from four vantage point locations during the 2023 breeding season. Vantage point surveys aim to quantify the flight activity of primary and secondary 'target species' within the study area. The main purpose of vantage point surveys is to collect data on primary target species that will enable estimates to be made of:

- The time spent flying over the site.
- The relative use by birds of different parts of the site.
- The proportion of flying time spent within the provisional upper and lower risk height limits as determined by the potential rotor diameter and rotor hub height.
- The analysis of the potential risk of collision of birds with rotating turbines.

Vantage Point Locations and Viewshed Analysis

Viewshed analysis was carried out to confirm the sufficiency of the chosen vantage point locations (VP1 at ITM X592930 Y842236, VP2 at ITM X592615 Y842428, VP3 at ITM X593496 Y843692 and VP4 at ITM X 590407 Y 840997). The initial viewshed analysis was conducted in 2018 and reviewed in 2020. Viewsheds were calculated using Resoft Wind Farm ZTV (Zone of Theoretical Visibility) software in combination with MapInfo Professional (Version 10.0) using a notional layer suspended at 25m, which is representative of the minimum height considered for the Potential Collision Risk Area based on the turbine model at the time the vantage point locations were selected. Note that while the relevance of being able to view as much of the site to ground level is acknowledged, the SNH guidance emphasises the importance of visibility of the 'collision risk volume' when the data is to be used to estimate the risk of collision with turbines by birds. Therefore, the viewshed analysis aims to identify the most suitable locations to site vantage points such that the airspace of the turbine rotor swept area is in view using the fewest possible number of vantage points. The vantage point locations were tested for visibility coverage by creating a viewshed point 1.75m in height (to represent the height of observer) on a map using 10m contours terrain data. The relative height of any surrounding trees and its effects on visibility is also accounted for in the analysis. Using the ZTV software, a viewshed of 360° was produced calculating an area 25m from ground level up to a 2km radius. The resulting viewshed image was then cropped to 180° to give the viewshed.

Survey Effort

A total of 36 hours of watches was undertaken at each of the four vantage point locations from April to September 2023 inclusive. This equates to a total of six hours per vantage point per month. Survey effort undertaken during the 2023 breeding season is summarised in Table 3-2 and full details are presented in Appendix 2 of this report, including dates, times, duration, and weather conditions. A map of the vantage point locations if provided in Appendix 1 Figure 1.0.

Table 3.2 Summary of vantage point survey effort undertaken at the proposed Lissinagroagh Wind Farm from April 2023 to September 2023.

	VP1 ITM [1] X 592930 Y 842236	VP2 ITM X 592615 Y 842428	VP3 ITM X 593496 Y 843692	VP4 ITM X 590407 Y 840997
Month	**Hours**			
April	13/4/23 6 hours	20/4/23 6 hours	20/4/23 6 hours	27/4/23 6 hours
May	31/5/23 6 hours	30/5/23 6 hours	18/5/23 6 hours	10/5/23 6 hours
June	21/6/23 6 hours	N/A	N/A	N/A
July	17/7/23 6 hours	11/7/23 6 hours 20/7/23 6 hours	12/7/23 6 hours	13/7/23 6 hours
August	9/8/23 6 hours	18/8/23 6 hours	17/8/23 6 hours 30/8/23 6 hours	16/8/23 6 hours 29/8/23 6 hours
September	29/9/23 6 hours	21/9/23 6 hours	22/9/23 6 hours	19/9/23 6 hours
Total Hours	**36:00**	**36:00**	**36:00**	**36:00**

Primary Target Species

The target species for vantage point surveys were defined by legal and/or conservation status, following SNH (2017) guidance, which states that "*in most circumstances the target species will be limited to those species which are afforded a higher level of legislative protection.*" A list of primary target species was draw from the following sources:

- Species that are SCIs of the SPAs within 15km of the site.
- Species listed on Annex I of the Birds Directive that occur in Ireland.
- Species listed on the Red List of Birds of Conservation Concern in Ireland (Gilbert *et al.*, 2021) with the exception of Red List passerines, as these are generally not significantly impacted by wind energy developments.

Secondary Target Species

SNH (2017) also states that "*local circumstances may indicate that survey information should also be acquired on other species, especially those of regional conservation concern*". A list of secondary target species comprised:

- All other waterbirds that occur in Ireland that are not included as primary target species.
- All raptors that occur in Ireland that are not included as primary target species.

Data Collection

Data on bird observations and flight activity was collected by the surveyor by scanning the arc of 180° and a 2km radius from the fixed location. Surveys were scheduled to provide a spread over the full daylight period including at dawn and dusk (starting or ending an hour before dawn or an hour after dusk on alternate months for April, May, August, and September) to coincide with the highest peaks of bird activity and to record any wildfowl migration or crepuscular species. Breaks of at least 30 minutes were taken every 3 hours to minimise observer fatigue. A 10-minute settling in period was allowed for at the start of each

[1] Irish Transverse Mercator Co-Ordinates

vantage point to allow the surveyor to get into place, and to minimise the impact of surveyor disturbance on flight activity. For each primary target species observation, the following details were recorded:

- Date, time, and location of observation.
- Number of species recorded.
- Total duration of flightline observation.
- Duration at each of flightline at each height band.
- Species age and sex (where determinable).
- Habitat(s).
- Behaviour.

Recording height bands were determined based on the likely turbine specifications under consideration at the time of survey (upper tip height 175m and lower tip height 25m). Flight heights were attributed to four distinct height bands as follows:

- Band 1 = 0 - 15m (below the likely rotor swept area).
- Band 2 = 15 - 25m (potentially within the likely rotor swept area, at least in part).
- Band 3 = 25 - 175m (within the likely rotor swept area, potential collision height, PCH).
- Band 4 = >175m (above the likely rotor swept area).

Although recording of secondary species is subsidiary to recording of primary target species, secondary target species were also recorded to provide an index of flight activity for secondary target species within the site.

3.3.2 Foraging Vantage Point Surveys

Foraging vantage point surveys (FVPs) were undertaken to provide additional information on foraging areas utilised by hen harrier breeding in the study area. FVPs were selected based on the number of nests located and the available viewshed in each case. Given the large core foraging area of birds and the extensive effort required to cover all potential foraging areas simultaneously, it was decided the nest sites would be directly observed and all visible activity recorded to provide as much information on areas utilised for foraging as possible given limitations on survey effort. Surveys were carried out during daylight hours and in accordance with peak activity hours for the species where possible. Surveys lasted from 3 to 6 hours.

FVPs began in June 2023 once a nest site had been identified to the south and continued into August 2023 when breeding birds had left the area. The single nest site identified was surveyed from two FVPs. Two FVPs were required to monitor all routes to and from the nest adequately. On each occasion a bird was observed its flight path was followed until it was lost from view. The key undertaking during these observations was to identify the areas utilised by foraging hen harrier. For each hen harrier observation, the following details were recorded:

- Flightline including direction of flight.
- Date, time, and location of observation.
- Number of species recorded.
- Species age and sex (where determinable).
- Habitat(s).
- Behaviour.

FVP locations are presented in Appendix 1 Figure 3.0.

3.3.3 Breeding Raptor Surveys

Breeding raptor (i.e. birds of prey) surveys were undertaken to identify occupied raptor territories and ascertain whether breeding was successful. Surveys were carried out during the core breeding season period from April to August 2023.

Methodology followed Hardey *et al.* (2013). Surveys involved a combination of raptor vantage point watches of 3 hours and transects in areas deemed most likely to hold breeding raptors based on habitat and observed movements of raptor species in the study area. There were 21 breeding raptor survey locations. Once breeding activity was observed, vantage point and transect locations were adjusted with the aim of pinpointing breeding locations. Each breeding raptor survey location was visited four times to complete a full round of breeding season surveys. The purpose of the four visits is (1) to establish occupancy, (2) to establish active nests, (2) to check for chicks and (4) to check for fledglings. Timings of these visits vary by species as set out in Hardey *et al.* (2013). Although visits between April and July are advised, nests identified during surveys were still active at the end of July, therefore surveys were extended into August. Survey effort is provided in Appendix 2 of this report, including dates, times, duration and weather conditions. A map of the breeding raptor survey locations is presented in Appendix 1 Figure 2.0.

3.4 Project Team

This report has been prepared by Andrew O'Donoghue (B.Sc.), Project Ornithologist with MKO and reviewed by Padraig Cregg (B.Sc., M.Sc..), Principal Ornithologist. Both are suitably qualified ornithologists with experience in completing avifaunal assessments and competent experts for the purposes of the preparation of this report, following SNH (2017) and CIEEM (2017) ecological reporting guidelines.

3.4.1 Field Survey Team

The field surveys were undertaken in the 2023 breeding season by Andrew O'Donoghue, Kate Bismilla (B.Sc.), and Niall McHugh (B.Sc.). Surveyors are suitably qualified competent experts in field ornithology. Andrew has eight years of experience in ornithological surveys, Kate has eight years of experience, and Niall has five years of experience, including vantage point, breeding raptor and breeding walkover surveys.

3.5 Survey Limitations

A comprehensive suite of bird surveys was undertaken at the site between April and September 2023, as detailed in this report. There were no significant gaps in viewsheds during vantage point surveys. It was possible to schedule surveys to avoid potential human disturbances (e.g., forestry operations, agriculture, peat extraction, recreational activity). Surveys were not carried out in unsuitable weather conditions where visibility or bird activity would be impacted. On occasions where weather turned unsuitable or dangerous (e.g. lightning) after the survey had begun, surveys were postponed. Results from the 2023 breeding season are derived from a continuous six months of surveying undertaken following best practice guidance (SNH, 2017). The survey duration and scope are considered entirely satisfactory.

The foraging vantage points mentioned above in Section 3.3.2, were selected to identify where nesting hen harriers were foraging. And foraging areas were successfully identified. However, as hen harriers forage over a large area, the two No. FVP locations are unlikely to have provided full coverage of all areas utilised for foraging.

4. RESULTS

4.1 Desk Study

4.1.1 Sites Designated for Nature Conservation

Using GIS software, sites designated for nature conservation within the potential zone of influence of the proposed wind farm development were identified. In the absence of any specific European or Irish guidance, SNH (2016) was consulted. This document provides guidance in relation to the identification of connectivity between proposed development proposals and SPAs. It takes into consideration the distances some species may travel beyond the boundary of their SPAs and outlines information on dispersal and foraging ranges of certain bird species. In addition, taking a precautionary approach, sites within a 15km radius of the proposed wind farm were identified. Sites designated for birds are listed below in Table 4-1.

Table 4-1 Designated sites within 15km of the site

Designated site and code	Distance from proposed works (km)
Special Protection Areas (SPA)	
Sligo/Leitrim Uplands (002384)	9.2
Natural Heritage Areas (NHA)	
Dough/Thur Mountains (002384)	0.1
Aghavoghil Bog (002430)	4.2
Crockauns/Keelogyboy Bogs (002435)	9.0

5.1.1 Previous Survey Data

5.1.1.1 Breeding Bird Atlas Records

'Bird Atlas 2007-11: *The breeding and wintering birds of Britain and Ireland'* (Balmer *et al.*, 2013) is the most recent comprehensive work on breeding birds in Ireland. It provides information on species and their breeding status in 10km hectads. The site lies within hectad G94. Table 5-1 presents a list of nine species of conservation interest recorded within this hectad.

Table 5-1 Bird atlas 2007-11 records

Species Name	Hectad (G94)	Conservation Status
Golden plover	Non-Breeding	Annex I EU Birds Directive, BoCCI Red Listed
Peregrine	Probable Breeding	Annex I EU Birds Directive, SCI of SPA within 15km
Hen harrier	Confirmed Breeding	Annex I EU Birds Directive
Merlin	Possible Breeding	Annex I EU Birds Directive

Species Name	Hectad (G94)	Conservation Status
Red grouse	Probable Breeding	BoCCI Red Listed

5.1.1.2 Rare and Protected Species Dataset

An information request was sent to the NPWS requesting records from the Rare and Protected Species Database. The sections below provide records obtained from the NPWS (on 18th of June 2018) of the rare and protected breeding bird species hen harrier, peregrine and red grouse.

Hen Harrier

Table 5-2 below presents the NPWS records for hen harrier nest sites to defined radii of the development site.

Table 5-2 NPWS Hen Harrier Nest Site Records

Year	Within site boundary	0-1km from site boundary	1-3km from site boundary	3-5km from site boundary
2015	No Records	1 confirmed breeding site	No Records	1 confirmed breeding site
2010	No Records	3 confirmed breeding sites	1 sighting	1 confirmed breeding site, 1 additional sighting
2005	No Records	3 sightings	No records	No records
1998-2004	No Records	No Records	No Records	No records

Peregrine

The NPWS identified one confirmed peregrine nest site within 3-5km of the site. The observation was recorded during a survey in 2002.

Red Grouse

The NPWS hold records of red grouse in the area. Between 2000 and 2011 this species was recorded on nine occasions. One observation was recorded on site. There were two records located approximately 500m from the site - one just south of Dough Mountain and the other just north of Killea. The remainder of the observations were recorded over 3km from the site, three of which were in the vicinity of Thur Mountain.

5.2 Field Surveys

5.2.1 Flight Activity Surveys

During vantage point surveys, hen harrier were recorded regularly on site, including some time spent at potential collision height (PCH). White -tailed eagle, merlin, red grouse, golden plover, snipe, woodcock, buzzard, and kestrel were also recorded on site, including at PCH (Individual species accounts of primary and secondary target species are provided below).

5.2.1.1 Primary Target Species

Hen harrier

Hen harrier were observed 34 times during vantage point surveys, all on site or within 500m of site. A total of 1,570s of flight was recorded at PCH. All observations involved adult male or female birds flying, hunting and foraging. Maps are presented in Appendix 1 Figure 1.1.

White tailed eagle

White tailed eagle was observed once during surveys. In August a single bird was observed soaring at Dough Mountain. A total of 450s was spent at PCH. Maps are presented in Appendix 1 Figure 1.2.

Merlin

Merlin were recorded once during vantage point surveys, on site. No time was observed at PCH. In May a single bird was observed in flight near Tawnyfeacle. Maps are presented in Appendix 1 Figure 1.3.

Red grouse

Red grouse were recorded four times during vantage point surveys, within 500m of the site. No time was observed at PCH. In April a single bird was observed in flight and calling at Killea. Maps are presented in Appendix 1 Figure 1.4.

Woodcock

Woodcock were recorded once during vantage point surveys, within 500m of the site. No time was observed at PCH. A single bird was observed in flight at Tawnyfeacle in April. Maps are presented in Appendix 1 Figure 1.5.

Snipe

Snipe were recorded 25 times during vantage point surveys, all on site or within 500m of the site. A total of 1,155s was spent at PCH. Observations involved single birds or flocks of up to six birds in flight, calling and displaying. Displaying birds were observed near Killea, Tawnyfeacle and Dough Mountain. Maps are presented in Appendix 1 Figure 1.6.

Kestrel

Kestrel were recorded eight times during vantage point surveys. A total of 1,095s were spent at PCH. Observations involved single birds foraging, hovering or flying. Maps are presented in Appendix 1 Figure 1.7.

5.2.1.2 Secondary Target Species

Buzzard

Buzzard were recorded 36 times during vantage point surveys, all on site or within 500m of site. A total of 6,275s was spent at PCH. Observations included single birds or pairs soaring, travelling, or foraging in both the northern and southern sections of the site. Maps are presented in Appendix 1 Figure 1.8.

Sparrowhawk

Sparrowhawk were recorded five times during vantage point surveys, all on site or within 500m of site. No time was observed at PCH. Observations involved single birds flying over, foraging, or perched. Young birds were recorded calling on site near Tawnyfeacle in August. Maps are presented in Appendix 1 Figure 1.9.

5.2.2 Breeding Raptor Surveys

Hen harrier

Hen harrier were observed 59 times during breeding raptor surveys. On the 4th of April a pair were recorded in courtship flight and displaying in the vicinity of the historic nest site to the south of the site indicating occupancy of the territory. On the 23rd of May, male and female birds were observed alarm calling confirming a nest location at [redacted], approx. 800m from the site boundary. Several observations recorded male and female provisioning this active nest location. On the 26th of July three chicks were observed flying around the nest site indicating successful fledging. Map of confirmed nest site in Confidential Appendix 3 Figure 5.0.

To the north, off site at [redacted] in the vicinity of a historic territory, a second pair was recorded. On the 4th of April, a male was recorded foraging indicating occupancy of the territory. On the 3rd of May a male was recorded carrying prey in the same area, likely as part of courtship rather than provisioning young given the early date. On the 4th of May, a pair was recorded in courtship and display flight in the same area. On the 24th of May, the male from the southern pair was observed with the northern male flying northwards. The 10th of May was the last time a female was observed in the northern area at [redacted]. The last observation of a male in the northern area was on the 14th of June flying uphill at Dough Mountain.

Maps are presented in Appendix 1 Figure 2.1.

White-tailed eagle

White-tailed eagle were recorded twice on site during breeding raptor surveys. Two observations were of the same bird on the 2nd of August. An adult bird flew low across the site at Killea, perching in heather. It then proceeded to fly north off-site. Maps are presented in Appendix 1 Figure 2.2.

Merlin

Merlin were observed twice during breeding raptor surveys. On the 27th of July, a female was twice observed in flight and hunting meadow pipits at Faughery on site and within 500m of site. Maps are presented in Appendix 1 Figure 2.3.

Kestrel

Kestrel were recorded seven times during breeding raptor surveys. Observations all involved single birds flying and hunting/foraging on and off site. In August a juvenile bird was observed foraging at Killea indicating breeding in the wider area. Maps are presented in Appendix 1 Figure 2.4.

Buzzard

Buzzard were recorded 19 times during breeding raptor surveys. Observations involved single birds or pairs flying or soaring both on and off site in the areas of Faughery, Raheelin and Boleyboy. Breeding behaviour was not confirmed. Maps are presented in Appendix 1 Figure 2.5.

Sparrowhawk

Sparrowhawk were recorded 12 times during breeding raptor surveys. Observations involved single birds in flight foraging or carrying prey. Breeding was confirmed on site west of Killea with a female at a historic nest site. Breeding was confirmed off site at Raheelin in two separate locations both approx. 1.5km from the site, confirmed through observations of adults carrying prey. Maps are presented in Appendix 1 Figure 2.6.

5.2.3 Foraging Vantage Point Surveys

Hen harrier

Hen harrier were observed 99 times during FVPs, of these, 63 observations involved foraging behaviour throughout or for part of the observation. Foraging observations centred around Faughery, the South of Saddle Hill, and in suitable habitat in the vicinity of the nest site at [redacted].

Prey carrying and food passes were observed 40 times. Other behaviours observed included flying, travelling, soaring, and mobbing. Individual adult male and female birds, pairs, and recently fledged chicks were all recorded. On the 18th of July, two chicks were observed flying to meet the adult female with prey confirming successful breeding. On the 21st of July, three chicks were observed at the nest. One chick was last observed in flight at the nest site on the 4th of August indicating successful fledging.

Maps are presented in Appendix 1 Figures 3.1, 3.2 and 3.3.

5.2.4 Incidental Observations

Hen harrier

Hen harrier were observed five times as incidental observations. Single adult males and females were recorded foraging and travelling at Boleyboy and Dough Mountain on site and within 500m of site and at Lisnabrack off site. Maps are presented in Appendix 1 Figure 4.0.

Red grouse

Red grouse were recorded three times as incidental observations. Single birds and a pair were recorded calling or in flight at Dough Mountain and Killea indicating probable breeding in these areas. Maps are presented in Appendix 1 Figure 4.1.

Kestrel

Kestrel were recorded on one occasion as an incidental observation. One bird was observed in flight at Tawnyfeacle in August. Maps are presented in Appendix 1 Figure 4.2.

Snipe

Snipe were recorded seven times as incidental observations. In May and June, birds were observed drumming (displaying) on site or within 500m of site at Killea, Dough Mountain, and Tawnyfeacle and off site at Raheelin. Maps are presented in Appendix 1 Figure 4.3.

Sparrowhawk

Sparrowhawk were recorded on five occasions as incidental observations. Single birds were recorded in flight on site at Tawnyfeacle and Boleyboy. Two recently fledged juveniles were also observed on site at Faughery in August confirming breeding here. Maps are presented in Appendix 1 Figure 4.4.

Buzzard

Buzzard were recorded on ten occasions. Single birds were recorded at Tawnyfeacle, Saddlehill, and Killea. A pair with a recently fledged chick was observed on site at Tawnyfeacle in July, confirming breeding here. Maps are presented in Appendix 1 Figure 4.5.

6. DISCUSSION

Ornithological surveys were conducted at the Lissinagroagh wind farm site from April to September 2023 inclusive. During these surveys, breeding territories were identified for hen harrier, red grouse, snipe and sparrowhawk.

Hen harrier were regularly recorded on site during surveys. Male and female birds were observed to the north and south of site in April and May indicating two pairs occupying territories in the area.

To the south of the site, on the 4th of April, a pair were recorded in courtship flight and displaying in the vicinity of a historic nest site to the south of the site indicating occupancy of the territory. On the 23rd of May, male and female birds were observed alarm calling confirming a nest location at [redacted], approx. 800m from the site boundary. Upon location of the nest site FVPs were then carried out from two locations. Foraging observations centred around Faughery, the South of Saddle Hill, and in suitable habitat in the vicinity of the nest site at [redacted]. On the 21st of July three chicks were recorded in flight at the nest site, these birds were last seen on the 4th of August, indicating successful fledging from this nest.

To the north of the site, on the 4th of April, a male was recorded foraging indicating likely occupancy of a territory. On the 3rd of May, a male was recorded carrying prey at [redacted] in the vicinity of the historic 2021 nest off site, likely as part of courtship rather than provisioning young given the early date. On the 4th of May, a pair were recorded in courtship and display flight in the same area. The 10th of May was the last time a female was observed in the northern area at Killea in flight. On the 24th of May, the male from the southern pair was observed in flight with the northern male. The last observation of a male to the north was on the 16th of June flying uphill at Dough Mountain. It is unlikely breeding was successful for this northern pair given the lack of observations confirming breeding, such as provisioning flights or fledged chicks.

It is noted that 2021 was the last time a nest was confirmed in this northern area ([redacted]. It is further noted that the forestry operations (felling) in this area in 2022 may have made the area unsuitable for nesting. The male from this pair was recorded foraging on-site to the north, however as a nest was not located FVPs were not carried out. All other previously identified historic nest sites to the north and south of the site (i.e. To the north, on site at [redacted] To the south, historic nest sites on site around [redacted], and off site at [redacted]) were unoccupied.

Sparrowhawk were confirmed breeding in two locations off site at Raheelin, and an adult female was seen at a historic nest site on site west of Killea. Additionally, the recently fledged juvenile kestrel present on site in August indicated breeding in the wider area. The nest site was not located.

Red grouse were recorded as probable breeding on site or within 500m of the site at Dough Mountain and Killea with the presence of calling birds. Snipe were also probable breeders with displaying birds recorded within 500m of the site at Killea, Tawnyfeacle, and Dough Mountain, and off site at Raheelin. Woodcock was recorded on one occasion in suitable breeding habitat at Tawnyfeacle indicating possible breeding.

Other birds of conservation concern recorded during the surveys were white-tailed eagle, golden plover and merlin. These species were observed on site or within 500m of the site during the breeding season. There was a low frequency of observations, and no breeding behaviour was observed.

REFERENCES

Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. & Fuller, R.J. (2013) *Bird Atlas 2007-11: The breeding and wintering birds of Britain and Ireland*. BTO Books, Thetford.

Council Directive 92/43/EEC 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31992L0043

Council Directive 2009/147/EC 30 November 2009 on the conservation of wild birds. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32009L0147

Gilbert, G., Gibbons, D.W. and Evans, J. (1998) *Bird Monitoring Methods.* Bedfordshire, England: Pelagic Publishing, Royal Society for the protection of Birds.

Gilbert, G., Stanbury, A. and Lewis, A. (2021). Birds of Conservation Concern in Ireland 4: 2020-2026. *Irish Birds,* 43:1-22. Available at: https://birdwatchireland.ie/birds-of-conservation-concern-in-ireland/

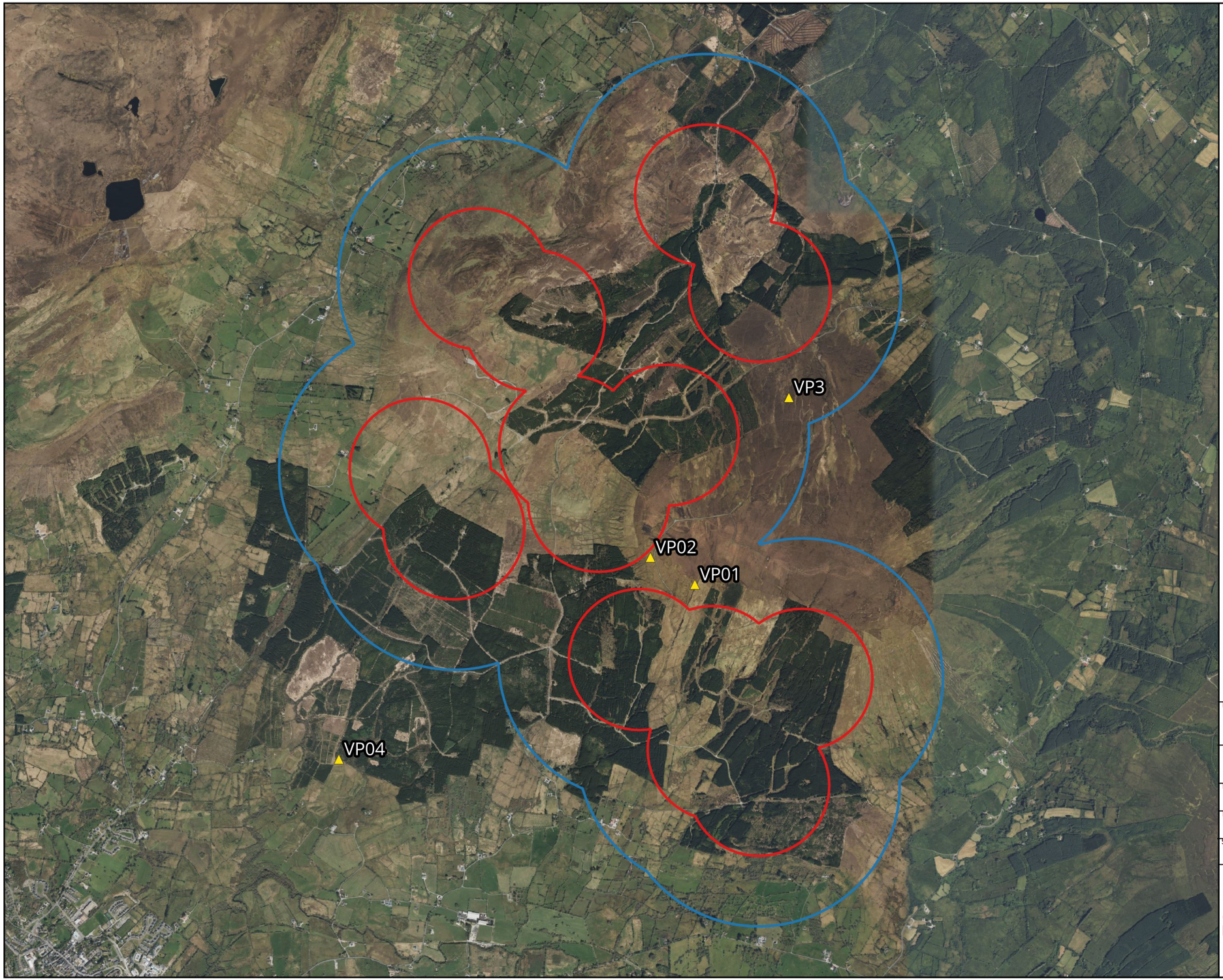
Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. and Thompson, D. (2013) *Raptors. A field Guide for Surveys and Monitoring.* The Stationary Office, Edinburgh.

SNH (2016). Assessing connectivity with Special Protection Areas (SPAs). Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2018-08/Assessing%20connectivity%20with%20special%20protection%20areas.pdf

SNH (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms. Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2018-06/Guidance%20Note%20-%20Recommended%20bird%20survey%20methods%20to%20inform%20impact%20assessment%20of%20onshore%20windfarms.pdf

APPENDIX 1

FIGURES



Map Legend

- Site Boundary (500m radius of 14T Layout)
- 500m radius of site boundary
- VP Locations

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N

Drawing Title

Vantage Point (VP) Locations

Project Title

Lissinagroagh

Drawn By	Checked By
AO'D	SD
Project No.	Drawing No.
200217-h	Fig 1.0
Scale	Date
1:35,000	08.10.24

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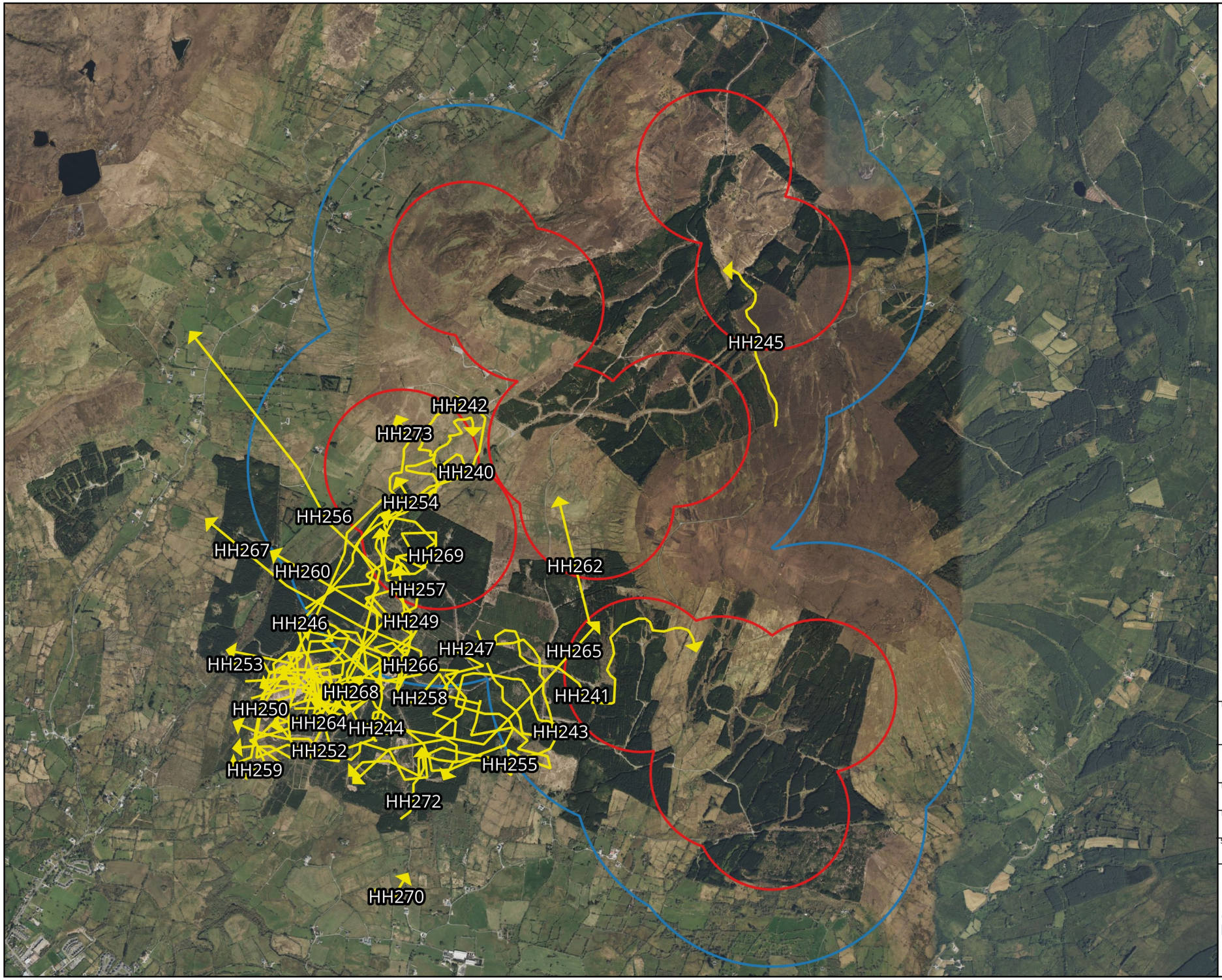

Map Legend

- Site Boundary
- 500m radius of site boundary
- Flightlines

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Drawing Title	Hen Harrier VP Flightlines
Project Title	Lissinagroagh
Drawn By: AO'D	Checked By: SD
Project No.: 200217-h	Drawing No.: Fig 1.1
Scale: 1:32,000	Date: 08.10.24

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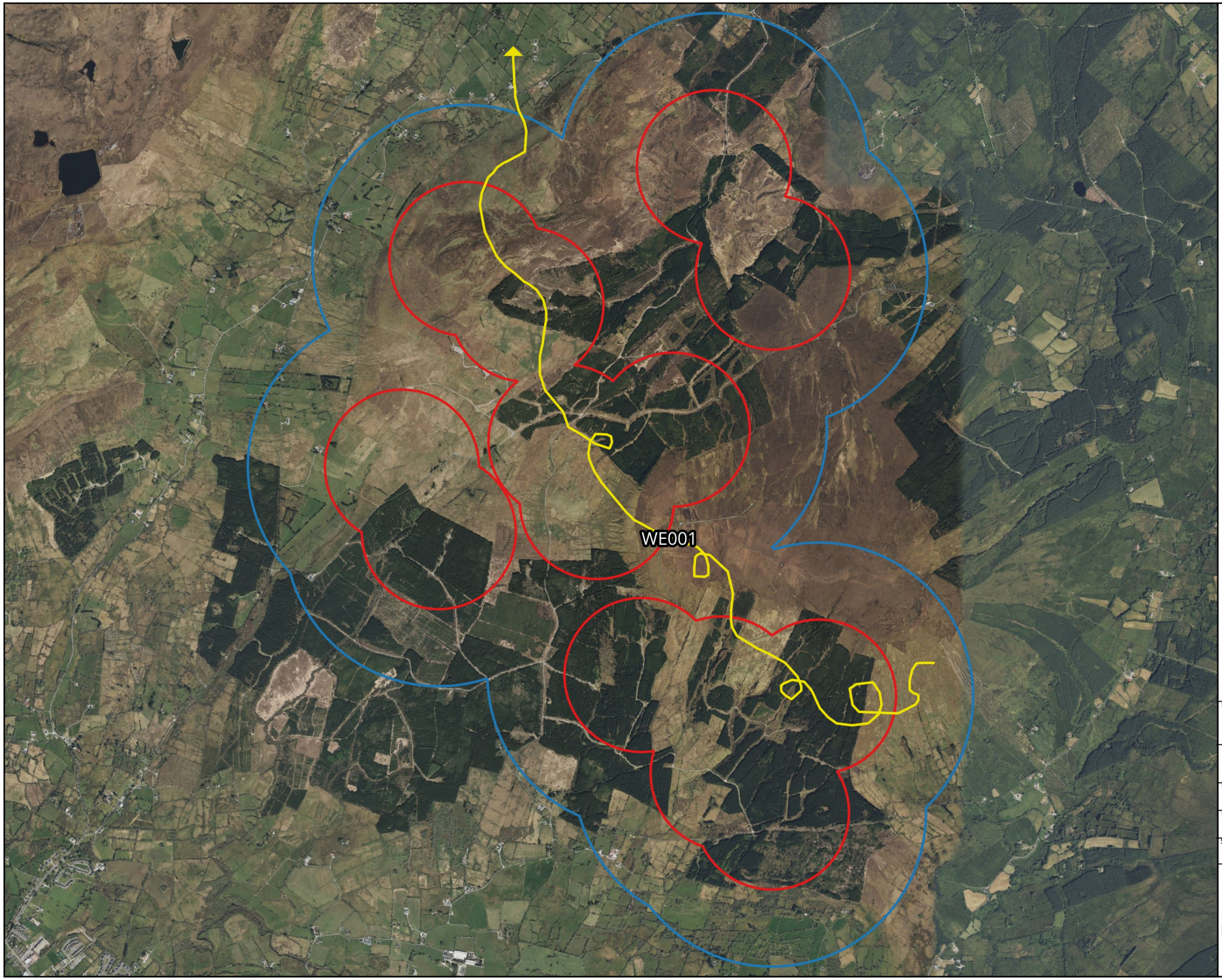

Map Legend

- Site Boundary
- 500m radius of site boundary
- Flightlines

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Drawing Title

White-tailed eagle VP Flightlines

Project Title

Lissinagroagh

Drawn By	Checked By
AO'D	SD
Project No.	Drawing No.
200217-h	Fig 1.2
Scale	Date
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Map Legend

- Site Boundary
- 500m radius of site boundary
- Flightlines

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Drawing Title: Merlin VP Flightlines

Project Title: Lissinagroagh

Drawn By	Checked By
AO'D	SD
Project No.	**Drawing No.**
200217-h	Fig 1.3
Scale	**Date**
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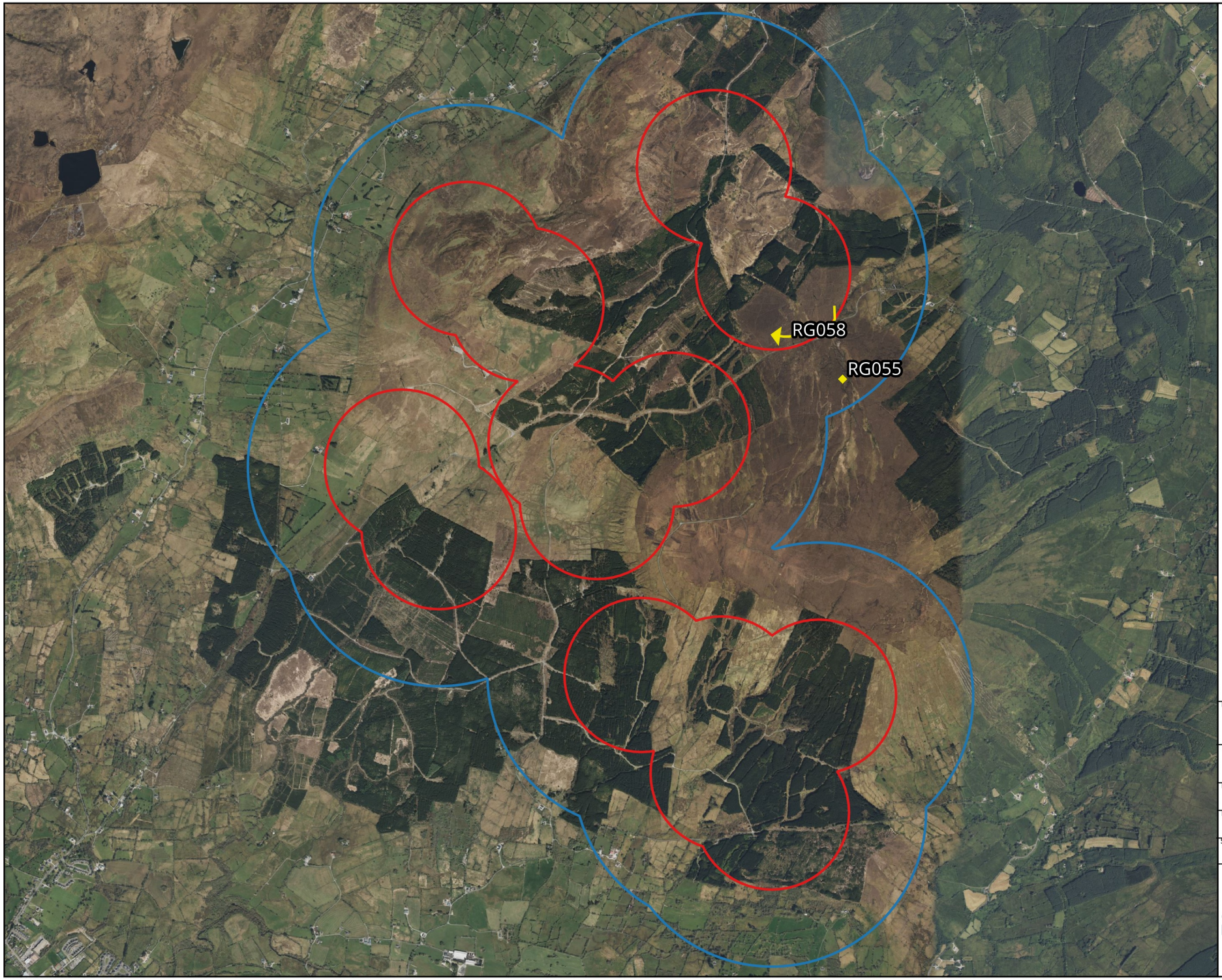

Map Legend

- Site Boundary
- 500m radius of site boundary
- Flightlines

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Drawing Title

Red grouse VP Flightlines

Project Title

Lissinagroagh

Drawn By	Checked By
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Project No.	Drawing No.
200217-h	Fig 1.4
Scale	Date
1:32,000	08.10.24

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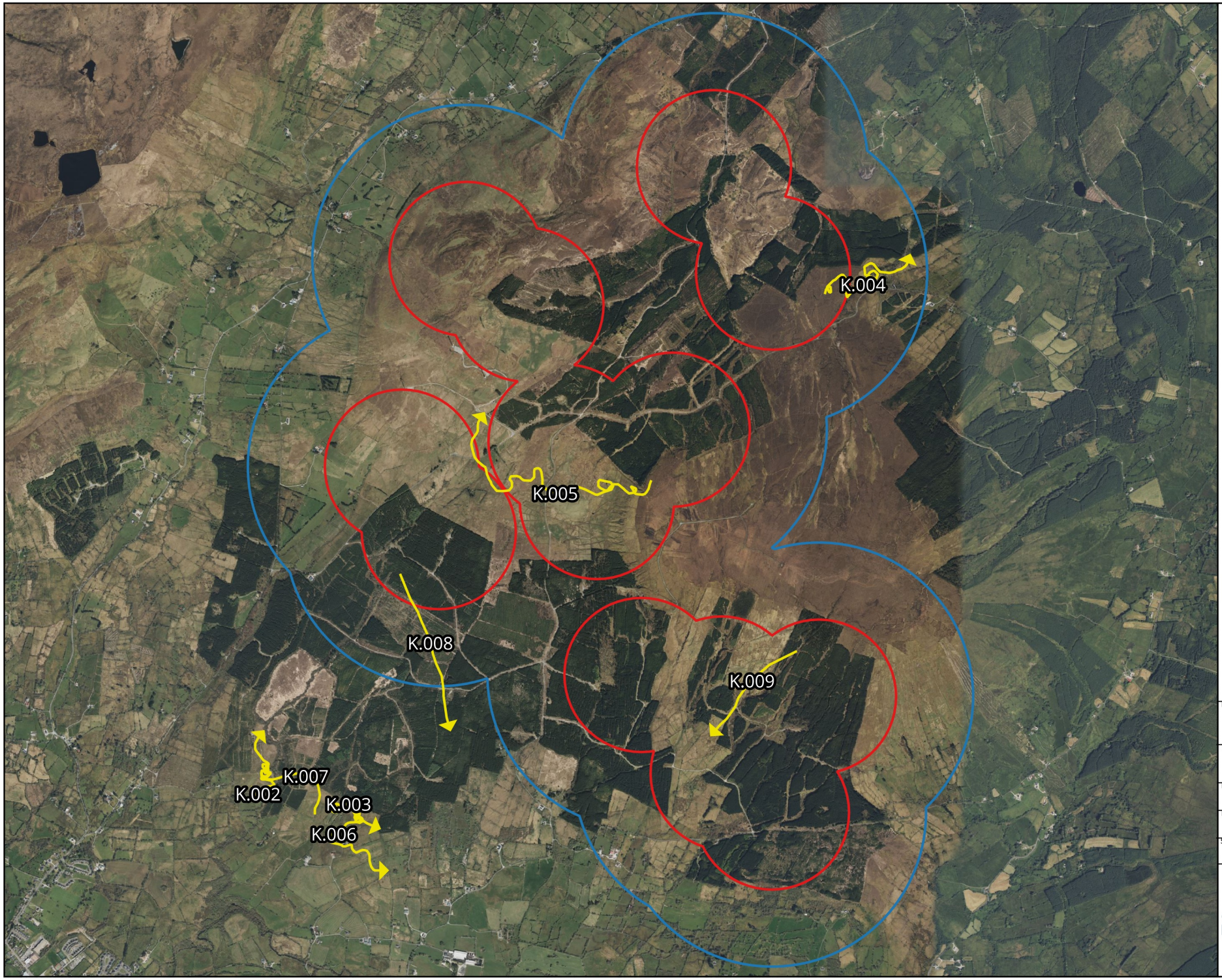

Map Legend

- Site Boundary
- 500m radius of site boundary
- Flightlines

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Drawing Title	Kestrel VP Flightlines
Project Title	Lissinagroagh
Drawn By: AO'D	Checked By: SD
Project No.: 200217-h	Drawing No.: Fig 1.5
Scale: 1:32,000	Date: 08.10.24

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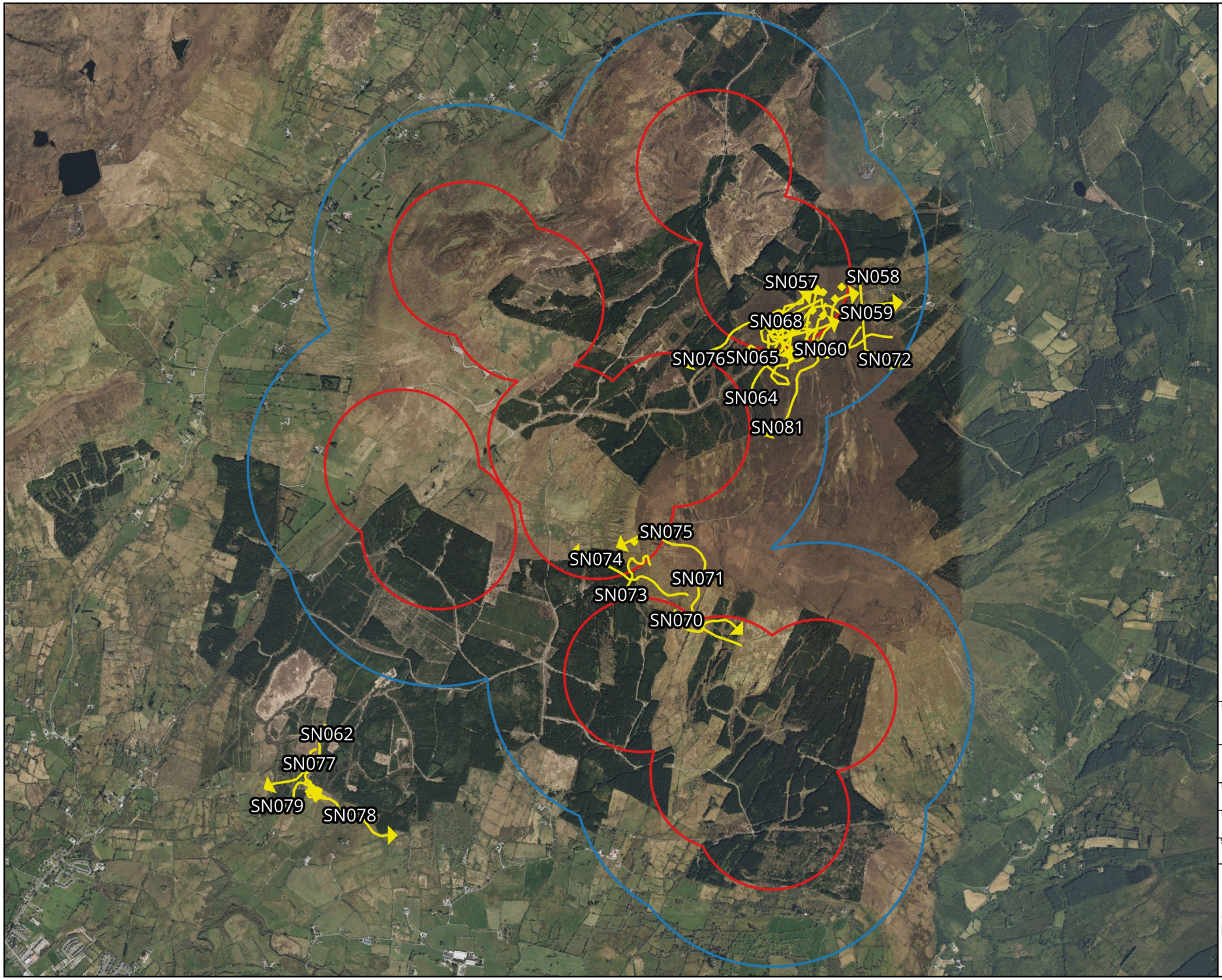

Map Legend

- Site Boundary
- 500m radius of site boundary
- Flightlines

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Drawing Title: Snipe VP Flightlines

Project Title: Lissinagroagh

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AO'D	SD
Project No.	Drawing No.
200217-h	Fig 1.6
Scale	Date
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Drawing Title

Woodcock VP Flightlines

Project Title

Lissinagroagh

Drawn By	Checked By
AO'D	SD
Project No.	Drawing No.
200217-h	Fig 1.7
Scale	Date
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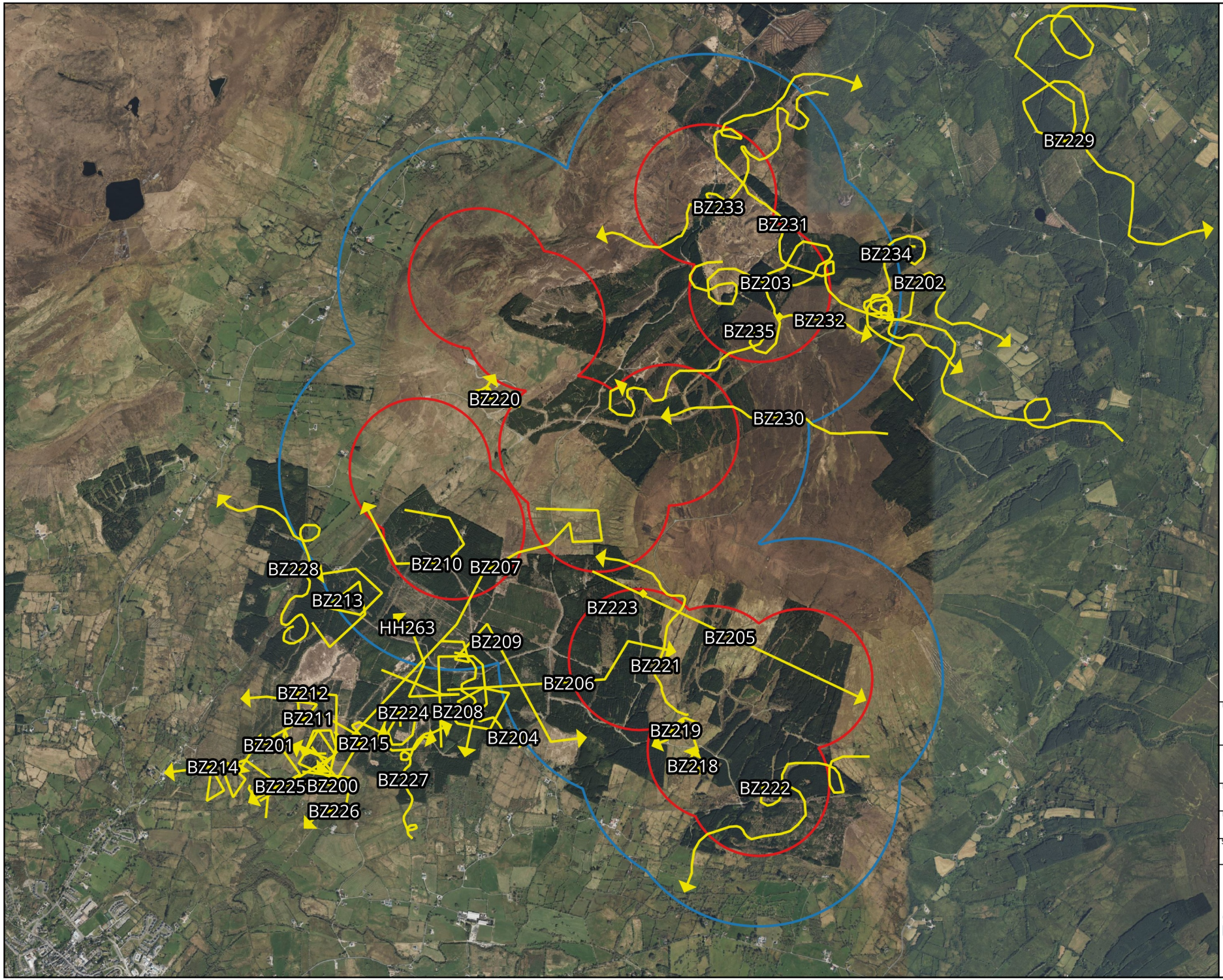

Map Legend

- Site Boundary
- 500m radius of site boundary
- Flightlines

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Drawing Title	Buzzard VP Flightlines
Project Title	Lissinagroagh
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Project No.: 200217-h	Drawing No.: Fig 1.8
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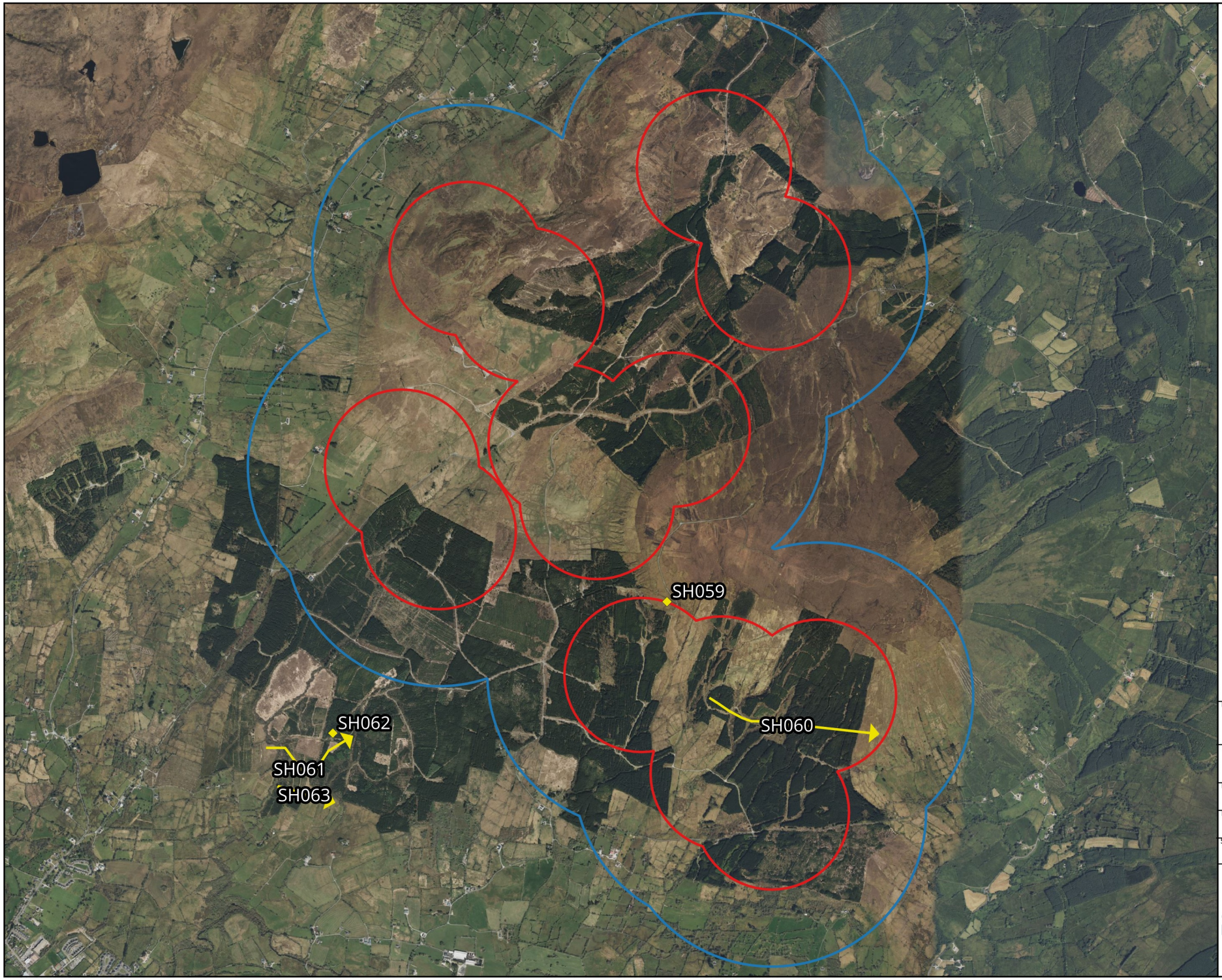

Map Legend

- Site Boundary
- 500m radius of site boundary
- Flightlines

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Drawing Title	Sparrowhawk VP Flightlines
Project Title	Lissinagroagh
Drawn By: AO'D	Checked By: SD
Project No.: 200217-h	Drawing No.: Fig 1.9
Scale: 1:32,000	Date: 08.10.24

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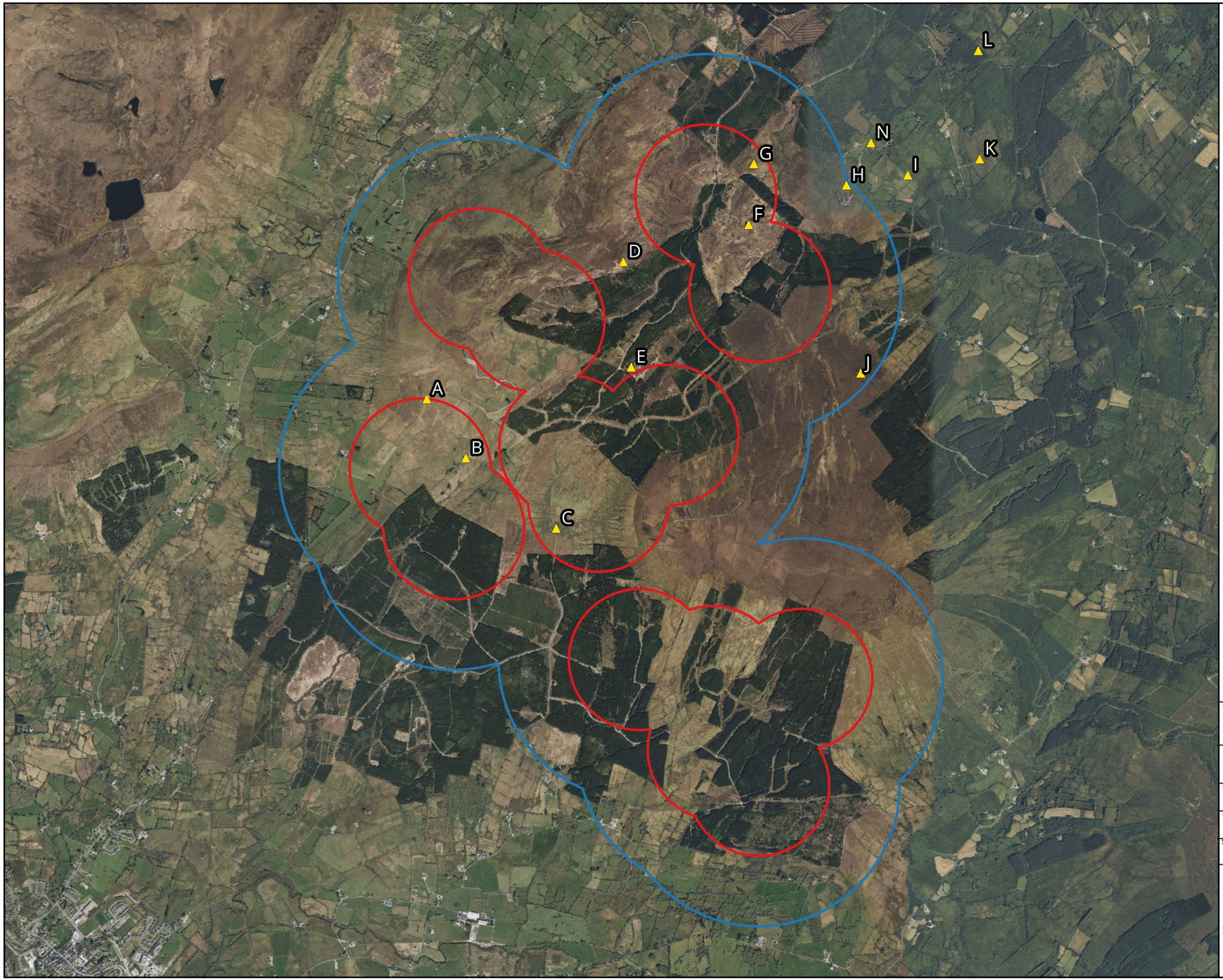

Map Legend

- Site Boundary
- 500m radius of site boundary
- Breeding Raptor VP Locations

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Project Title	Lissinagroagh
Drawn By: AO'D	Checked By: SD
Project No.: 200217-h	Drawing No.: Fig 2.0
Scale: 1:35,000	Date: 08.10.24

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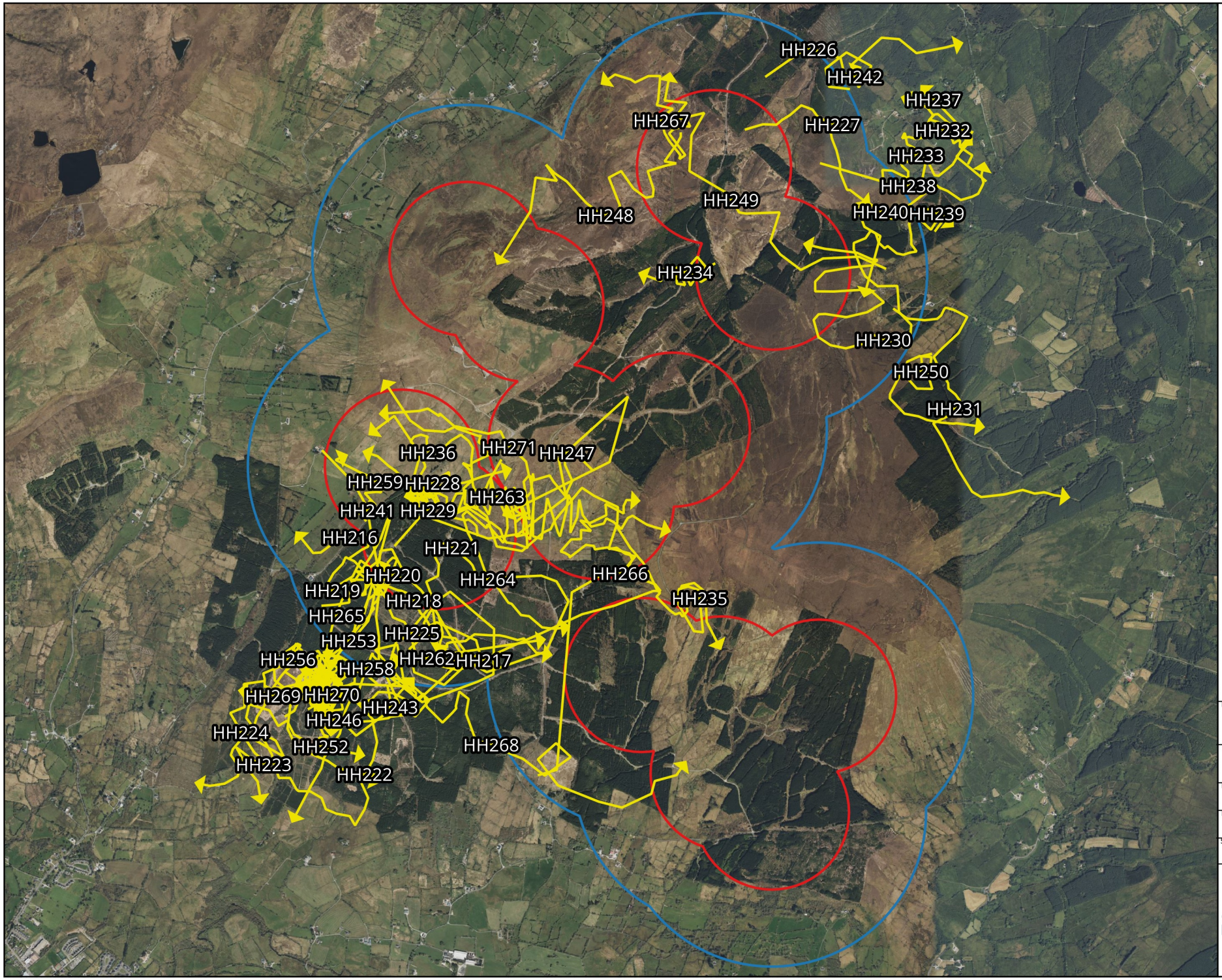

Map Legend

- Site Boundary
- 500m radius of site boundary
- Flightlines

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Drawing Title	Hen Harrier Breeding Raptor Flightlines
Project Title	Lissinagroagh
Drawn By: AO'D	Checked By: SD
Project No.: 200217-h	Drawing No.: Fig 2.1
Scale: 1:32,000	Date: 08.10.24

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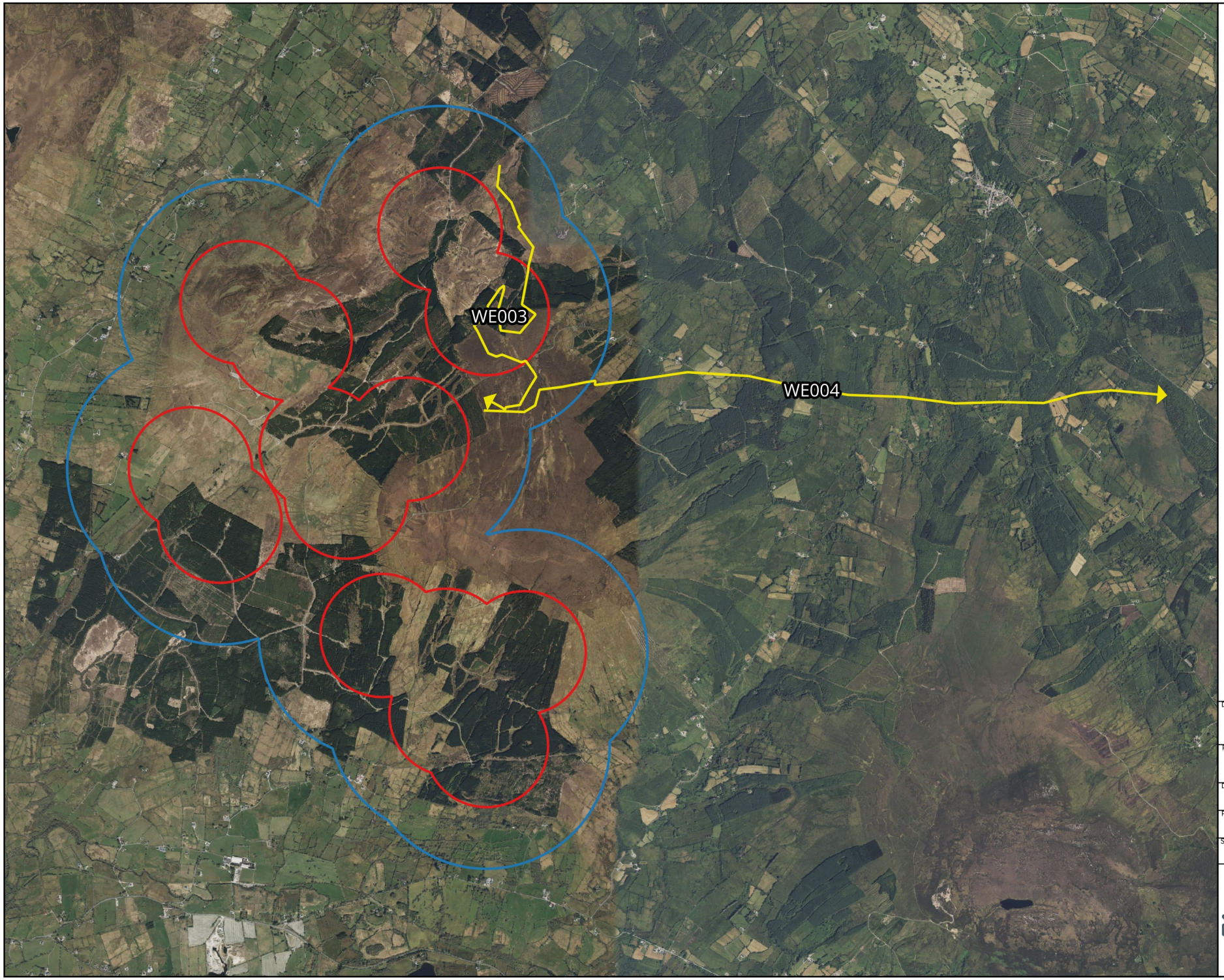

Map Legend

- Site Boundary
- 500m radius of site boundary
- Flightlines

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Drawing Title

White-tailed eagle
Breeding Raptor Flightlines

Project Title

Lissinagroagh

Drawn By	Checked By
AO'D	SD
Project No.	Drawing No.
200217-h	Fig 2.2
Scale	Date
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- Flightlines

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Drawing Title
Merlin Breeding Raptor Flightlines

Project Title
Lissinagroagh

Drawn By	Checked By
AO'D	SD
Project No.	Drawing No.
200217-h	Fig 2.3
Scale	Date
1:32,000	08.10.24

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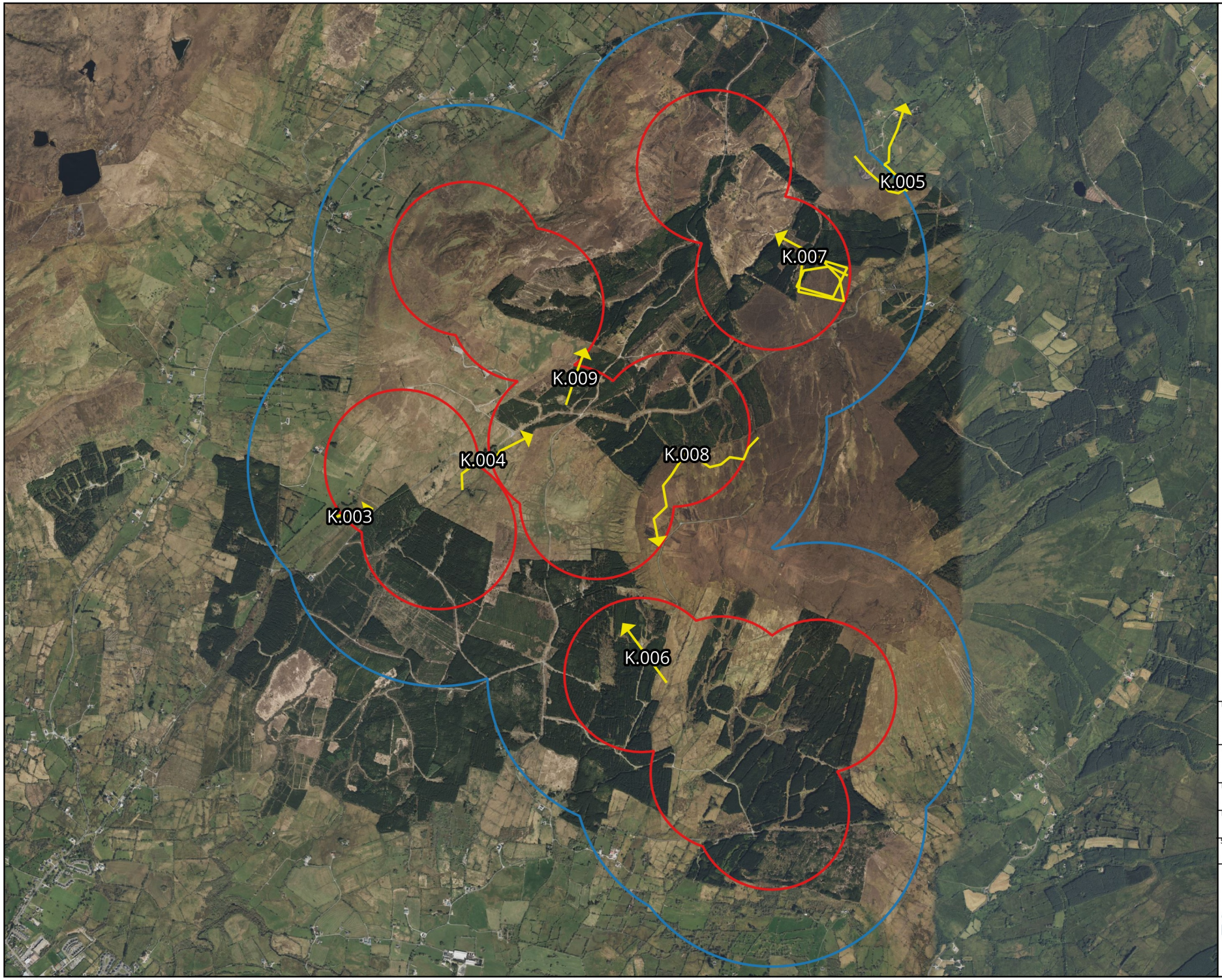

Map Legend

- Site Boundary
- 500m radius of site boundary
- Flightlines

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Drawing Title
Kestrel Breeding Raptor Flightlines

Project Title
Lissinagroagh

Drawn By	Checked By
AO'D	SD
Project No.	Drawing No.
200217-h	Fig 2.4
Scale	Date
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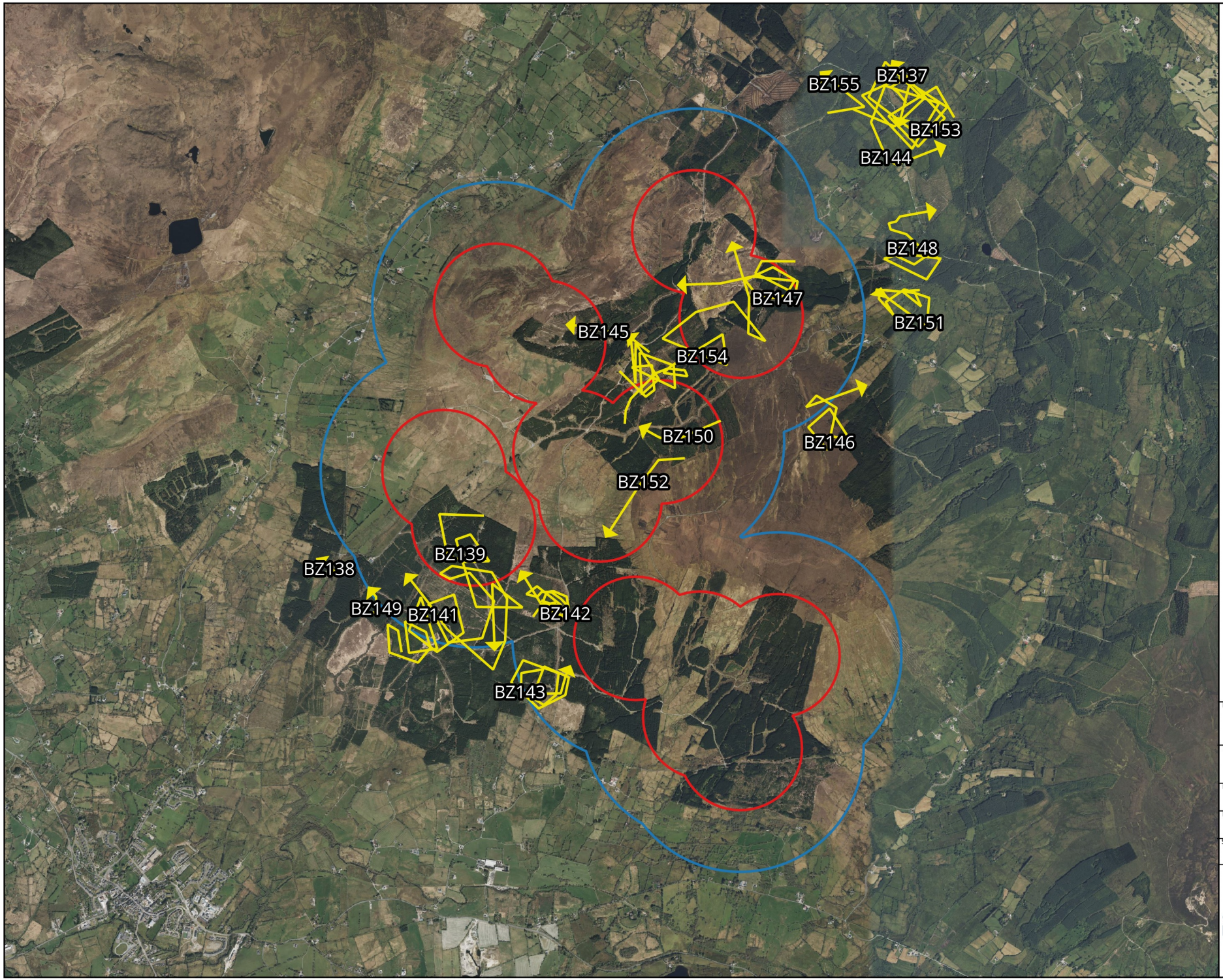

Map Legend

- Site Boundary
- 500m radius of site boundary
- Flightlines

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Drawing Title: Buzzard Breeding Raptor Flightlines

Project Title: Lissinagroagh

Drawn By	Checked By
AO'D	SD
Project No.	Drawing No.
200217-h	Fig 2.5
Scale	Date
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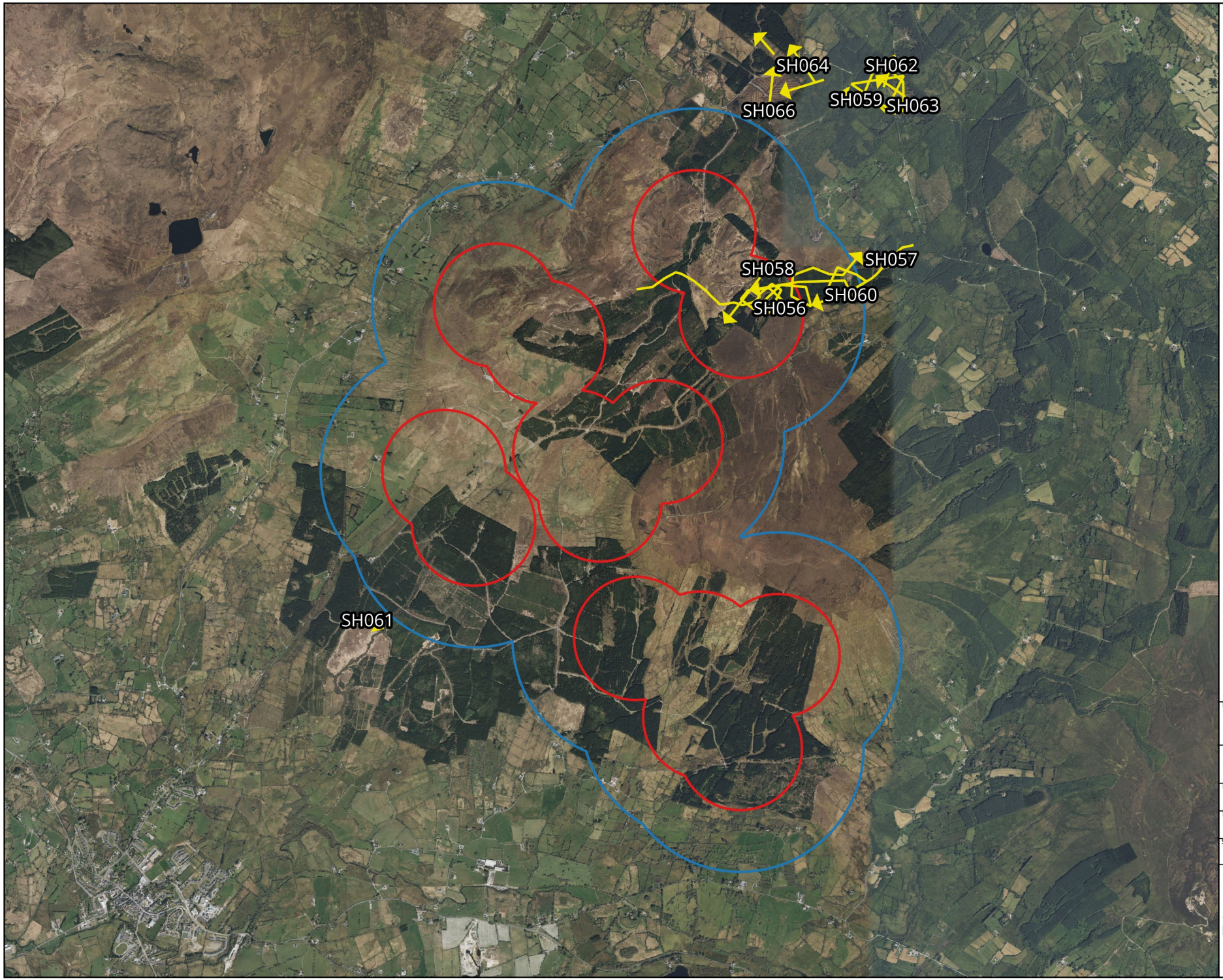

Map Legend

- Site Boundary
- 500m radius of site boundary
- Flightlines

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Drawing Title
Sparrowhawk Breeding Raptor Flightlines

Project Title
Lissinagroagh

Drawn By	Checked By
AO'D	SD
Project No.	Drawing No.
200217-h	Fig 2.6
Scale	Date
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Map Legend

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- FVP

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Drawing Title: Foraging VP Locations

Project Title: Lissinagroagh

Drawn By	Checked By
AO'D	SD
Project No.	Drawing No.
200217-h	Fig 3.0
Scale	Date
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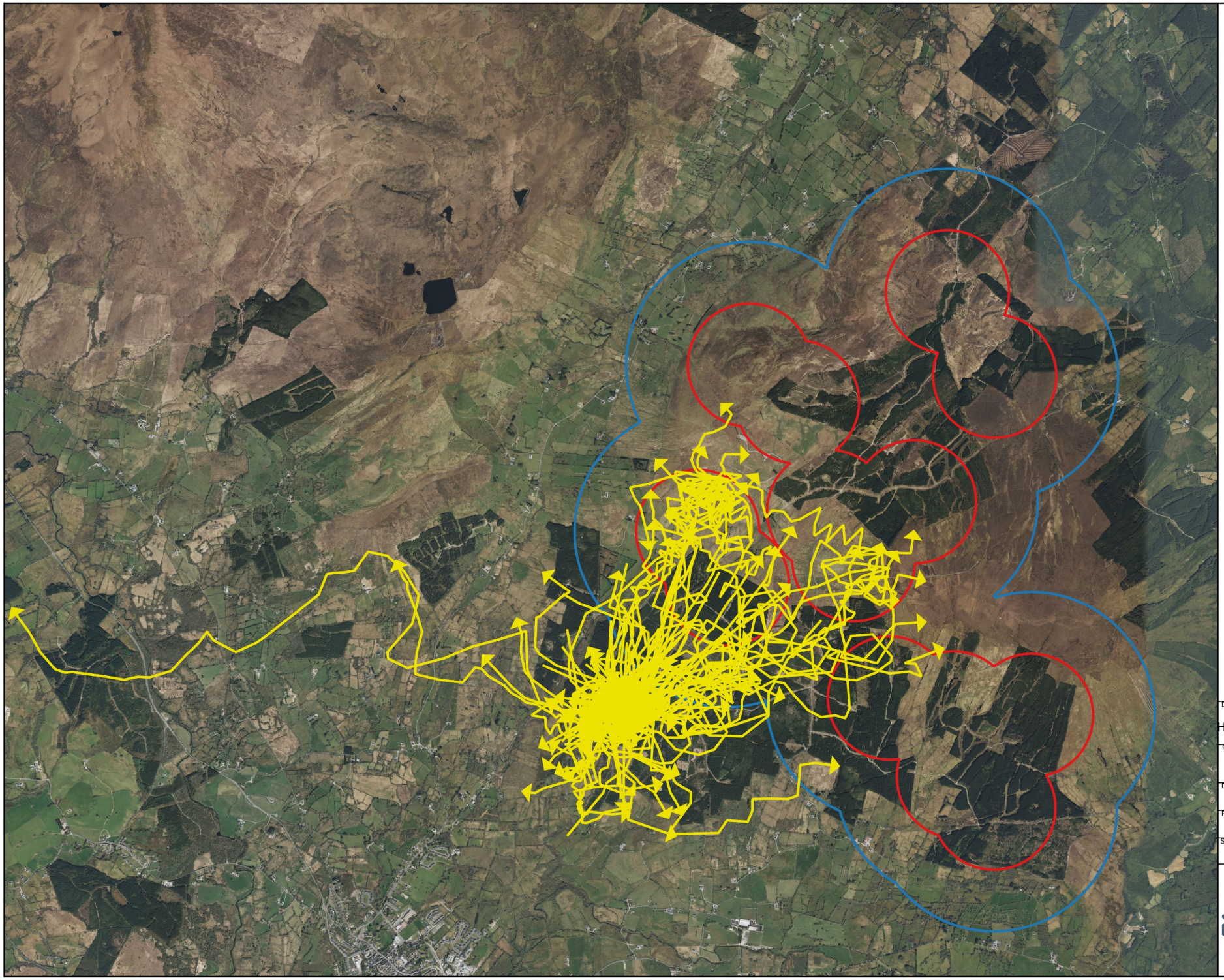

Drawing Title

Hen Harrier Foraging VP Flightlines

Project Title

Lissinagroagh

Drawn By	Checked By
AO'D	SD
Project No.	Drawing No.
200217-h	Fig 3.1
Scale	Date
1:40,000	08.10.24

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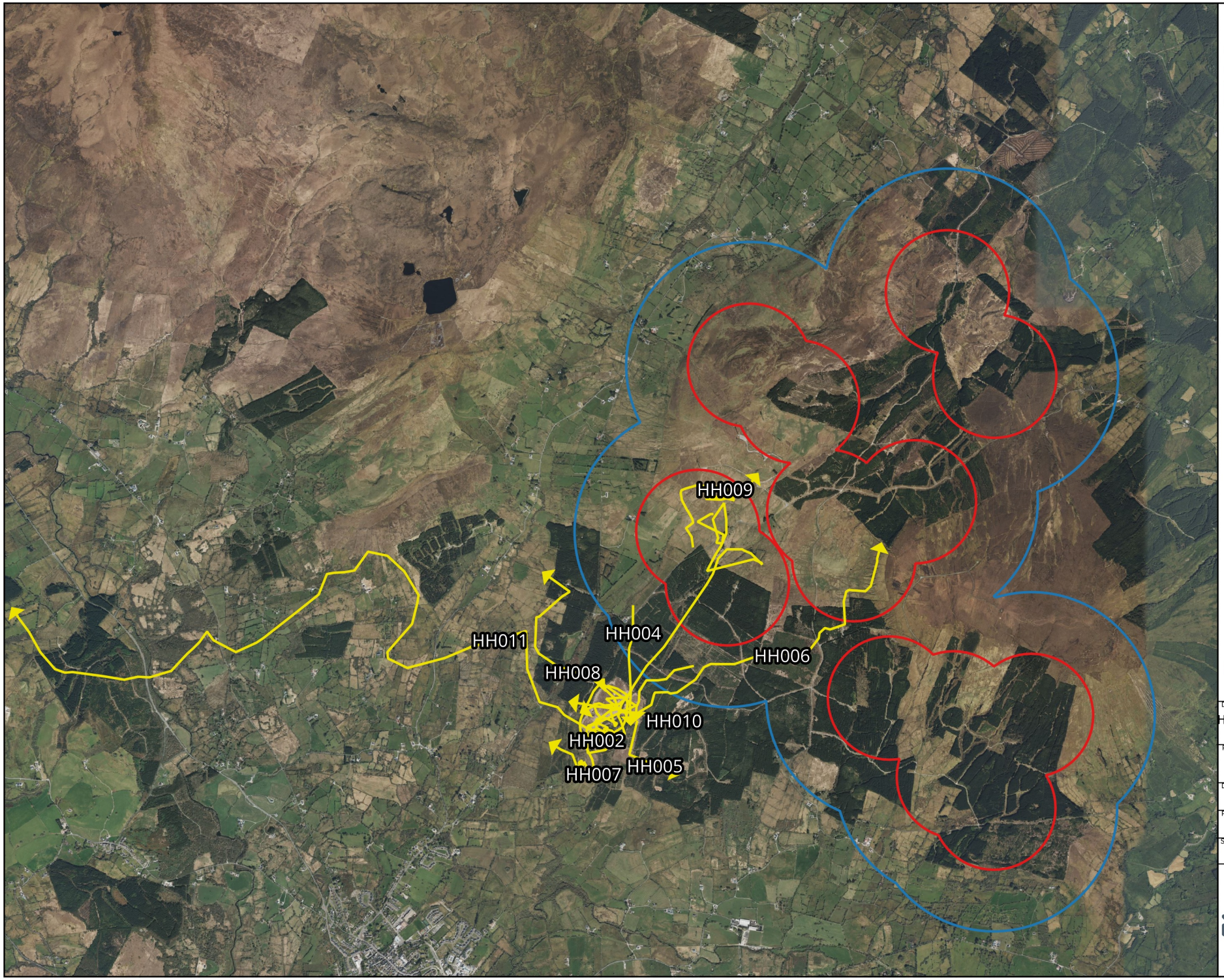

Map Legend

- Site Boundary
- 500m radius of site boundary
- Flightlines

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Drawing Title	Hen Harrier Foraging VP Flightlines June 2023
Project Title	Lissinagroagh
Drawn By: AO'D	Checked By: SD
Project No.: 200217-h	Drawing No.: Fig 3.1.1
Scale: 1:40,000	Date: 08.10.24

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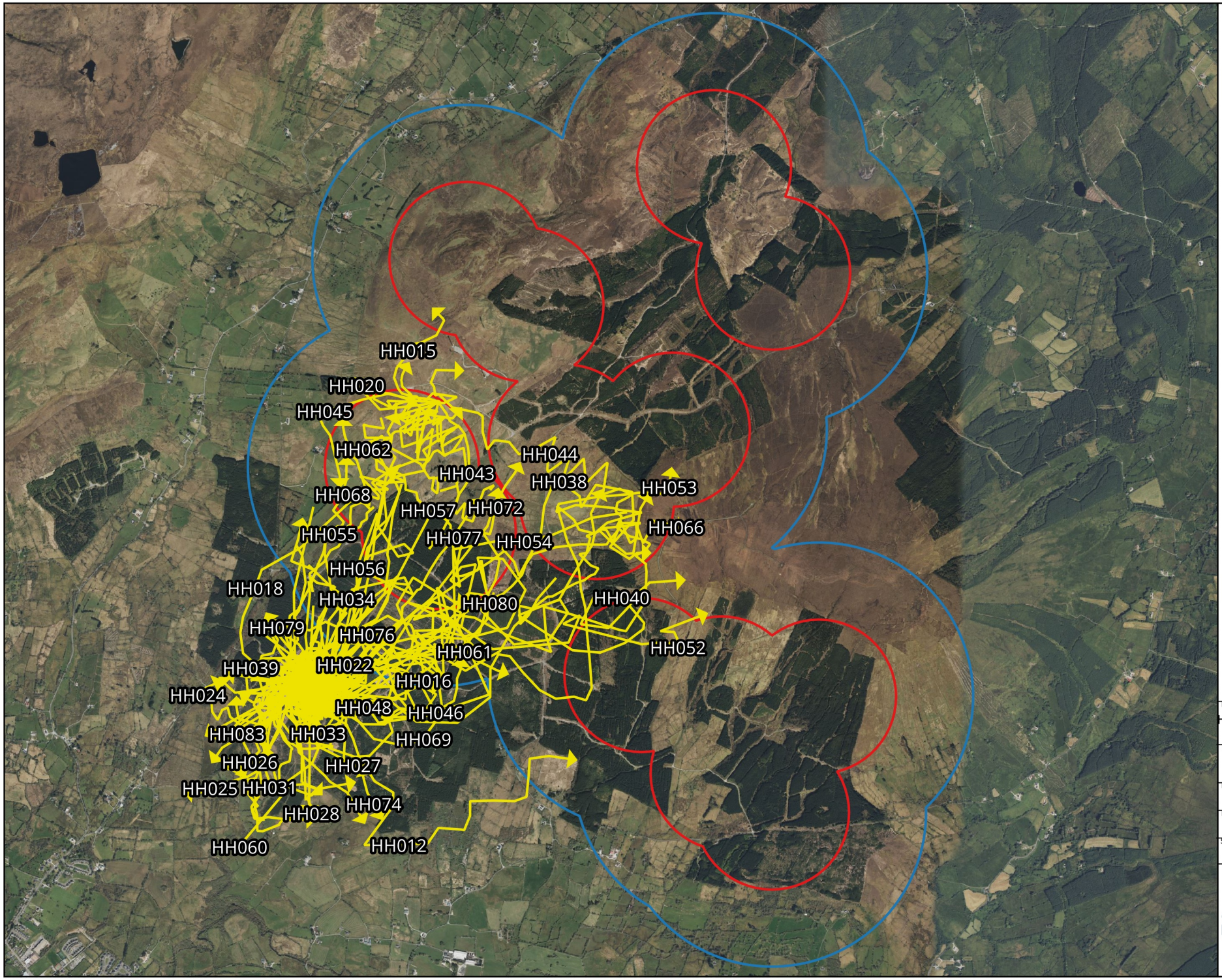

Map Legend

- Site Boundary
- 500m radius of site boundary
- Flightlines

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Drawing Title	Hen Harrier Foraging VP Flightlines July 2023
Project Title	Lissinagroagh
Drawn By: AO'D	Checked By: SD
Project No.: 200217-h	Drawing No.: Fig 3.1.2
Scale: 1:32,000	Date: 08.10.24

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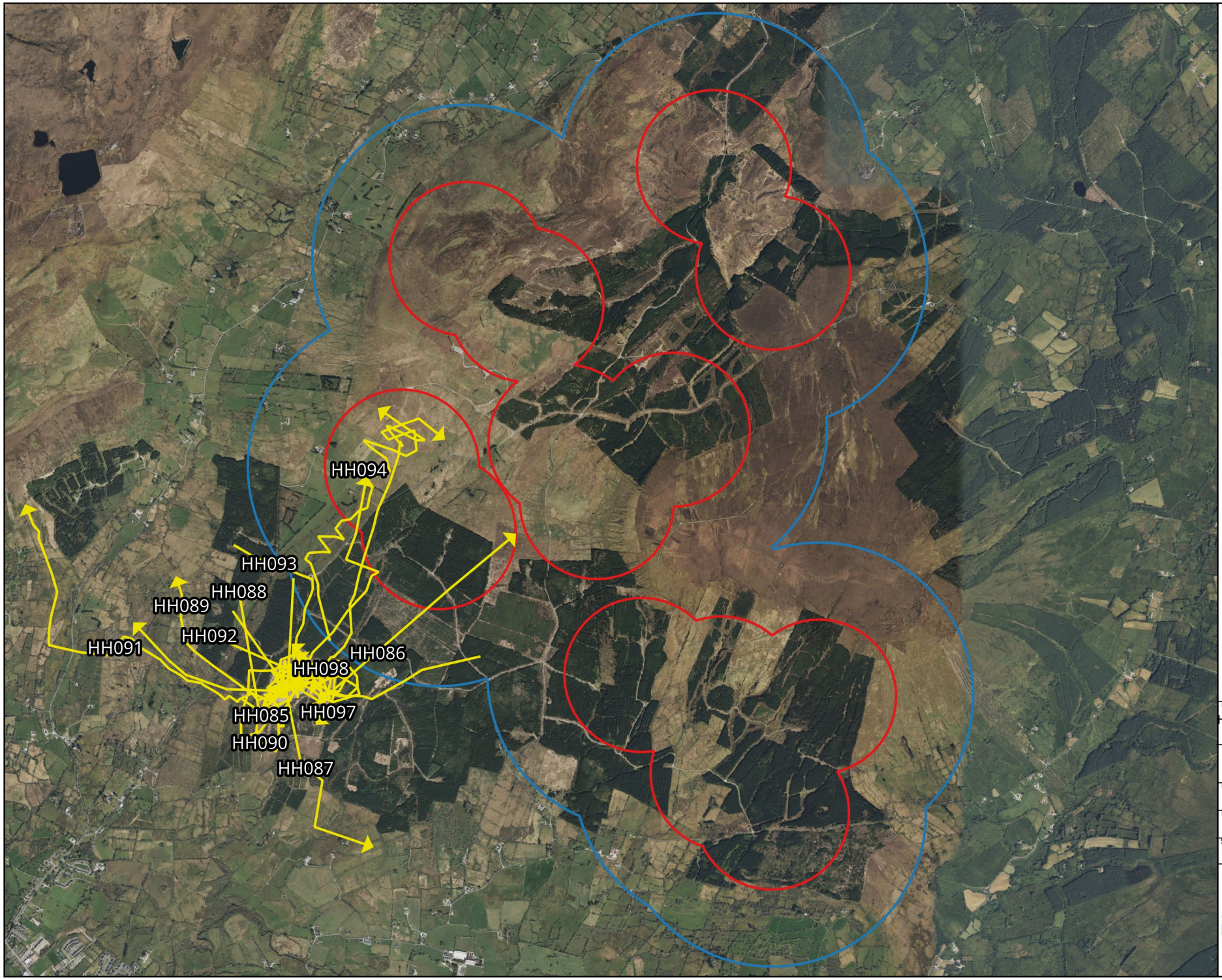

Map Legend

- Site Boundary
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- Flightlines

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Drawing Title
Hen Harrier Foraging VP Flightlines August 2023

Project Title
Lissinagroagh

Drawn By	Checked By
AO'D	SD
Project No.	Drawing No.
200217-h	Fig 3.1.3
Scale	Date
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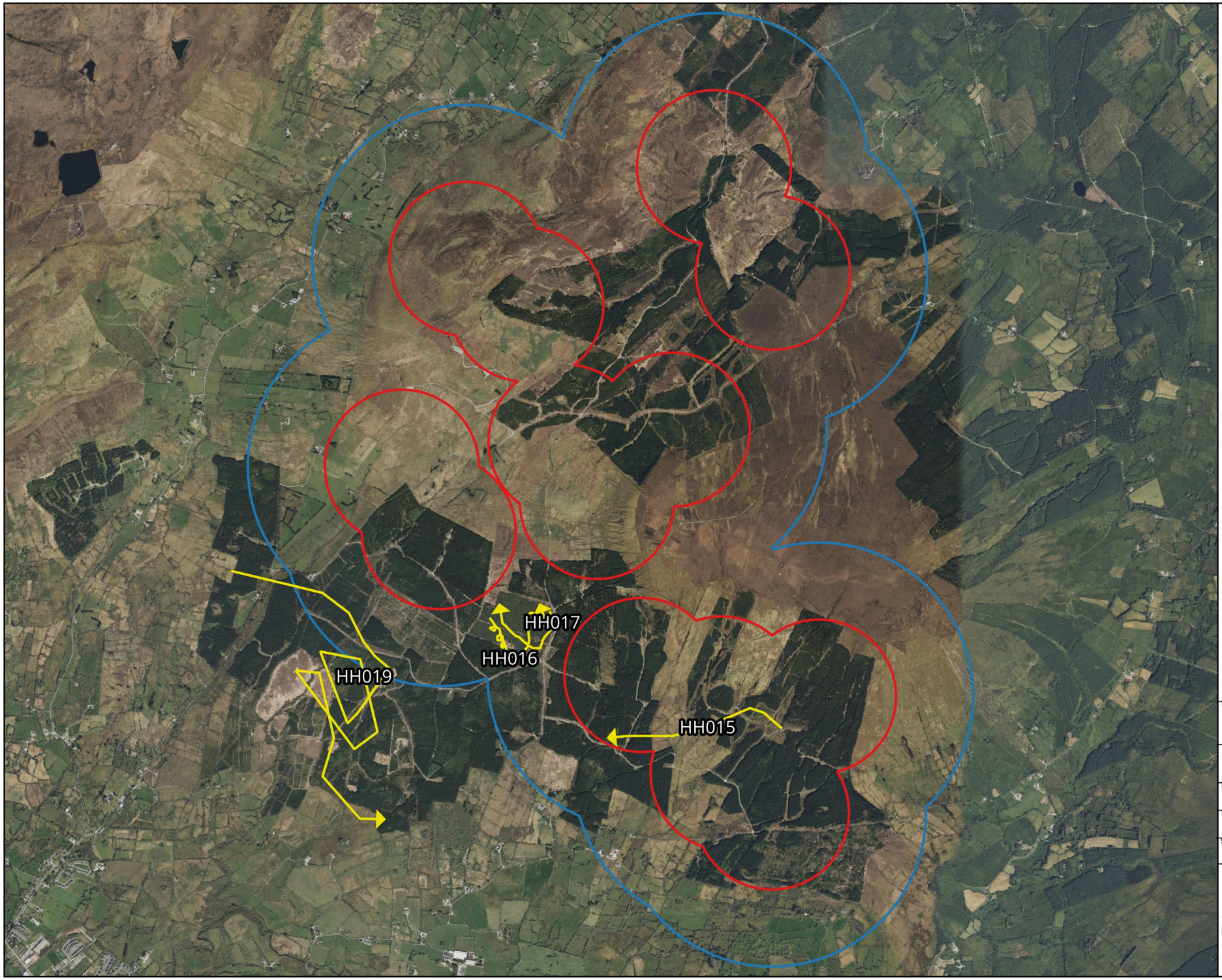

Map Legend

- Site Boundary
- 500m radius of site boundary
- Flightlines

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Drawing Title	Hen Harrier Incidental Observations
Project Title	Lissinagroagh
Drawn By: AO'D	Checked By: SD
Project No.: 200217-h	Drawing No.: Fig 4.0
Scale: 1:32,000	Date: 08.10.24

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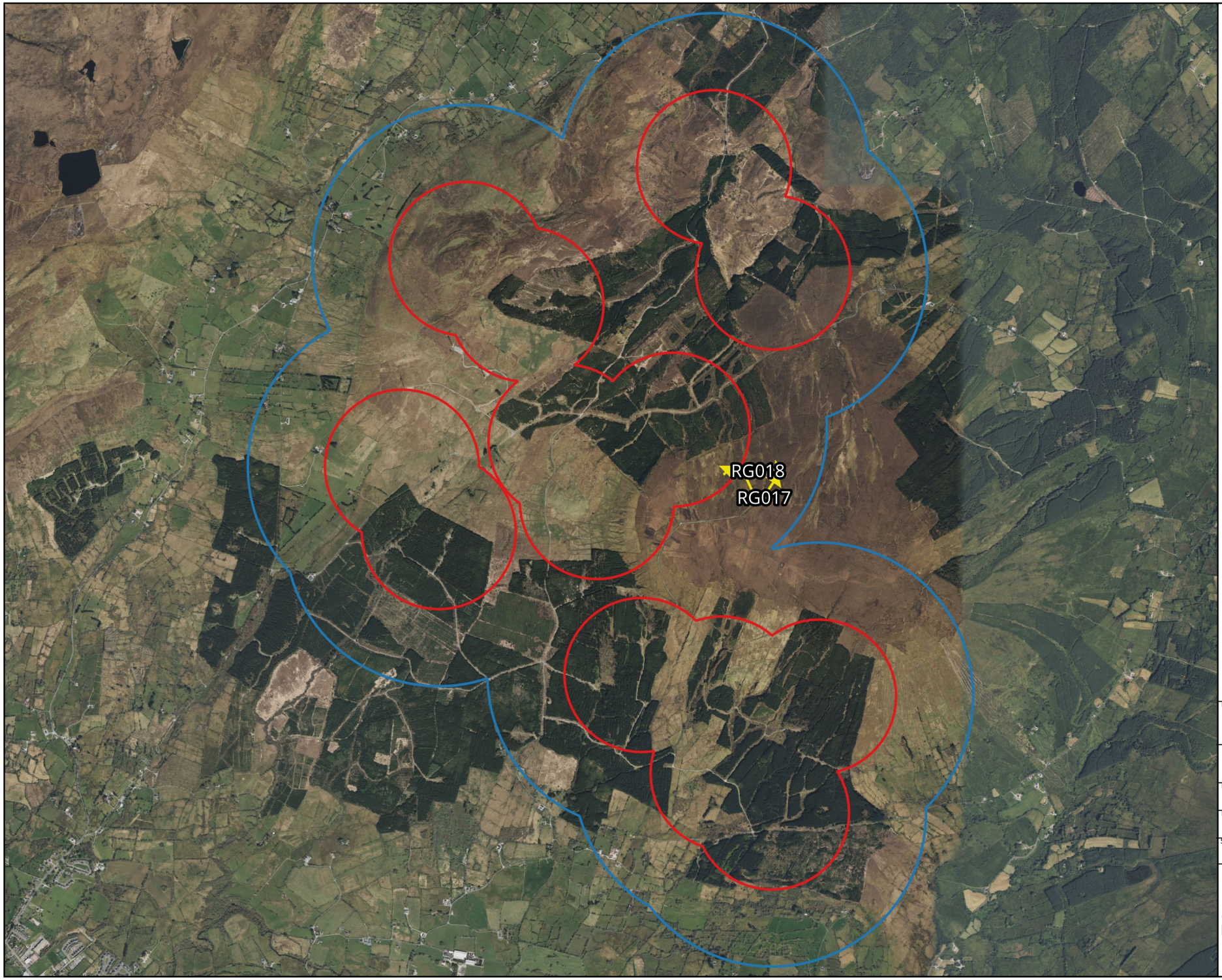

Map Legend

- Site Boundary
- 500m radius of site boundary
- Flightlines

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Drawing Title
Red Grouse Incidental Observations

Project Title
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Drawn By	Checked By
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Map Legend

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Drawing Title

Kestrel Incidental Observations

Project Title

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Project No.	Drawing No.
200217-h	Fig 4.2
Scale	Date
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Map Legend

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Drawing Title: Snipe Incidental Observations

Project Title: Lissinagroagh

Drawn By	Checked By
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Project No.	Drawing No.
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Scale	Date
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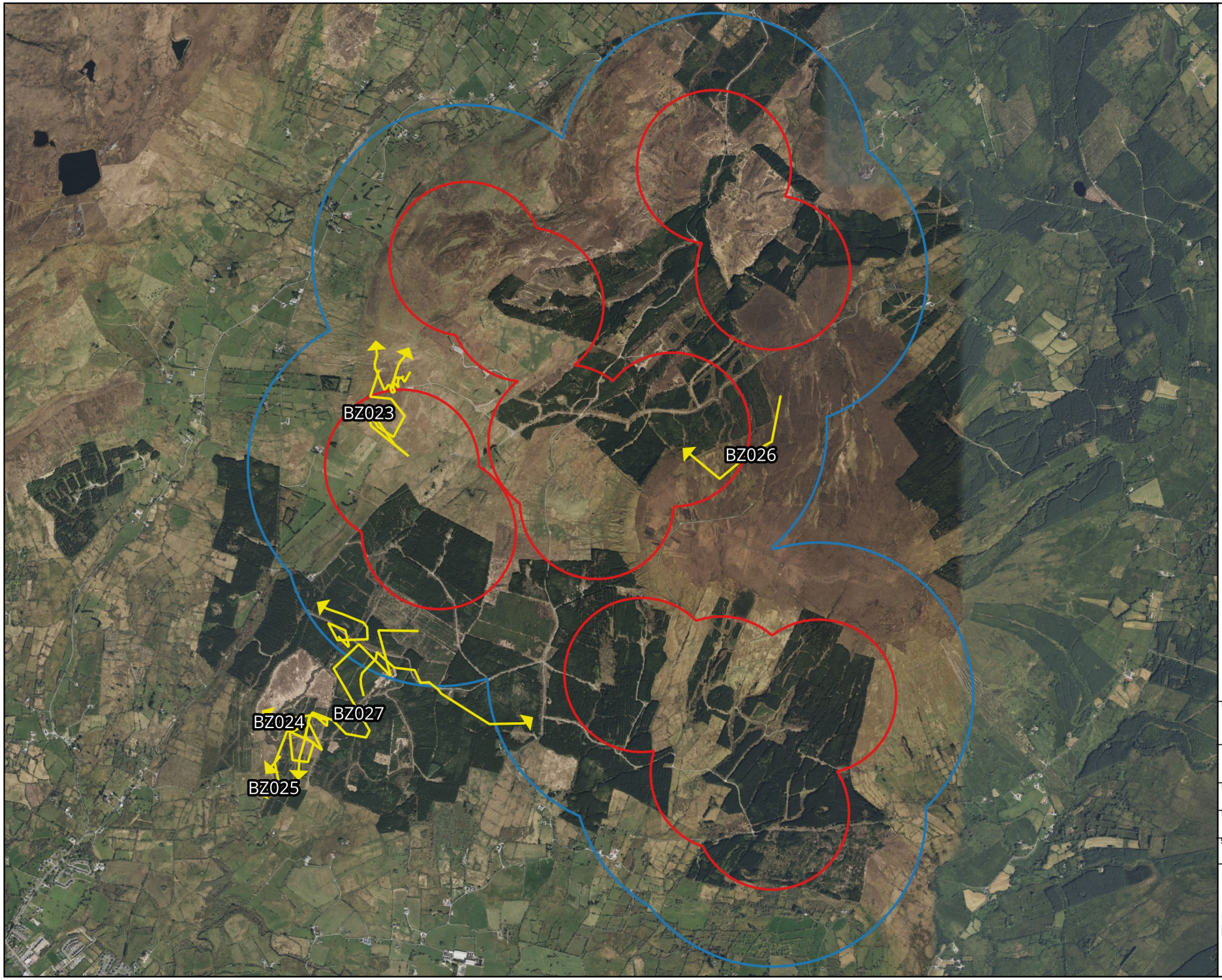

Map Legend

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- Flightlines

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Drawing Title

Buzzard Incidental Observations

Project Title

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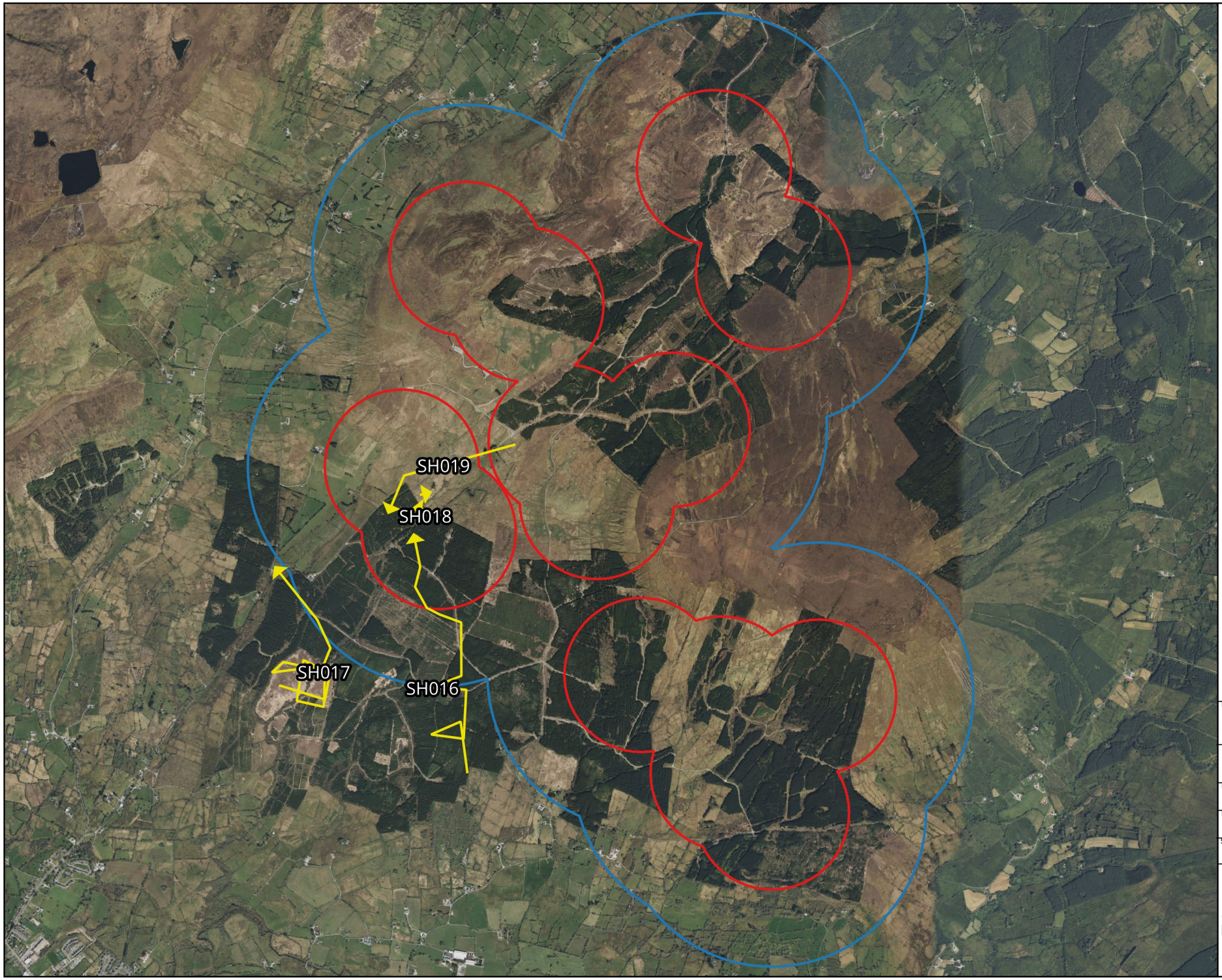

Map Legend

- Site Boundary
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- Flightlines

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Drawing Title	Sparrowhawk Incidental Observations
Project Title	Lissinagroagh
Drawn By	AO'D
Checked By	SD
Project No.	200217-h
Drawing No.	Fig 4.5
Scale	1:32,000
Date	08.10.24

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APPENDIX 2

SURVEY DATA

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Appendix 2 Table 1 Vantage Point Survey Effort

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
13/04/2023	Vantage Point Surveys	VP1	3:00 starting at 05:40	Visibility: good; Wind speed and direction: strong breeze W; Cloud cover and height: 3% 150-500m; Rain: light showers; Frost: none; Snow: none	regular but brief heavy showers, some sleet, Male HH seen briefly.	RV
13/04/2023	Vantage Point Surveys	VP1	3:00 starting at 09:10	Visibility: good; Wind speed and direction: strong breeze W; Cloud cover and height: 3% 150-500m; Rain: light showers; Frost: none; Snow: none	regular but brief heavy showers, some sleet, Male HH seen briefly.	RV
20/04/2023	Vantage Point Survey	VP3	3:00 starting at 05:20	Visibility: good; Wind speed and direction: moderate breeze E; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		KB
20/04/2023	Vantage Point Survey	VP3	3:00 starting at 08:50	Visibility: good; Wind speed and direction: moderate breeze E; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		KB
20/04/2023	Vantage Point Surveys	VP2	3:00 starting at 05:20		Cloudless skies, male and female HH seen several times	RV
20/04/2023	Vantage Point Surveys	VP2	3:00 starting at 08:50		Cloudless skies, male and female HH seen several times	RV
27/04/2023	Vantage Point Surveys	VP4	3:00 starting at 05:00	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none	Early WK and a BZ, VP now poor with surrounding conifers now restricting views	RV
27/04/2023	Vantage Point Surveys	VP4	3:00 starting at 08:30	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none	Early WK and a BZ, VP now poor with surrounding conifers now restricting views	RV

10/05/2023	Vantage Point Survey	VP4	3:00 starting at 16:10	Visibility: moderate; Wind speed and direction: moderate breeze WNW; Cloud cover and height: 33-66% 150-500m; Rain: light showers; Frost: none; Snow: none		NM
10/05/2023	Vantage Point Survey	VP4	3:00 starting at 19:40	Visibility: moderate; Wind speed and direction: moderate breeze WNW; Cloud cover and height: 33-66% 150-500m; Rain: light showers; Frost: none; Snow: none		NM
18/05/2023	Vantage Point Survey	VP3	3:00 starting at 16:20	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Largely fair throughout with periods of sunshine. Gentle W breeze. Warm and humid, 10 - 15°C. Dusk survey. Sunset - 21:31	NM
18/05/2023	Vantage Point Survey	VP3	3:00 starting at 19:50	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Largely fair throughout with periods of sunshine. Gentle W breeze. Warm and humid, 10 - 15°C. Dusk survey. Sunset - 21:31	NM
30/05/2023	Vantage Point Survey	VP2	3:00 starting at 16:00	Visibility: good; Wind speed and direction: light air NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		KB
30/05/2023	Vantage Point Survey	VP2	3:00 starting at 19:53	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		KB
31/05/2023	Vantage Point Survey	VP1	3:00 starting at 16:00	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		KB
31/05/2023	Vantage Point Survey	VP1	3:00 starting at 19:54	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		KB
21/06/2023	Vantage Point Survey	1	3:00 starting at 09:30	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		KB
21/06/2023	Vantage Point Survey	1	3:00 starting at 13:10	Visibility: moderate; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		KB
11/07/2023	Vantage Point Survey	2	3:00 starting at 11:00	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none	June survey	KB

11/07/2023	Vantage Point Survey	2	3:00 starting at 14:30	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none	June survey	KB
12/07/2023	Vantage Point Survey	3	3:00 starting at 11:30	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none	June survey	KB
12/07/2023	Vantage Point Survey	3	3:00 starting at 15:00	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none	June survey	KB
13/07/2023	Vantage Point Survey	4	3:00 starting at 11:00	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none	June survey	KB
13/07/2023	Vantage Point Survey	4	3:00 starting at 14:30	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none	June survey	KB
17/07/2023	Vantage Point Survey	VP1	3:00 starting at 05:10	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none	Thick fog for periods, some light showers	RV
17/07/2023	Vantage Point Survey	VP1	3:00 starting at 08:40	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none	Thick fog for periods, some light showers	RV
20/07/2023	Vantage Point Survey	VP2	3:00 starting at 05:10	Visibility: poor; Wind speed and direction: gentle breeze NW; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none	Thick fog for periods, some light showers	RV
20/07/2023	Vantage Point Survey	VP2	3:00 starting at 08:40	Visibility: poor; Wind speed and direction: gentle breeze NW; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none	Thick fog for periods, some light showers	RV
09/08/2023	Vantage Point Survey	VP1	3:00 starting at 13:30	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: 33-66% >500m; Rain: light showers; Frost: none; Snow: none	Largely fair with scattered bright and cloudy spells. Occasional light showers blowing through but these were short-lived and sporadic. Gentle NE breeze, 12 - 17°C	NM

16/08/2023	Vantage Point Survey	VP4	3:00 starting at 11:00	Visibility: good; Wind speed and direction: light air SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none	July Surveys	KB
16/08/2023	Vantage Point Survey	VP4	3:00 starting at 14:30	Visibility: good; Wind speed and direction: light air SE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	July Surveys	KB
17/08/2023	Vantage Point Survey	VP3	3:00 starting at 11:00	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	July Surveys	KB
17/08/2023	Vantage Point Survey	VP3	3:00 starting at 14:30	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	July Surveys	KB
18/08/2023	Vantage Point Survey	VP2	3:00 starting at 07:00	Visibility: good; Wind speed and direction: strong breeze SSW; Cloud cover and height: 33-66% >500m; Rain: drizzle; Frost: none; Snow: none	Strong SSW breeze building throughout the survey. It started off relatively fair but gradually became darker and quite stormy and unsettled towards the end of the survey. Drizzle blowing through at times. 11 - 15°C	NM
18/08/2023	Vantage Point Survey	VP2	3:00 starting at 10:30	Visibility: good; Wind speed and direction: strong breeze SSW; Cloud cover and height: 33-66% >500m; Rain: drizzle; Frost: none; Snow: none	Strong SSW breeze building throughout the survey. It started off relatively fair but gradually became darker and quite stormy and unsettled towards the end of the survey. Drizzle blowing through at times. 11 - 15°C	NM

29/08/2023	Vantage Point Survey	VP4	3:00 starting at 08:00	Visibility: moderate; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none	Largely fair throughout but with occasional drizzle being blown in. Visibility was changeable throughout, close and humid at VP due to sheltered nature. Moderate SW breeze, 13 - 17°C	NM
29/08/2023	Vantage Point Survey	VP4	3:00 starting at 11:30	Visibility: moderate; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none	Largely fair throughout but with occasional drizzle being blown in. Visibility was changeable throughout, close and humid at VP due to sheltered nature. Moderate SW breeze, 13 - 17°C	NM
30/08/2023	Vantage Point Survey	VP3	3:00 starting at 09:15	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Fair throughout with some bright spells of sunshine drifting through early in the survey. It became gradually more overcast towards the end of the survey but remaining dry. Close and humid due to lack of significant breeze, 12 - 18°C	NM

30/08/2023	Vantage Point Survey	VP3	3:00 starting at 12:45	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Fair throughout with some bright spells of sunshine drifting through early in the survey. It became gradually more overcast towards the end of the survey but remaining dry. Close and humid due to lack of significant breeze, 12 - 18°C	NM
19/09/2023	Vantage Point Survey	VP4	3:00 starting at 06:10	Visibility: moderate; Wind speed and direction: gentle breeze SSW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none	Entirely grey and overcast with persistent light rain. Close and humid throughout with mid - height cloud. Gentle SSW breeze, 12 - 16°C. No clearances whatsoever. Dawn survey. Sunrise - 07:10	NM
19/09/2023	Vantage Point Survey	VP4	3:00 starting at 09:40	Visibility: moderate; Wind speed and direction: gentle breeze SSW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none	Entirely grey and overcast with persistent light rain. Close and humid throughout with mid - height cloud. Gentle SSW breeze, 12 - 16°C. No clearances whatsoever. Dawn survey. Sunrise - 07:10	NM
21/09/2023	Vantage Point Survey	VP2	3:00 starting at 06:00	Visibility: limited; Wind speed and direction: gentle breeze SSW; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none	very cloudy at before and after dawn.	NS
21/09/2023	Vantage Point Survey	VP2	3:00 starting at 09:30	Visibility: moderate; Wind speed and direction: moderate breeze SSW; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none	low clouds throughout the survey	NS
22/09/2023	Vantage Point Survey	VP3	3:00 starting at 06:15	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Fair and clear throughout with prolonged sunny spells. Moderate S breeze blowing high patches of cloud across, 9 - 15°. Dawn survey. Sunrise - 07:15	NM
22/09/2023	Vantage Point Survey	VP3	3:00 starting at 09:40	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Fair and clear throughout with prolonged sunny spells. Moderate S breeze blowing high patches of cloud across, 9 - 15°. Dawn survey. Sunrise - 07:15	NM
29/09/2023	Vantage Point Survey	VP1	3:00 starting at 06:30			NS

29/09/2023	Vantage Point Survey	VP1	3:00 starting at 10:00			NS

Appendix 2 Table 2 Breeding Raptor Survey Effort

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
04/04/2023	Breeding Raptor Survey	rvpc	3:30 starting at 08:30	Visibility: good; Wind speed and direction: strong breeze NE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
04/04/2023	Breeding Raptor Survey	rvpe	1:30 starting at 13:00	Visibility: good; Wind speed and direction: strong breeze NE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
28/04/2023	Breeding Raptor Survey	rvpa	5:00 starting at 12:45	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
03/05/2023	Breeding Raptor Survey	rvps	3:00 starting at 13:00	Visibility: good; Wind speed and direction: fresh breeze NE; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		AOD
03/05/2023	Breeding Raptor Survey	rvpe	3:00 starting at 16:00	Visibility: good; Wind speed and direction: fresh breeze NE; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		AOD
04/05/2023	Breeding Raptor Survey	rvpa	3:00 starting at 12:00	Visibility: good; Wind speed and direction: strong breeze E; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
04/05/2023	Breeding Raptor Survey	rvpi	3:00 starting at 15:00	Visibility: good; Wind speed and direction: strong breeze E; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
09/05/2023	Breeding Raptor Survey	rvpp	4:00 starting at 12:00	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
09/05/2023	Breeding Raptor Survey	rvpc	1:00 starting at 17:00	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
09/05/2023	Breeding Raptor Survey	rvpi	1:00 starting at 18:00	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD

10/05/2023	Breeding Raptor Survey	rvph	4:00 starting at 10:00	Visibility: poor; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
10/05/2023	Breeding Raptor Survey	rvpk	2:00 starting at 15:00	Visibility: poor; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
11/05/2023	Breeding Raptor Survey	rvpe	3:00 starting at 11:00	Visibility: moderate; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
19/05/2023	Breeding Raptor Survey	rvpi	3:00 starting at 07:30	Visibility: moderate; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
23/05/2023	Breeding Raptor Survey	rvpo	4:30 starting at 10:45	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
23/05/2023	Breeding Raptor Survey	rvpc	1:30 starting at 15:45	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
24/05/2023	Breeding Raptor Survey	rvpe	4:00 starting at 12:40	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
31/05/2023	Breeding Raptor Survey	rvpu	3:00 starting at 13:00	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
31/05/2023	Breeding Raptor Survey	rvpp	1:00 starting at 16:30	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
06/06/2023	Breeding Raptor Survey	rvpn	4:00 starting at 11:30	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
06/06/2023	Breeding Raptor Survey	rvpn	2:00 starting at 16:00	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
07/06/2023	Breeding Raptor Survey	rvph	3:00 starting at 14:45	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD

07/06/2023	Breeding Raptor Survey	rvpp	3:00 starting at 18:15	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
13/06/2023	Breeding Raptor Survey	rvpi	4:00 starting at 12:00	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
13/06/2023	Breeding Raptor Survey	rvpi	1:00 starting at 18:00	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
14/06/2023	Breeding Raptor Survey	rvpj	3:00 starting at 08:15	Visibility: good; Wind speed and direction: moderate breeze NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
20/06/2023	Breeding Raptor Survey	rvph	1:00 starting at 13:30	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none		AOD
21/06/2023	Breeding Raptor Survey	rvpo	4:30 starting at 12:00	Visibility: poor; Wind speed and direction: light air S; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
21/06/2023	Breeding Raptor Survey	rvpe	4:30 starting at 17:00	Visibility: poor; Wind speed and direction: light air S; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
22/06/2023	Breeding Raptor Survey	rvpi	3:00 starting at 16:30	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		AOD
23/06/2023	Breeding Raptor Survey	rvph	3:00 starting at 11:20	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
23/06/2023	Breeding Raptor Survey	rvpt	3:00 starting at 14:20	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
28/06/2023	Breeding Raptor Survey	rvpk	3:00 starting at 15:10	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
29/06/2023	Breeding Raptor Survey	rvpl	3:00 starting at 09:00	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
29/06/2023	Breeding Raptor Survey	rvpm	3:00 starting at 13:00	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD

30/06/2023	Breeding Raptor Survey	rvph	3:00 starting at 10:00	Visibility: poor; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
30/06/2023	Breeding Raptor Survey	rvpm	1:00 starting at 13:00	Visibility: poor; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none		AOD
07/07/2023	Breeding Raptor Survey	rvpm	3:00 starting at 16:10	Visibility: good; Wind speed and direction: strong breeze E; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
10/07/2023	Breeding Raptor Survey	rvpt	3:00 starting at 17:45	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		AOD
11/07/2023	Breeding Raptor Survey	rvpo	3:00 starting at 13:00	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
11/07/2023	Breeding Raptor Survey	rvpl	1:00 starting at 16:45	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
12/07/2023	Breeding Raptor Survey	rvpi	3:00 starting at 16:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		AOD
12/07/2023	Breeding Raptor Survey	rvpp	2:00 starting at 19:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		AOD
13/07/2023	Breeding Raptor Survey	rvph	3:00 starting at 12:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
13/07/2023	Breeding Raptor Survey	rvpj	3:00 starting at 16:15	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
19/07/2023	Breeding Raptor Survey	rvpp	3:00 starting at 14:20	Visibility: moderate; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
25/07/2023	Breeding Raptor Survey	rvph	3:00 starting at 16:30	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD

26/07/2023	Breeding Raptor Survey	transect north site	4:30 starting at 07:30	Visibility: poor; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none		AOD
27/07/2023	Breeding Raptor Survey	rvps	3:00 starting at 13:30	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
27/07/2023	Breeding Raptor Survey	rvpp	3:00 starting at 17:00	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
28/07/2023	Breeding Raptor Survey	rvps	3:00 starting at 14:15	Visibility: moderate; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD
28/07/2023	Breeding Raptor Survey	rvpi	1:00 starting at 17:15	Visibility: poor; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
28/07/2023	Breeding Raptor Survey	rvpo	2:00 starting at 18:30	Visibility: poor; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
02/08/2023	Breeding Raptor Survey	rvph	3:00 starting at 15:10	Visibility: good; Wind speed and direction: fresh breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
03/08/2023	Breeding Raptor Survey	transect north site	2:00 starting at 16:45	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
04/08/2023	Breeding Raptor Survey	rvpj	3:00 starting at 12:15	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
10/08/2023	Breeding Raptor Survey	rvpa	1:00 starting at 13:00	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
10/08/2023	Breeding Raptor Survey	rvpd	3:00 starting at 14:30	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: heavy showers; Frost: none; Snow: none		AOD
10/08/2023	Breeding Raptor Survey	transect north site	3:00 starting at 17:30	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: heavy showers; Frost: none; Snow: none		AOD
16/08/2023	Breeding Raptor Survey	transect north site	3:00 starting at 11:00	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD

16/08/2023	Breeding Raptor Survey	rvpp	3:00 starting at 15:00	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
17/08/2023	Breeding Raptor Survey	rvpi	3:00 starting at 11:15	Visibility: good; Wind speed and direction: fresh breeze NE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
17/08/2023	Breeding Raptor Survey	rvpr	3:00 starting at 14:45	Visibility: good; Wind speed and direction: fresh breeze NE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
22/08/2023	Breeding Raptor Survey	rvpj	3:00 starting at 12:40	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
22/08/2023	Breeding Raptor Survey	rvpp	1:00 starting at 15:50	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD

Appendix 2 Table 3 Foraging Vantage Point Survey Effort

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
27/06/2023	Foraging Vantage Point	fvp1	3:00 starting at 06:50	Visibility: poor; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD
27/06/2023	Foraging Vantage Point	fvp2	3:00 starting at 10:10	Visibility: moderate; Wind speed and direction: fresh breeze S; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
05/07/2023	Foraging Vantage Point	fvp2	3:00 starting at 09:30	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 33-66% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
05/07/2023	Foraging Vantage Point	fvp2	3:00 starting at 13:20	Visibility: moderate; Wind speed and direction: gentle breeze SW; Cloud cover and height: 33-66% >500m; Rain: light showers; Frost: none; Snow: none		AOD
06/07/2023	Foraging Vantage Point	fvp1	3:00 starting at 10:35	Visibility: moderate; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none		AOD
06/07/2023	Foraging Vantage Point	fvp1	1:00 starting at 14:15	Visibility: moderate; Wind speed and direction: fresh breeze SE; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD

07/07/2023	Foraging Vantage Point	fvp1	2:00 starting at 10:45	Visibility: good; Wind speed and direction: fresh breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
07/07/2023	Foraging Vantage Point	fvp2	3:00 starting at 13:00	Visibility: good; Wind speed and direction: strong breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
10/07/2023	Foraging Vantage Point	fvp1	3:00 starting at 14:15	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none		AOD
17/07/2023	Foraging Vantage Point	fvp2	3:00 starting at 14:40	Visibility: good; Wind speed and direction: light breeze SE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
17/07/2023	Foraging Vantage Point	fvp1	3:00 starting at 11:30	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
17/07/2023	Foraging Vantage Point	fvp2	3:00 starting at 15:00	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
18/07/2023	Foraging Vantage Point	fvp1	3:00 starting at 10:35	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
18/07/2023	Foraging Vantage Point	fvp1	3:00 starting at 14:20	Visibility: moderate; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
19/07/2023	Foraging Vantage Point	fvp2	3:00 starting at 10:35	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
20/07/2023	Foraging Vantage Point	fvp1	3:00 starting at 10:30	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		AOD
20/07/2023	Foraging Vantage Point	fvp1	3:00 starting at 14:00	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		AOD
21/07/2023	Foraging Vantage Point	fvp1	3:00 starting at 09:50	Visibility: poor; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD

25/07/2023	Foraging Vantage Point	fvp1	3:00 starting at 12:45	Visibility: good; Wind speed and direction: light air SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
01/08/2023	Foraging Vantage Point	fvp1	3:00 starting at 12:15	Visibility: good; Wind speed and direction: light breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
01/08/2023	Foraging Vantage Point	fvp2	3:00 starting at 15:45	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
02/08/2023	Foraging Vantage Point	fvp2	3:00 starting at 11:00	Visibility: good; Wind speed and direction: fresh breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
03/08/2023	Foraging Vantage Point	fvp1	3:00 starting at 18:50	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
04/08/2023	Foraging Vantage Point	fvp2	1:00 starting at 16:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
10/08/2023	Foraging Vantage Point	fvp1	2:00 starting at 11:00	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD

Appendix 2 Table 4 Vantage Point Survey Data

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-10m)	Band 2 (10-25m)	Band 3 (25-175m)	Band 4 (>175m)	Habitat and activity	Surveyor
MP075	VP1	13/04/2023	06:15	Meadow Pipit	8	-	-	-	-	-	upland blanket bog; displaying, atleast 8 singing and displaying around vp	RV
LB029	VP1	13/04/2023	10:37	Lesser Black-backed Gull	1	82	20	62	0	0	improved agricultural grassland; flying, flew across site and landed on lake south of vp	RV
SN057	VP3	20/04/2023	05:43	Snipe	1	-	-	-	-	-	bogs; chirping	KB

MP076	VP3	20/04/2023	06:01	Meadow Pipit	2	-	-	-	-	-	bogs; flying	KB
MP077	VP3	20/04/2023	06:16	Meadow Pipit	1	-	-	-	-	-	bogs; singing	KB
SN058	VP3	20/04/2023	06:40	Snipe	1	-	-	-	-	-	bogs; chirping	KB
SN059	VP3	20/04/2023	06:52	Snipe	1	-	-	-	-	-	bogs; chirping	KB
RG055	VP3	20/04/2023	07:04	Red Grouse	1	-	-	-	-	-	bogs; on ground, calling	KB
RG056	VP3	20/04/2023	07:50	Red Grouse	2	-	-	-	-	-	bogs; on ground	KB
RG057	VP3	20/04/2023	07:59	Red Grouse	1	-	-	-	-	-	bogs; on ground, calling	KB
SN060	VP3	20/04/2023	08:04	Snipe	1	80	5	5	70	0	bogs; drumming	KB
SN061	VP3	20/04/2023	09:31	Snipe	1	45	10	5	25	0	bogs; drumming	KB
RG058	VP3	20/04/2023	10:26	Red Grouse	1	5	5	0	0	0	bogs; flying, landed	KB
MP078	VP2	20/04/2023	06:20	Meadow Pipit	8	-	-	-	-	-	upland blanket bog and improved agricultural grassland; displaying, 4 pairs chasing around vp	RV
LB030	VP2	20/04/2023	07:42	Lesser Black-backed Gull	1	42	35	7	0	0	improved agricultural grassland and conifer plantation; flying, ad flying lazily across site	RV
HH240	VP2	20/04/2023	09:05	Hen Harrier	1	320	320	0	0	0	improved agricultural grassland and conifer plantation; hunting, same male recorded during break in incidental, hunted over wide area, landed after appearing to catch something	RV
LB031	VP2	20/04/2023	09:41	Lesser Black-backed Gull	1	83	33	50	0	0	improved agricultural grassland and conifer plantation; flying, ad flying across site	RV

HH241	VP2	20/04/2023	09:54	Hen Harrier	1	445	380	65	0	0	improved agricultural grassland and conifer plantation; flying/hunting, female over a wide area	RV
HH242	VP2	20/04/2023	10:42	Hen Harrier	1	320	250	70	0	0	improved agricultural grassland and conifer plantation; hunting, male hunting	RV
HH243	VP2	20/04/2023	11:08	Hen Harrier	1	1140	200	800	140		improved agricultural grassland and conifer plantation; hunting/displaying, male hunting then circling briefly with female	RV
HH244	VP2	20/04/2023	11:14	Hen Harrier	1	45	0	0	45	0	improved agricultural grassland and conifer plantation; circling/ displaying, female circled with male but i lost it as i followed male and could not relocate	RV
WK011	VP4	27/04/2023	05:24	Woodcock	1	5	0	5	0	0	scrub; flying, flew over scrub, called once	RV
MP079	VP4	27/04/2023	05:30	Meadow Pipit	6	-	-	-	-	-	improved agricultural grassland and lowland blanket bog; displaying, 4 birds displaying over bog, 2 more in with sheep	RV
LB032	VP4	27/04/2023	08:41	Lesser Black-backed Gull	1	21	0	21	0	0	#N/A	RV
BZ200	VP4	27/04/2023	08:47	Buzzard	1	30	0	30	0	0	improved agricultural grassland, conifer plantation and scrub; flying, ad circled up and flew across valley	RV
BZ201	VP4	27/04/2023	11:02	Buzzard	1	14	0	14	0	0	improved agricultural grassland, conifer plantation and scrub; flying, adult flew across valley	RV
ML005	VP4	10/05/2023	18:43	Merlin	1	130	60	70	0	0	conifer plantation and semi-natural grassland; flying low and rapidly with young forestry adjacent to vp, disappeared se	

K.002	VP4	10/05/2023	17:30	Kestrel	1	230	0	40	190	0	semi-natural grassland and scrub; hunting and hovering high over rough farmland to w of vp	
K.003	VP4	10/05/2023	21:11	Kestrel	1	450	80	30	340	0	semi-natural grassland and bogs; hunting and hovering over boggy grassland and along forestry fringes,	
MP080	VP4	10/05/2023	16:30	Meadow Pipit	37	10000	7500	2250	250	0	semi-natural grassland and improved agricultural grassland; lots of activity on open ground immediate se of vp throughout survey, uncountable	
MP081	VP4	10/05/2023	19:49	Meadow Pipit	7	90	0	0	90	0	conifer plantation and semi-natural grassland; small group calling and flying sw across vp	
MP082	VP4	10/05/2023	18:08	Meadow Pipit	19	250	180	70	0	0	scattered tress and parkland and scrub; calling and flitting low across open area and landing with scrub	
SN062	VP4	10/05/2023	16:29	Snipe	3	130	0	30	100	0	semi-natural grassland and scrub; flying and calling, heading n across vp	

SN063	VP4	10/05/2023	22:03	Snipe	14	1020	150	690	160	0	semi-natural grassland and improved agricultural grassland; display flights and calls above open boggy grassland to immediate se of vp	
CA002	VP4	10/05/2023	18:32	Cormorant	3	250	0	0	250	0	improved agricultural grassland and scrub; pair flying high, heading n and over site	
BH002	VP4	10/05/2023	16:14	Black-headed Gull	7	200	0	0	200	0	improved agricultural grassland and semi-natural grassland; flying high along s 500m buffer, heading e	
BH003	VP4	10/05/2023	19:07	Black-headed Gull	13	320	0	120	200	0	conifer plantation and scrub; flying high over site and heading w	
BH004	VP4	10/05/2023	20:27	Black-headed Gull	134	450	20	40	390	0	improved agricultural grassland and scrub; circling high over farmland to se, wheeling and disappearing into folds of the land eventually	
LB033	VP4	10/05/2023	17:41	Lesser Black-backed Gull	1	270	0	0	100	170	improved agricultural grassland and scrub; soaring high above s 500m buffer, heading gradually n	
LB034	VP4	10/05/2023	18:17	Lesser Black-backed Gull	9	320	0	30	260	30	conifer plantation and semi-natural grassland; flying high across w of site, moved steadily w and disappeared into lowland	

HH245	VP3	18/05/2023	19:47	Hen Harrier	1	110	90	20	0	0	mixed conifer woodland and heath; commuting low along forestry edge and across heather moorland, heading downhill (n)	
K.004	VP3	18/05/2023	20:55	Kestrel	1	350	40	260	50	0	bogs and heath; hunting and hovering over moorland, along forestry fringes and rough farmland to ne of vp	
H.002	VP3	18/05/2023	17:32	Grey Heron	1	200	0	0	200	0	bogs and scrub; flying high along e buffer, heading n and downhill	
ET001	VP3	18/05/2023	18:43	Little Egret	3	170	0	170	0	0	improved agricultural grassland and hedgerows; flying along valley and farmland within valley to nw of vp	
MP083	VP3	18/05/2023	17:00	Meadow Pipit	32	15000	14200	800	0	0	heath and bogs; almost continuous activity of mp on open moorland surrounding vp throughout, calling and flitting	

MP084	VP3	18/05/2023	19:53	Meadow Pipit	14	160	0	0	160	0	heath and bogs; flying high and calling across vp, heading nw across forestry on site	
SN064	VP3	18/05/2023	18:09	Snipe	4	160	0	145	15	0	conifer plantation and semi-natural grassland; flying rapidly across vp area and calling, heading e	
SN065	VP3	18/05/2023	21:15	Snipe	21	5400	340	4700	360	0	heath and semi-natural grassland; persistent display flights and calls over vp for last 90mins of survey, still going at the end	
LB035	VP3	18/05/2023	17:40	Lesser Black-backed Gull	16	270	0	0	270	0	heath and improved agricultural grassland; soaring over moorland and upland farmland to n, heading nw and descending into valley	
BZ202	VP3	18/05/2023	18:56	Buzzard	2	470	0	90	380	0	conifer plantation and semi-natural grassland; pair soaring over forestry to e of vp, moving away gradually	
BZ203	VP3	18/05/2023	20:38	Buzzard	1	900	40	100	760	0	conifer plantation and scrub; soaring over forestry and rough moorland on site for a long period in evening	

HH246	VP2	30/05/2023	17:31	Hen Harrier	1	45	0	25	20	0	conifer plantation; foraging, male	KB
BZ204	VP2	30/05/2023	17:48	Buzzard	1	20	0	20	0	0	conifer plantation; flying	KB
MP085	VP2	30/05/2023	17:52	Meadow Pipit	1	-	-	-	-	-	bogs; singing	KB
SH059	VP2	30/05/2023	18:43	Sparrowhawk	1	8	8	0	0	0	bogs; flying, female	KB
MP086	VP1	31/05/2023	20:25	Meadow Pipit	2	-	-	-	-	-	bogs; adult feeding a fledgeling	KB
BZ205	VP1	31/05/2023	20:33	Buzzard	1	50	0	20	30	0	conifer plantation and wet grassland; flying	KB
SH060	VP1	31/05/2023	21:41	Sparrowhawk	1	8	8	0	0	0	wet grassland; foraging	KB
MP087	VP1	21/06/2023	09:40	Meadow Pipit	1	-	-	-	-	-	bogs; foraging	KB
HH247	VP1	21/06/2023	11:03	Hen Harrier	1	160	0	0	160	0	conifer plantation; foraging, male	KB
HH248	VP1	21/06/2023	11:31	Hen Harrier	1	120	0	60	60	0	bogs; foraging, male	KB
HH249	VP1	21/06/2023	11:36	Hen Harrier	1	240	0	0	60	180	bogs and conifer plantation; soaring, male. ascending - lost from view in clouds	KB
BZ206	VP1	21/06/2023	11:44	Buzzard	1	90	0	0	90	0	conifer plantation; flying	KB
HH250	VP1	21/06/2023	13:26	Hen Harrier	1	120	10	60	50	0	conifer plantation and bogs; foraging, male	KB
HH251	VP1	21/06/2023	13:30	Hen Harrier	1	300	15	45	120	0	conifer plantation and bogs; foraging, male	KB
HH252	VP1	21/06/2023	14:15	Hen Harrier	1	90	0	0	90	0	bogs; foraging, male	KB
HH253	VP1	21/06/2023	14:19	Hen Harrier	1	120	0	0	120	0	bogs and conifer plantation; foraging, male	KB
HH254	VP1	21/06/2023	14:26	Hen Harrier	1	100	0	0	100	0	conifer plantation; foraging, male	KB
HH255	VP1	21/06/2023	15:48	Hen Harrier	1	240	0	0	240	0	conifer plantation; foraging, male	KB

MP088	VP2	11/07/2023	11:12	Meadow Pipit	3	-	-	-	-	-	bogs; flying	KB
MP089	VP2	11/07/2023	11:35	Meadow Pipit	1	-	-	-	-	-	bogs; singing	KB
BZ207	VP2	11/07/2023	12:18	Buzzard	1	200	20	60	120	0	bogs and conifer plantation; flying	KB
HH256	VP2	11/07/2023	12:20	Hen Harrier	1	300	0	150	150	0	bogs and conifer plantation; flying, male	KB
BZ208	VP2	11/07/2023	13:05	Buzzard	1	60	0	10	50	0	conifer plantation; soaring	KB
HH257	VP2	11/07/2023	13:36	Hen Harrier	1	50	0	15	35	0	bogs and conifer plantation; flying, male	KB
HH258	VP2	11/07/2023	13:52	Hen Harrier	1	180	0	60	120	0	conifer plantation; flying, male	KB
HH259	VP2	11/07/2023	15:44	Hen Harrier	1	120	100	20	0	0	bogs and conifer plantation; foraging, male	KB
BZ209	VP2	11/07/2023	15:53	Buzzard	1	330	0	10	320	0	conifer plantation; soaring	KB
BZ210	VP2	11/07/2023	16:11	Buzzard	1	40	0	5	35	0	conifer plantation; soaring	KB
HH260	VP2	11/07/2023	16:28	Hen Harrier	1	70	20	10	40	0	bogs and conifer plantation; foraging, male	KB
HH261	VP2	11/07/2023	16:34	Hen Harrier	1	50	40	10	0	0	bogs and conifer plantation; foraging, male	KB
SN066	VP3	12/07/2023	11:45	Snipe	1	-	-	-	-	-	bogs; chipping	KB
MP090	VP3	12/07/2023	12:10	Meadow Pipit	2	-	-	-	-	-	bogs; singing	KB
SN067	VP3	12/07/2023	12:23	Snipe	1	-	-	-	-	-	bogs; chipping	KB
SN068	VP3	12/07/2023	12:41	Snipe	1	240	30	60	150	0	bogs; drumming	KB
SN069	VP3	12/07/2023	15:01	Snipe	1	200	5	95	100	0	bogs; drumming	KB
HH262	VP4	13/07/2023	11:17	Hen Harrier	1	8	0	8	0	0	conifer plantation and bogs; flying, male	KB

BZ211	VP4	13/07/2023	11:29	Buzzard	1	80	5	20	55	0	semi-natural grassland and hedgerows; soaring	KB
BZ212	VP4	13/07/2023	11:48	Buzzard	1	120	30	30	60	0	semi-natural grassland, bogs and conifer plantation; soaring	KB
HH263	VP4	13/07/2023	12:10	Hen Harrier	1	20	0	20	0	0	conifer plantation; flying, male	KB
BZ213	VP4	13/07/2023	12:14	Buzzard	1	30	0	0	30	0	conifer plantation; soaring	KB
HH264	VP4	13/07/2023	13:36	Hen Harrier	1	7	7	0	0	0	conifer plantation and bogs; pair up flying together - female dropped down, male flew ne, female	KB
HH265	VP4	13/07/2023	13:36	Hen Harrier	1	20	5	15	0	0	conifer plantation and bogs; pair up flying together - female dropped down, male flew ne, male	KB
BZ214	VP4	13/07/2023	13:48	Buzzard	1	60	0	20	40	0	semi-natural grassland and hedgerows; soaring	KB
HH266	VP4	13/07/2023	13:49	Hen Harrier	1	25	0	25	0	0	conifer plantation and bogs; flying, male	KB
HH267	VP4	13/07/2023	13:55	Hen Harrier	1	70	0	50	20	0	conifer plantation and bogs; foraging, male	KB
HH268	VP4	13/07/2023	13:56	Hen Harrier	1	30	20	10	0	0	bogs and conifer plantation; up circling and descended, female	KB
BZ215	VP4	13/07/2023	13:57	Buzzard	1	5	5	0	0	0	bogs and conifer plantation; flying and calling	KB
HH269	VP4	13/07/2023	15:25	Hen Harrier	1	150	10	140	0	0	conifer plantation and bogs; soaring, female	KB
BZ216	VP4	13/07/2023	16:09	Buzzard	1	7	7	0	0	0	semi-natural grassland; flying - landed in tree	KB
BZ217	VP4	13/07/2023	16:12	Buzzard	1	5	5	0	0	0	semi-natural grassland; took up from perch	KB
SH061	VP4	13/07/2023	16:21	Sparrowhawk	1	12	0	12	0	0	semi-natural grassland, bogs and conifer plantation; foraging	KB

HH270	VP1	17/07/2023	08:49	Hen Harrier	1	15	0	15	0	0	improved agricultural grassland; flying, female flew from edge of plantation and was lost when i switched to scope	RV
BZ218	VP1	17/07/2023	09:13	Buzzard	1	7	7	0	0	0	improved agricultural grassland; flying, heard calling and flew short distance to isolated trees	RV
HH271	VP1	17/07/2023	09:28	Hen Harrier	1	9	9	0	0	0	conifer plantation and upland blanket bog; flying, male low over plantation and into clearing	RV
HH272	VP1	17/07/2023	09:51	Hen Harrier	1	12	12	0	0	0	improved agricultural grassland; flying, male low over similar area to female	RV
BZ219	VP1	17/07/2023	10:17	Buzzard	1	55	15	40	0	0	improved agricultural grassland; circling, circling over sheep fields and flew into gap in plantation	RV
MP091	VP1	17/07/2023	11:40	Meadow Pipit	11	-	-	-	-	-	upland blanket bog; feeding, max of 11 in air around vp	RV
MP092	VP1	17/07/2023	11:40	Meadow Pipit	5	-	-	-	-	-	improved agricultural grassland; feeding, several in sheep field through out survey, atleast 5 in air when bz flew over	RV
HH273	VP2	20/07/2023	09:48	Hen Harrier	1	260	205	55	0	0	upland blanket bog, conifer plantation and improved agricultural grassland; hunting, hunting over a wide area and lost behind hill by turbines	RV
BZ220	VP2	20/07/2023	10:27	Buzzard	1	165	0	0	165	0	upland blanket bog and improved agricultural grassland; circling, circling high over hill, dove steeply out of view behind hill	RV
MP093	VP2	20/07/2023	11:40	Meadow Pipit	15	-	-	-	-	-	upland blanket bog and improved agricultural grassland; feeding, atleast 15 flying around vp during the survey period	RV

HG002	VP1	09/08/2023	11:12	Herring Gull	18	340	0	0	340	0	conifer plantation, bogs and scrub; commuting high across site, moving ne	NM
LB036	VP1	09/08/2023	10:09	Lesser Black-backed Gull	6	430	0	190	340	0	conifer plantation, scrub and semi-natural grassland; commuting across site, swirling over forestry on occasion but continuing sw	NM
LB037	VP1	09/08/2023	12:42	Lesser Black-backed Gull	5	340	0	0	280	60	bogs, mixed conifer woodland and scrub; commuting high across site, moving s	NM
LB038	VP1	09/08/2023	11:20	Lesser Black-backed Gull	14	570	0	280	290	0	bogs and conifer plantation; swirling over hillside for a period, moving e	NM
BH005	VP1	09/08/2023	10:43	Black-headed Gull	9	210	0	210	0	0	conifer plantation, bogs and semi-natural grassland; commuting nw across site, relatively low across forestry	NM
BH006	VP1	09/08/2023	14:17	Black-headed Gull	9	175	0	0	175	0	conifer plantation, bogs and semi-natural grassland; commuting s across site	NM
LB039	VP1	09/08/2023	12:04	Lesser Black-backed Gull	37	2670	400	2000	270	0	lakes and ponds and improved agricultural grassland; swirling over lake and adjacent farmland, well off site, disappearing sw	NM

BH007	VP1	09/08/2023	11:48	Black-headed Gull	73	3450	350	2800	300	0	lakes and ponds and improved agricultural grassland; swirling over lake and adjacent farmland, swooping low, disappearing se, individual birds were seen in and around the lake for the rest of the survey	NM
HG003	VP1	09/08/2023	15:29	Herring Gull	5	685	0	0	685	0	improved agricultural grassland and conifer plantation; soaring to the se of site	NM
LB040	VP1	09/08/2023	10:54	Lesser Black-backed Gull	8	430	0	250	180	0	improved agricultural grassland and conifer plantation; commuting w along s 500m buffer	NM
MP094	VP1	09/08/2023	11:39	Meadow Pipit	17	75	75	0	0	0	bogs and semi-natural grassland; flying and calling frantically downhill, flushed by bz passing through	NM
BZ221	VP1	09/08/2023	11:35	Buzzard	1	380	360	20	0	0	bogs, conifer plantation and scrub; flying low uphill along forestry fringe, continuing nw until it was lost within scrubby forestry	NM
BZ222	VP1	09/08/2023	13:07	Buzzard	2	790	0	0	790	0	conifer plantation, improved agricultural grassland and scrub; soaring and circling over se of site, moving s and off site	NM
MP095	VP1	09/08/2023	15:28	Meadow Pipit	7	65	0	0	65	0	bogs and heath; flying high and calling across hillside	NM
H.003	VP1	09/08/2023	11:33	Grey Heron	1	165	0	0	165	0	conifer plantation, bogs and improved agricultural grassland; commuting high across se of site	NM

SI003	VP1	09/08/2023	12:47	Swift	26	1150	0	380	770	0	bogs, scrub and highly modified/non-native woodland; soaring and swirling over hillside and across site, moving sw until they were lost from view	NM
SN070	VP1	09/08/2023	10:03	Snipe	3	70	35	35	0	0	bogs, highly modified/non-native woodland and semi-natural grassland; flushed from rushy bog	NM
SN071	VP1	09/08/2023	14:52	Snipe	3	130	0	110	20	0	highly modified/non-native woodland and bogs; flying and alarm calling across vp area, moving nw	NM
MP096	VP1	09/08/2023	10:25	Meadow Pipit	43	-	-	-	-	-	bogs and heath; flitting and calling within heather moorland and bog surrounding vp area, throughout survey, numbers were rough. max flock - 13	NM
BZ223	VP1	09/08/2023	15:28	Buzzard	1	-	-	-	-	-	mixed conifer woodland; perched within edges of forestry	NM
SH062	VP4	16/08/2023	11:24	Sparrowhawk		-	-	-	-	-	conifer plantation; begging calls heard	KB
BZ224	VP4	16/08/2023	12:52	Buzzard	1	25	0	0	25	0	conifer plantation; soaring	KB
BZ225	VP4	16/08/2023	13:40	Buzzard	1	50	0	20	30	0	conifer plantation, semi-natural grassland and hedgerows; flying	KB
BZ226	VP4	16/08/2023	15:03	Buzzard	1	30	0	0	30	0	improved grassland and hedgerows; flying	KB
SH063	VP4	16/08/2023	16:14	Sparrowhawk	1	12	0	12	0	0	improved grassland and conifer plantation; flying	KB
MP097	VP3	17/08/2023	11:18	Meadow Pipit	2	-	-	-	-	-	bogs; flying	KB

HG004	VP3	17/08/2023	15:03	Herring Gull	1	40	0	10	30	0	bogs and conifer plantation; flying	KB
SN072	VP3	17/08/2023	17:22	Snipe	1	30	0	0	30	0	bogs; flying	KB
WE001	VP2	18/08/2023	08:19	White-tailed Eagle	1	1050	0	0	450	600	conifer plantation, bogs and semi-natural grassland; soaring high across site, moving nw and appeared to be heading towards l. melvin	NM
GB003	VP2	18/08/2023	12:15	Great Black-backed Gull	5	470	0	100	370	0	conifer plantation, bogs and improved agricultural grassland; commuting across site, moving sw	NM
LB041	VP2	18/08/2023	09:22	Lesser Black-backed Gull	7	350	0	0	350	0	bogs and highly modified/non-native woodland; commuting se across site	NM
LB042	VP2	18/08/2023	11:52	Lesser Black-backed Gull	17	330	0	40	290	0	conifer plantation, semi-natural grassland and scrub; commuting w across s of site, was lost behind forestry	NM
SN073	VP2	18/08/2023	07:03	Snipe	2	75	25	50	0	0	bogs and highly modified/non-native woodland; flushed from bog	NM
SN074	VP2	18/08/2023	10:34	Snipe	6	115	0	80	35	0	bogs and conifer plantation; flying frantically and alarm calling across vp area, moving w	NM
K.005	VP2	18/08/2023	08:17	Kestrel	1	590	60	180	250	0	bogs and semi-natural grassland; hunting and hovering over moorland, moving w	NM

MP098	VP2	18/08/2023	07:20	Meadow Pipit	36	-	-	-	-	-	bogs, semi-natural grassland and improved agricultural grassland; flitting and calling within moorland and upland grassland adjacent to vp, throughout survey, numbers were rough. max flock - 11	NM
SN075	VP2	18/08/2023	10:19	Snipe	3	-	-	-	-	-	bogs, improved agricultural grassland and semi-natural grassland; chirping on bog and rushy grassland	NM
MP099	VP4	29/08/2023	09:21	Meadow Pipit	6	70	0	70	0	0	highly modified/non-native woodland; flying and calling across vp area, moving s	NM
MP100	VP4	29/08/2023	12:04	Meadow Pipit	4	40	0	4	0	0	highly modified/non-native woodland, bogs and scrub; flying and calling across vp, heading w	NM
H.004	VP4	29/08/2023	12:18	Grey Heron	1	250	0	120	130	0	highly modified/non-native woodland, improved agricultural grassland and scrub; flying s along sw 500m buffer	NM
K.006	VP4	29/08/2023	09:39	Kestrel	1	430	50	350	30	0	improved agricultural grassland, semi-natural grassland and scrub; hunting and hovering over rough farmland	NM
BZ227	VP4	29/08/2023	08:53	Buzzard	1	430	0	0	430	0	improved agricultural grassland and conifer plantation; soaring and circling high over forestry, heading n onto site	NM
BZ228	VP4	29/08/2023	13:11	Buzzard	2	875	0	230	645	0	conifer plantation, improved agricultural grassland and scrub; soaring and calling across forestry, moving w	NM

BH008	VP4	29/08/2023	09:00	Black-headed Gull	7	190	0	70	130	0	improved agricultural grassland and conifer plantation; commuting ne across site	NM
BH009	VP4	29/08/2023	11:27	Black-headed Gull	29	350	0	230	120	0	conifer plantation, improved agricultural grassland and scrub; commuting and swooping sw	NM
MA003	VP4	29/08/2023	08:23	Mallard	13	320	0	0	320	0	improved agricultural grassland; commuting across farmland	NM
MP101	VP4	29/08/2023	08:20	Meadow Pipit	25	-	-	-	-	-	improved agricultural grassland and bogs; flitting and calling within boggy farmland adjacent to vp, throughout survey	NM
MP102	VP3	30/08/2023	10:43	Meadow Pipit	12	60	60	0	0	0	bogs and heath; flying low and calling across heather moorland	NM
MP103	VP3	30/08/2023	09:19	Meadow Pipit	7	45	45	0	0	0	bogs and heath; flying low and calling across heather moorland	NM
MP104	VP3	30/08/2023	14:32	Meadow Pipit	19	250	170	20	60	0	heath, bogs and conifer plantation; flitting and calling within heather below vp, before moving away sw	NM
ET002	VP3	30/08/2023	11:38	Little Egret	2	150	0	0	150	0	bogs, conifer plantation and improved agricultural grassland; commuting high across heather moorland and forestry, moving n	NM

SN076	VP3	30/08/2023	09:37	Snipe	4	90	0	20	70	0	bogs and conifer plantation; flying frantically and alarm calling across vp	NM
LB043	VP3	30/08/2023	13:48	Lesser Black-backed Gull	7	280	0	0	280	0	bogs and conifer plantation; commuting nw across n of site	NM
LB044	VP3	30/08/2023	12:42	Lesser Black-backed Gull	21	570	0	200	370	0	highly modified/non-native woodland and improved agricultural grassland; soaring and swooping to the n of site, appearing to be heading towards l. melvin	NM
BZ229	VP3	30/08/2023	09:51	Buzzard	1	630	0	0	630	0	improved agricultural grassland and highly modified/non-native woodland; soaring high to the ne, moving se	NM
BZ230	VP3	30/08/2023	13:21	Buzzard	1	190	0	150	30	0	bogs, heath and conifer plantation; commuting across heather moorland and forestry within n of site	NM
BZ231	VP3	30/08/2023	10:09	Buzzard	2	1300	0	240	900	160	conifer plantation, bogs and scrub; soaring and calling over forestry, moving n across n of site and onto lands further n	NM

K.007	VP4	19/09/2023	10:17	Kestrel	1	475	0	350	125	0	improved agricultural grassland, highly modified/non-native woodland and scrub; commuting and gliding across vp area, moving nw, hunting & hovering over rough farmland to nw of vp	NM
SN077	VP4	19/09/2023	07:54	Snipe	2	135	0	135	0	0	mixed conifer woodland, scrub and improved agricultural grassland; commuting sw and alarm calling	NM
HG005	VP4	19/09/2023	11:43	Herring Gull	7	320	0	0	320	0	improved agricultural grassland and conifer plantation; commuting ne across s of site, disappearing behind forestry	NM
SN078	VP4	19/09/2023	09:31	Snipe	1	160	0	140	20	0	improved agricultural grassland, scrub and semi-natural grassland; flying frantically and alarm calling across rough farmland and border with forestry	NM
MP105	VP4	19/09/2023	07:27	Meadow Pipit	6	90	0	65	25	0	improved agricultural grassland, mixed conifer woodland and scrub; flying and calling across vp, moving n	NM
MP106	VP4	19/09/2023	08:21	Meadow Pipit	26	10000	8600	1400	0	0	improved agricultural grassland, scrub and semi-natural grassland; calling and flitting within rough boggy farmland, gradually moving e along s buffer, foraging and in area for a long period, numbers were estimates	NM
MP107	VP4	19/09/2023	11:47	Meadow Pipit	5	150	0	0	150	0	conifer plantation and improved agricultural grassland; flying high and calling, moving s	NM

MP108	VP4	19/09/2023	10:42	Meadow Pipit	11	210	0	210	0	0	scrub and mixed conifer woodland; flying and calling across vp area, moving n	NM
MP109	VP4	19/09/2023	11:57	Meadow Pipit	3	90	0	90	0	0	mixed conifer woodland and improved agricultural grassland; flying and calling across vp, moving w	NM
SN079	VP4	19/09/2023	06:51	Snipe	3	-	-	-	-	-	improved agricultural grassland and semi-natural grassland; chirping within farmland	NM
K.008	VP2	21/09/2023	11:09	Kestrel	1	100	0	0	100	0	conifer plantation; flying	NS
BZ232	VP3	22/09/2023	07:54	Buzzard	1	90	75	15	0	0	mixed conifer woodland, bogs and improved agricultural grassland; departing from perched and flying low across bog, moving e	NM
BZ233	VP3	22/09/2023	09:18	Buzzard	1	750	0	120	630	0	conifer plantation, bogs and heath; soaring over forestry and open moorland, moving high and w across n site	NM
BZ234	VP3	22/09/2023	11:21	Buzzard	2	470	0	0	0	470	improved agricultural grassland, conifer plantation and scrub; pair soaring and circling high	NM
H.005	VP3	22/09/2023	09:18	Grey Heron	1	250	0	0	250	0	bogs and conifer plantation; commuting high across n of site, moving sw	NM
LB045	VP3	22/09/2023	12:03	Lesser Black-backed Gull	18	110	0	50	60	0	improved agricultural grassland and scrub; commuting across farmland to nw, well off site	NM
LB046	VP3	22/09/2023	08:02	Lesser Black-backed Gull	7	230	0	0	230	0	bogs and conifer plantation; commuting n across vp	NM

GB004	VP3	22/09/2023	09:42	Great Black-backed Gull	2	345	0	0	0	345	bogs, heath and conifer plantation; soaring high above heath and moorland, moving sw, mostly off site	NM
BH010	VP3	22/09/2023	07:26	Black-headed Gull	11	280	0	35	245	0	bogs, conifer plantation and improved agricultural grassland; commuting across n of site, moving nw	NM
LB047	VP3	22/09/2023	10:03	Lesser Black-backed Gull	37	460	0	130	330	0	improved agricultural grassland and mixed conifer woodland; swirling and circling to ne of vp	NM
BH011	VP3	22/09/2023	09:09	Black-headed Gull	7	90	0	0	90	0	conifer plantation, bogs and heath; commuting se across n of site	NM
BH012	VP3	22/09/2023	11:18	Black-headed Gull	6	165	0	50	115	0	bogs, conifer plantation and improved agricultural grassland; commuting across n of site, moving nw and descending into valley	NM
SN080	VP3	22/09/2023	07:02	Snipe	3	45	30	15	0	0	bogs and heath; flushed from heather bog, alarm calling	NM
SN081	VP3	22/09/2023	07:56	Snipe	5	75	50	20	0	0	bogs, heath and semi-natural grassland; flushed from bog by bz, alarm calling and flying frantically across vp	NM
MP110	VP3	22/09/2023	08:16	Meadow Pipit	9	80	0	80	0	0	bogs and semi-natural grassland; flying and calling across heath and moorland adjacent to vp, moving ne	NM

MP111	VP3	22/09/2023	07:17	Meadow Pipit	16	200	70	120	10	0	bogs and heath; flying and calling across bog, swirling and landing within heather briefly as they moved	NM
MP112	VP3	22/09/2023	11:08	Meadow Pipit	4	80	15	65	0	0	bogs and heath; flitting and calling across heather moorland	NM
BZ235	VP3	22/09/2023	07:12	Buzzard	1	-	-	-	-	-	mixed conifer woodland and bogs; perched in tree on edges of woodland early in the morning, there for ~40 mins	NM
K.009	VP1	29/09/2023	11:50	Kestrel	1	30	0	20	10	0	conifer plantation; flying	NS

Appendix 2 Table 5 Breeding Raptor Survey Data

Ref.	BR	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
HH213	C	04/04/2023	09:01	Hen Harrier	1	conifer plantation and upland blanket bog, soaring/foraging, male soaring over 2021 nest then foraging southwards	suitable nesting habitat; possible breeder	AOD
HH214	C	04/04/2023	10:27	Hen Harrier	1	upland blanket bog, foraging, female foraging with male	suitable nesting habitat; possible breeder	AOD
HH215	C	04/04/2023	10:29	Hen Harrier	1	upland blanket bog, foraging, foraging with female/courtship	suitable nesting habitat; possible breeder	AOD
K.003	E	04/04/2023	12:30	Kestrel	1	wet grassland, foraging, female foraging	suitable nesting habitat; possible breeder	AOD

HH216	E	04/04/2023	13:08	Hen Harrier	1	wet grassland, foraging, male foraging	suitable nesting habitat; possible breeder	AOD
HH217	A	28/04/2023	13:58	Hen Harrier	1	conifer plantation, foraging, male soared up from near 2019 nest site. displayed breifly skydance then flew to dough foraging back around to faughry/saddle hill	courtship and display; probable breeding	AOD
HH218	A	28/04/2023	14:12	Hen Harrier	1	conifer plantation, sky dancing, male dancing from 2019 nest location out and back	courtship and display; probable breeding	AOD
HH219	A	28/04/2023	14:22	Hen Harrier	2	conifer plantation, courtship flight, pair flying close together then perched together breifly	courtship and display; probable breeding	AOD
HH220	A	28/04/2023	15:43	Hen Harrier	2	conifer plantation, courtship, pair flying togeher low in wd4	courtship and display; probable breeding	AOD
HH221	S	03/05/2023	13:38	Hen Harrier	1	conifer plantation, perched/display, male perched near 2019 nest site 10mins then began displaying flew north	courtship and display; probable breeding	AOD
K.004	S	03/05/2023	13:20	Kestrel	1	upland blanket bog, foraging, foraging immature/female	suitable nesting habitat; possible breeder	AOD
HH222	S	03/05/2023	14:20	Hen Harrier	1	conifer plantation, foraging, male foraging caught prey flew back to 2020 nest location and dropped out of view.reappeared again foraging to south.may have dropped prey to unseen female	suitable nesting habitat; possible breeder	AOD
HH223	S	03/05/2023	14:30	Hen Harrier	1	wet grassland and upland blanket bog, foraging, male foraging	suitable nesting habitat; possible breeder	AOD
HH224	S	03/05/2023	14:31	Hen Harrier	1	conifer plantation, flying over, adult female	suitable nesting habitat; possible breeder	AOD
HH225	S	03/05/2023	15:02	Hen Harrier	2	conifer plantation, courtship, male and female flying close and interacting.dropped out of view for several mins then continued north together	courtship and display; probable breeding	AOD
BZ137	E	03/05/2023	16:25	Buzzard	2	conifer plantation, soaring, pair	suitable nesting habitat; possible breeder	AOD
HH226	E	03/05/2023	17:35	Hen Harrier	1	conifer plantation, flying over, male flying mobbed by 2hc	suitable nesting habitat; possible breeder	AOD
HH227	E	03/05/2023	18:38	Hen Harrier	1	upland blanket bog, carrying prey, adult male carrying prey east.	pair; probable breeding	AOD
HH228	A	04/05/2023	12:01	Hen Harrier	2	wet grassland, courtship/foraging, pair engaged in courtship and foraging close together for several mins.male flew off north foraging	courtship and display; probable breeding	AOD
HH229	A	04/05/2023	12:26	Hen Harrier	2	conifer plantation and wet grassland, courtship, pair again in flight close together	courtship and display; probable breeding	AOD

K.005	A	04/05/2023	13:10	Kestrel	1	wet grassland, foraging, fem/imm	suitable nesting habitat; possible breeder	AOD
HH230	A	04/05/2023	14:32	Hen Harrier	2	conifer plantation and upland blanket bog, display, male and female up circling from lowin wd4 male took off sky dancing up the hill female moved towards site flying over wd4	courtship and display; probable breeding	AOD
HH231	A	04/05/2023	14:45	Hen Harrier	1	conifer plantation and upland blanket bog, foraging, male foraging	suitable nesting habitat; possible breeder	AOD
HH232	I	04/05/2023	15:25	Hen Harrier	1	conifer plantation and wet grassland, dancing, adult male sky dancing several mins	courtship and display; probable breeding	AOD
HH233	I	04/05/2023	15:42	Hen Harrier	1	wet grassland, foraging/carrying prey, male foraging caught prey out of view carried it out of site	pair; probable breeding	AOD
HH234	I	04/05/2023	17:56	Hen Harrier	1	conifer plantation, soaring, female soaring over 2020 2021 nest in northern section	suitable nesting habitat; possible breeder	AOD
SH056	P	09/05/2023	12:48	Sparrowhawk	1	conifer plantation, fly, female soaring	suitable nesting habitat; possible breeder	AOD
HH235	P	09/05/2023	16:17	Hen Harrier	1	upland blanket bog, foraging, male	suitable nesting habitat; possible breeder	AOD
HH236	P	09/05/2023	16:36	Hen Harrier	1	upland blanket bog, foraging, male	suitable nesting habitat; possible breeder	AOD
BZ138	P	09/05/2023	16:43	Buzzard	1	mixed conifer woodland, fly	suitable nesting habitat; possible breeder	AOD
HH237	C	09/05/2023	18:20	Hen Harrier	1	conifer plantation and wet grassland, prey carrying, male carrying prey.flew out of sight	pair; probable breeding	AOD
HH238	H	10/05/2023	10:56	Hen Harrier	1	conifer plantation and wet grassland, travelling, male flying in rain	suitable nesting habitat; possible breeder	AOD
HH239	H	10/05/2023	11:05	Hen Harrier	1	conifer plantation, fly, female appeared breifly between trees low	suitable nesting habitat; possible breeder	AOD
HH240	H	10/05/2023	13:12	Hen Harrier	1	conifer plantation and upland blanket bog, foraging	suitable nesting habitat; possible breeder	AOD
SH057	H	10/05/2023	13:38	Sparrowhawk	1	conifer plantation, flying over, female	suitable nesting habitat; possible breeder	AOD
HH241	E	11/05/2023	11:14	Hen Harrier	1	conifer plantation, prey carry, male into southern area w prey lost behind trees	pair; probable breeding	AOD
BZ139	E	11/05/2023	11:57	Buzzard	1	conifer plantation, soaring, soaring adult	suitable nesting habitat; possible breeder	AOD

SH058	E	11/05/2023	12:40	Sparrowhawk	1	conifer plantation, fly, female into historic nest area	suitable nesting habitat; possible breeder	AOD
BZ140	E	11/05/2023	14:49	Buzzard	1	#N/A	suitable nesting habitat; possible breeder	AOD
HH242	E	11/05/2023	14:36	Hen Harrier	1	conifer plantation, soaring, male	suitable nesting habitat; possible breeder	AOD
HH243	O	23/05/2023	10:58	Hen Harrier	1	#N/A	suitable nesting habitat; possible breeder	AOD
HH244	O	23/05/2023	10:59	Hen Harrier	1	conifer plantation, flying, female circling v low breifly not foraging.possible nest area	suitable nesting habitat; possible breeder	AOD
HH245	O	23/05/2023	11:21	Hen Harrier	1	#N/A	suitable nesting habitat; possible breeder	AOD
BZ141	O	23/05/2023	11:48	Buzzard	1	#N/A	suitable nesting habitat; possible breeder	AOD
HH246	O	23/05/2023	12:47	Hen Harrier	2	conifer plantation and upland blanket bog, alarm at nest, m and f at nest confirmed alarming. female flew from low perch	nest with eggs; confirmed breeding	AOD
BZ142	O	23/05/2023	13:17	Buzzard	1	conifer plantation, soaring	suitable nesting habitat; possible breeder	AOD
BZ143	O	23/05/2023	13:18	Buzzard	1	#N/A	suitable nesting habitat; possible breeder	AOD
K.006	O	23/05/2023	14:02	Kestrel	1	conifer plantation, travelling	suitable nesting habitat; possible breeder	AOD
HH247	E	24/05/2023	12:52	Hen Harrier	2	conifer plantation, flying, male from hh1 chasing 2nd male to north. returned south after other male left area	suitable nesting habitat; possible breeder	AOD
HH248	U	31/05/2023	17:23	Hen Harrier	1	upland blanket bog, foraging, foraging male	suitable nesting habitat; possible breeder	AOD
K.007	N	06/06/2023	12:05	Kestrel	1	conifer plantation and upland blanket bog, foraging	suitable nesting habitat; possible breeder	AOD
SH059	N	06/06/2023	13:00	Sparrowhawk	1	#N/A	suitable nesting habitat; possible breeder	AOD
BZ144	N	06/06/2023	13:25	Buzzard	1	conifer plantation, soaring	suitable nesting habitat; possible breeder	AOD
BZ145	N	06/06/2023	16:55	Buzzard	1	conifer plantation, soaring	suitable nesting habitat; possible breeder	AOD
BZ146	H	07/06/2023	15:42	Buzzard	1	#N/A	suitable nesting habitat; possible breeder	AOD

HH249	P	07/06/2023	20:40	Hen Harrier	1	upland blanket bog and conifer plantation, foraging, male foraging	suitable nesting habitat; possible breeder	AOD
SH060	I	13/06/2023	13:01	Sparrowhawk	1	conifer plantation, fly, female up from possible nest site	suitable nesting habitat; possible breeder	AOD
BZ147	J	14/06/2023	10:03	Buzzard	1	conifer plantation, soaring, adult soaring	suitable nesting habitat; possible breeder	AOD
HH250	j	14/06/2023	10:22	Hen Harrier	1	conifer plantation, soaring, male soaring uphill flew east lost in wd4	suitable nesting habitat; possible breeder	AOD
BZ148	j	14/06/2023	10:55	Buzzard	2	conifer plantation, soaring, pair soaring	suitable nesting habitat; possible breeder	AOD
SH061	o	21/06/2023	12:21	Sparrowhawk	1		suitable nesting habitat; possible breeder	AOD
HH251	o	21/06/2023	12:44	Hen Harrier	1	upland blanket bog and conifer plantation, at nest, female carrying vegetation at nest	nest building; probable breeding	AOD
HH252	o	21/06/2023	13:01	Hen Harrier	1	conifer plantation, soaring, female up soaring from nest	suitable nesting habitat; possible breeder	AOD
HH253	o	21/06/2023	13:12	Hen Harrier	1	conifer plantation, prey carrying, female into nest with prey	adult carrying food/faecal sac; confirmed breeding	AOD
HH254	o	21/06/2023	13:14	Hen Harrier	1	conifer plantation, fly, female back out to perch after bringing prey into nest	adult carrying food/faecal sac; confirmed breeding	AOD
BZ149	o	21/06/2023	14:01	Buzzard	1	conifer plantation, fly	suitable nesting habitat; possible breeder	AOD
HH255	o	21/06/2023	14:07	Hen Harrier	2	conifer plantation and upland blanket bog, foodpass prey carrying, male in from north with prey met female foodpass female brought prey to nest male perched out of sight.	adult carrying food/faecal sac; confirmed breeding	AOD
HH256	o	21/06/2023	14:52	Hen Harrier	2	conifer plantation, circling, male and female up soaring out from nest	occupied nest; confirmed breeding	AOD
BZ150	p	21/06/2023	17:05	Buzzard	1		suitable nesting habitat; possible breeder	AOD
BZ151	t	23/06/2023	16:24	Buzzard	1	conifer plantation, soaring	#N/A	AOD
HH257	l	28/06/2023	16:05	Hen Harrier	1	conifer plantation, flying, male flying low over trees briefly	suitable nesting habitat; possible breeder	AOD
SH062	l	28/06/2023	16:45	Sparrowhawk	1	conifer plantation, flying, female flying low	suitable nesting habitat; possible breeder	AOD

SH063	l	28/06/2023	17:10	Sparrowhawk	1	conifer plantation, prey carrying, female in with prey. likely nest site	adult carrying food/faecal sac; confirmed breeding	AOD
SH064	m	29/06/2023	15:01	Sparrowhawk	1	conifer plantation, prey carrying, female in with prey. another nest site confimred here	adult carrying food/faecal sac; confirmed breeding	AOD
SH065	m	07/07/2023	17:46	Sparrowhawk	1	wet grassland, flying	suitable nesting habitat; possible breeder	AOD
HH258	o	11/07/2023	13:09	Hen Harrier	2	conifer plantation and upland blanket bog, prey carry, foodpass, male in with prey ffrom nw. foodpass w female then male back out to ne	adult carrying food/faecal sac; confirmed breeding	AOD
HH259	H	25/07/2023	16:44	Hen Harrier	1	wet grassland, foraging, foraging	suitable nesting habitat; possible breeder	AOD
HH260	TRANSECT	26/07/2023	07:53	Hen Harrier	3	upland blanket bog and conifer plantation, fledged chicks at nest, three chicks flying around nest site	adult carrying food/faecal sac; confirmed breeding	AOD
HH261	S	27/07/2023	13:39	Hen Harrier	3	upland blanket bog, chicks at nest, chicks present at nest	fledged young; confirmed breeding	AOD
ML002	S	27/07/2023	14:07	Merlin	1	wet grassland, hunting, hunting mp flock. unable to age/sex	suitable nesting habitat; possible breeder	AOD
HH262	S	27/07/2023	14:19	Hen Harrier	4	conifer plantation and upland blanket bog, foraging, male at nest with 3 chicks then flew off towards dough	adult carrying food/faecal sac; confirmed breeding	AOD
HH263	S	27/07/2023	14:36	Hen Harrier	1	wet grassland and upland blanket bog, foraging, male foraging	suitable nesting habitat; possible breeder	AOD
ML003	S	27/07/2023	15:12	Merlin	1	upland blanket bog and conifer plantation, hunting, female hunting	suitable nesting habitat; possible breeder	AOD
HH264	S	27/07/2023	15:35	Hen Harrier	1	upland blanket bog, foraging, male at nest then foraging up towards dough mtn.	adult carrying food/faecal sac; confirmed breeding	AOD
HH265	S	27/07/2023	16:02	Hen Harrier	4	upland blanket bog and wet grassland, foraging/prey carrying, male in with prey met by three chicks flew off lost in wd4	adult carrying food/faecal sac; confirmed breeding	AOD
HH266	S	27/07/2023	16:10	Hen Harrier	1	upland blanket bog and conifer plantation, foraging, female foraging	suitable nesting habitat; possible breeder	AOD
HH267	P	27/07/2023	19:25	Hen Harrier	1	upland blanket bog, foraging, male foraging	suitable nesting habitat; possible breeder	AOD
HH268	S	28/07/2023	14:51	Hen Harrier	2	conifer plantation, chicks flying, two chicks flying well away from nest, soaring.	fledged young; confirmed breeding	AOD

HH269	S	28/07/2023	15:49	Hen Harrier	1	upland blanket bog, flying over, female flying	suitable nesting habitat; possible breeder	AOD
HH270	I	28/07/2023	19:29	Hen Harrier	3	upland blanket bog, flyingchick at nest, 3 chicks around nest	fledged young; confirmed breeding	AOD
HH271	I	28/07/2023	19:30	Hen Harrier	1	upland blanket bog and wet grassland, foraging, foraging male	suitable nesting habitat; possible breeder	AOD
WE003	h	02/08/2023	16:16	White-tailed Eagle	1	upland blanket bog and conifer plantation, flying over, adult eagle, no tags visible.flying across site perched on hillside.mobbed by rn	suitable nesting habitat; possible breeder	AOD
WE004	h	02/08/2023	16:22	White-tailed Eagle	1	conifer plantation, upland blanket bog and wet grassland, flying/perch, adult perched then fly ne mobbed by rn.no tags visible	suitable nesting habitat; possible breeder	AOD
SH066	h	02/08/2023	18:08	Sparrowhawk	1	conifer plantation, at nest, male from known nest site	adult carrying food/faecal sac; confirmed breeding	AOD
BZ152	j	04/08/2023	13:06	Buzzard	1	conifer plantation, fly, flying	suitable nesting habitat; possible breeder	AOD
K.008	j	04/08/2023	13:21	Kestrel	1	upland blanket bog, foraging, young bird foraging	fledged young; confirmed breeding	AOD
BZ153	p	16/08/2023	12:32	Buzzard	1	#N/A	suitable nesting habitat; possible breeder	AOD
K.009	p	16/08/2023	14:08	Kestrel	1	#N/A	fledged young; confirmed breeding	AOD
BZ154	j	22/08/2023	14:16	Buzzard	1	conifer plantation, soaring, adult	suitable nesting habitat; possible breeder	AOD
BZ155	p	22/08/2023	17:03	Buzzard	1	conifer plantation, fly	suitable nesting habitat; possible breeder	AOD
SH067	p	22/08/2023	17:04	Sparrowhawk	1	conifer plantation, fly, female flushed	suitable nesting habitat; possible breeder	AOD

Appendix 2 Table 6 Foraging Vantage Point Survey Data

Ref.	FVP	Date	Time	Species		Number	Habitat and activity	Breeding status	Surveyor
HH001	fvp1	27/06/2023	07:37	Hen Harrier		1	upland blanket bog, flying, female flying low	suitable nesting habitat; possible breeder	AOD
HH002	fvp1	27/06/2023	07:57	Hen Harrier		2	conifer plantation, upland blanket bog and wet grassland, flying calling, pair up from nest area circling. female alarm calling	agitated behaviour; probable breeding	AOD
HH003	fvp1	27/06/2023	08:05	Hen Harrier		2	upland blanket bog, flying foraging, pair circled female into nest male flew west	probable nest site; probable breeding	AOD
HH004	fvp1	27/06/2023	08:25	Hen Harrier		1	conifer plantation, upland blanket bog and , prey carry, male flew in from nw with prey to nest area	adult carrying food/faecal sac; confirmed breeding	AOD
HH005	fvp1	27/06/2023	08:46	Hen Harrier		1	conifer plantation, wet grassland and , foraging, male out from nest foraging	suitable nesting habitat; possible breeder	AOD
HH006	fvp1	27/06/2023	09:19	Hen Harrier		1	conifer plantation, travelling foraging, male up from nest are travelled to dough mtn foraging	suitable nesting habitat; possible breeder	AOD
HH007	fvp1	27/06/2023	09:21	Hen Harrier		1	conifer plantation, upland blanket bog and , foraging, female up from nest foraging then out west	suitable nesting habitat; possible breeder	AOD
HH008	fvp2	27/06/2023	10:48	Hen Harrier		1	conifer plantation, wet grassland and , prey carrying, foraging, female in with prey to nest then flew off west foraging	adult carrying food/faecal sac; confirmed breeding	AOD
HH009	fvp2	27/06/2023	11:16	Hen Harrier		1	wet grassland, foraging, male foraging up from direction of nest	suitable nesting habitat; possible breeder	AOD
HH010	fvp2	27/06/2023	11:46	Hen Harrier		1	upland blanket bog, foraging, female foraging around nest	suitable nesting habitat; possible breeder	AOD
HH011	fvp2	27/06/2023	12:16	Hen Harrier		2	conifer plantation, wet grassland and upland blanket bog, foraging, foodpass, male in to nest with prey met female in foodpass at nest. male continued foraging out far to sw	adult carrying food/faecal sac; confirmed breeding	AOD

HH012	fvp2	05/07/2023	09:45	Hen Harrier		1	wet grassland, foraging, male foraging	suitable nesting habitat; possible breeder	AOD
HH013	fvp2	05/07/2023	10:10	Hen Harrier		2	conifer plantation, upland blanket bog and , soaring, male and female soaring around nest site	pair; probable breeding	AOD
HH014	fvp2	05/07/2023	10:45	Hen Harrier		2	conifer plantation, soaring, foraging, male and female soaring then male moved off south foraging	pair; probable breeding	AOD
HH015	fvp2	05/07/2023	12:16	Hen Harrier		1	wet grassland, upland blanket bog and , foraging, male foraging for approx 10mins up saddle hill	suitable nesting habitat; possible breeder	AOD
HH016	fvp2	05/07/2023	13:30	Hen Harrier		1	conifer plantation, mobbing at nest, male mobbing bz near nest site. drove bz off to east and male returned to nest area	agitated behaviour; probable breeding	AOD
HH017	fvp2	05/07/2023	13:46	Hen Harrier		1	conifer plantation, prey carrying, foraging, male into nest with prey then foraging out to north	adult carrying food/faecal sac; confirmed breeding	AOD
HH018	fvp2	05/07/2023	14:02	Hen Harrier		1	conifer plantation, upland blanket bog and , prey carrying, foodpass, foraging, male in with prey foodpass to female, then out west foraging again	adult carrying food/faecal sac; confirmed breeding	AOD
HH019	fvp2	05/07/2023	14:10	Hen Harrier		1	conifer plantation, soaring, female soaring over nest	suitable nesting habitat; possible breeder	AOD
HH020	fvp2	05/07/2023	15:25	Hen Harrier		2	conifer plantation, wet grassland and , foraging, prey carrying, foodpass, male in w prey to onest foodpass to female then back out to north foraging up saddle hill	adult carrying food/faecal sac; confirmed breeding	AOD
HH021	fvp2	05/07/2023	15:36	Hen Harrier		2	conifer plantation, wet grassland and upland blanket bog, foragiing, prey carry, foodpass, male in w prey from north. foodpass with female at nest female dropped to nest male flew sw	adult carrying food/faecal sac; confirmed breeding	AOD
HH022	fvp2	05/07/2023	15:43	Hen Harrier		1	upland blanket bog, conifer plantation and , soaring, female soaring at nest	suitable nesting habitat; possible breeder	AOD
HH023	fvp2	05/07/2023	15:46	Hen Harrier		2	conifer plantation, prey carry, foodpass, male in from north w prey foodpass to female at nest. female dropped to nest male flew off west	adult carrying food/faecal sac; confirmed breeding	AOD
HH024	fvp1	06/07/2023	10:58	Hen Harrier		1	upland blanket bog, wet grassland and , foraging, female foraging near nest then out west	suitable nesting habitat; possible breeder	AOD

HH025	fvp1	06/07/2023	12:55	Hen Harrier		1	upland blanket bog, wet grassland and , foraging, male foraging	suitable nesting habitat; possible breeder	AOD
HH026	fvp1	06/07/2023	12:36	Hen Harrier		1	upland blanket bog, wet grassland and , foraging, fmeale back in towards nest foraging dropped into nest area	suitable nesting habitat; possible breeder	AOD
HH027	fvp1	06/07/2023	12:41	Hen Harrier		1	conifer plantation, upland blanket bog and , prey carrying, travelling, foraging, male in from north w prey dropped to nest are then continued out to se	adult carrying food/faecal sac; confirmed breeding	AOD
HH028	fvp1	06/07/2023	13:11	Hen Harrier		1	wet grassland, upland blanket bog and , foraging, female foraging	suitable nesting habitat; possible breeder	AOD
HH029	fvp1	06/07/2023	14:40	Hen Harrier		1	upland blanket bog, conifer plantation and , foraging, female foraging	suitable nesting habitat; possible breeder	AOD
HH030	fvp1	06/07/2023	15:04	Hen Harrier		1	upland blanket bog, foraging travelling, female	suitable nesting habitat; possible breeder	AOD
HH031	fvp1	07/07/2023	11:01	Hen Harrier		2	conifer plantation, upland blanket bog and , prey carrying, foodpass, male in from nw w prey foodpass with female then male off to se	adult carrying food/faecal sac; confirmed breeding	AOD
HH032	fvp1	07/07/2023	11:09	Hen Harrier		1	conifer plantation, travelling, foraging, female out from nest	suitable nesting habitat; possible breeder	AOD
HH033	fvp1	07/07/2023	11:36	Hen Harrier		1	conifer plantation, soaring, female circling over nest	suitable nesting habitat; possible breeder	AOD
HH034	fvp1	07/07/2023	11:46	Hen Harrier		2	conifer plantation, prey carry, mobbing, male in w prey from north. foodpass to female both dropped to near nest. male then up to mob raven and dropped to nest again	adult carrying food/faecal sac; confirmed breeding	AOD
HH035	fvp1	07/07/2023	12:09	Hen Harrier		1	conifer plantation, upland blanket bog and , soaring, foraging, female circling nest then foraging out from nest area to west	suitable nesting habitat; possible breeder	AOD
HH036	fvp1	07/07/2023	12:23	Hen Harrier		2	conifer plantation, prey carry, foodpass, mobbing, male in from north w prey foodpass to female. male flew up mobbing three ravens to east	adult carrying food/faecal sac; confirmed breeding	AOD
HH037	fvp1	07/07/2023	12:41	Hen Harrier		1	upland blanket bog, foraging, foraging near nest	suitable nesting habitat; possible breeder	AOD

HH038	fvp1	07/07/2023	12:45	Hen Harrier		1	conifer plantation, wet grassland and , soaring, travelling , foraging, male soaring up high from nest towards dough mtn began foraging	suitable nesting habitat; possible breeder	AOD
HH039	fvp2	07/07/2023	13:00	Hen Harrier		2	conifer plantation, soaring, male and female soaring above nest site	pair; probable breeding	AOD
HH040	fvp2	07/07/2023	13:34	Hen Harrier		1	conifer plantation, wet grassland and , prey carrying, soaring, travelling, male in w prey to nest area. flew back out soaring up to dough mtn	adult carrying food/faecal sac; confirmed breeding	AOD
HH041	fvp2	07/07/2023	14:38	Hen Harrier		1	wet grassland, upland blanket bog and , foraging, male foraging	suitable nesting habitat; possible breeder	AOD
HH042	fvp2	07/07/2023	14:51	Hen Harrier		1	conifer plantation, wet grassland and , foraging, prey carrying, mobbing, male casught prey back down to nest. foodpass with female who dropped to nest male continued up mobbing rn to east	adult carrying food/faecal sac; confirmed breeding	AOD
HH043	fvp2	07/07/2023	15:05	Hen Harrier		1	wet grassland, upland blanket bog and , foraging, male foraging	suitable nesting habitat; possible breeder	AOD
HH044	fvp2	07/07/2023	15:09	Hen Harrier		2	conifer plantation, wet grassland and upland blanket bog, prey carry, foodpass, foraging, male in from nw with prey foodpass a tnest w female. male then back out soaring over forestry then back foraging along dough mtn and towards saddle hill	adult carrying food/faecal sac; confirmed breeding	AOD
HH045	fvp2	07/07/2023	15:19	Hen Harrier		1	conifer plantation, wet grassland and , travelling, soaring, foraging, foodpass, male in w prey foodpass to female then back out mobbing rn, circled back towards saddle hill foraging up hill	adult carrying food/faecal sac; confirmed breeding	AOD
HH046	fvp2	07/07/2023	15:32	Hen Harrier		2	conifer plantation, wet grassland and , foodpass, foraging, travelling, male in w prey to nest foodpass with female. male back out to se travelling	adult carrying food/faecal sac; confirmed breeding	AOD
HH047	fvp1	10/07/2023	15:19	Hen Harrier		1	upland blanket bog, flying, female	suitable nesting habitat; possible breeder	AOD
HH048	fvp1	10/07/2023	15:25	Hen Harrier		2	upland blanket bog, conifer plantation and , soaring, pair circling at nest male moved off east	pair; probable breeding	AOD
HH049	fvp1	10/07/2023	15:33	Hen Harrier		2	conifer plantation, upland blanket bog and , prey carry, foodpass, foraging, male in w orey to femalke form nw. male flew off west foraging	adult carrying food/faecal sac; confirmed breeding	AOD

HH050	fvp1	10/07/2023	16:06	Hen Harrier		1	conifer plantation, flying, male flew acorss nest area from west out east	suitable nesting habitat; possible breeder	AOD
HH051	fvp1	10/07/2023	16:23	Hen Harrier		1	conifer plantation, upland blanket bog and , flying, male	suitable nesting habitat; possible breeder	AOD
HH052	fvp2	17/07/2023	15:11	Hen Harrier		1	conifer plantation, soaring, male soaring east from nest	suitable nesting habitat; possible breeder	AOD
HH053	fvp2	17/07/2023	15:26	Hen Harrier		1	conifer plantation, upland blanket bog and , soaring,foraging, fmelae soaring over nest then out towrds dough mtn foraging. notably far from nest for female	suitable nesting habitat; possible breeder	AOD
HH054	fvp2	17/07/2023	15:53	Hen Harrier		1	upland blanket bog, wet grassland and , prey carry, foraging, soaring, female in with prey from dough mtn dropped to nest then circling after	adult carrying food/faecal sac; confirmed breeding	AOD
HH055	fvp2	17/07/2023	16:04	Hen Harrier		1	wet grassland, conifer plantation and , foraging, female out from nest up saddle hill foraging	suitable nesting habitat; possible breeder	AOD
HH056	fvp2	17/07/2023	17:41	Hen Harrier		1	conifer plantation, wet grassland and , prey carry, foraging, female in with prey from north.circled nest for several mins after	adult carrying food/faecal sac; confirmed breeding	AOD
HH057	fvp1	18/07/2023	11:47	Hen Harrier		1	conifer plantation, flying/foraging, male flying over wd4 then foraging up saddle hill	suitable nesting habitat; possible breeder	AOD
HH058	fvp1	18/07/2023	12:08	Hen Harrier		3	upland blanket bog, conifer plantation and , prey to nest, female in with prey to nest. at least 2 chicks met her at nest.	adult carrying food/faecal sac; confirmed breeding	AOD
HH059	fvp1	18/07/2023	12:38	Hen Harrier		2	upland blanket bog, conifer plantation and , prey carrying, female in with prey.at least one chick met her.female circled after	adult carrying food/faecal sac; confirmed breeding	AOD
HH060	fvp1	18/07/2023	13:09	Hen Harrier		1	conifer plantation, upland blanket bog and , prey carry, female in with prey to nest flew back out sw	adult carrying food/faecal sac; confirmed breeding	AOD
HH061	fvp1	18/07/2023	13:33	Hen Harrier		1	conifer plantation, upland blanket bog and , prey carrying, male in with prey.took off ne	adult carrying food/faecal sac; confirmed breeding	AOD
HH062	fvp1	18/07/2023	15:56	Hen Harrier		1	conifer plantation, upland blanket bog and , prey carry/foraging, male into nest with prey.took off back out foraing to nw up saddle hill	adult carrying food/faecal sac; confirmed breeding	AOD

HH063	fvp2	19/07/2023	11:51	Hen Harrier		3	upland blanket bog, conifer plantation and , chicks at nest, three chicks flying low at nest	adult carrying food/faecal sac; confirmed breeding	AOD
HH064	fvp2	19/07/2023	12:05	Hen Harrier		2	upland blanket bog, conifer plantation and , chicks at nest, 2 chicks flying back and forth from nest	adult carrying food/faecal sac; confirmed breeding	AOD
HH065	fvp2	19/07/2023	13:41	Hen Harrier		3	upland blanket bog, preycarrying/chicksat nest, female in w prey met by twoflying chicks.female circled then flew off se	adult carrying food/faecal sac; confirmed breeding	AOD
HH066	fvp1	20/07/2023	11:10	Hen Harrier		3	upland blanket bog, prey carry/foraging, male into nest area with prey met by 2 chicks.male flew up dough soaring then foraging	adult carrying food/faecal sac; confirmed breeding	AOD
HH067	fvp1	20/07/2023	11:34	Hen Harrier		1	upland blanket bog, chick at nest, chick flew low at nest	adult carrying food/faecal sac; confirmed breeding	AOD
HH068	fvp1	20/07/2023	11:47	Hen Harrier		1	conifer plantation, upland blanket bog and , foraging, male in with prey to nest area then flew off west foraging up saddle hill	adult carrying food/faecal sac; confirmed breeding	AOD
HH069	fvp1	20/07/2023	12:49	Hen Harrier		1	conifer plantation, upland blanket bog and , flying/foraging, female in with prey to nest.soared up over wd4 then began foraging up dough mtn.	adult carrying food/faecal sac; confirmed breeding	AOD
HH070	fvp1	20/07/2023	13:05	Hen Harrier		2	conifer plantation, upland blanket bog and , foraging, female inyo nest with prey met by one chick. soared off to north foraging up dough mtn	adult carrying food/faecal sac; confirmed breeding	AOD
HH071	fvp1	20/07/2023	14:09	Hen Harrier		1	conifer plantation, upland blanket bog and , prey carry/foraging, male in with prey to nest soared up and moved west	adult carrying food/faecal sac; confirmed breeding	AOD
HH072	fvp1	20/07/2023	14:29	Hen Harrier		1	conifer plantation, upland blanket bog and , foraging, male dropped prey to nest then took off north	adult carrying food/faecal sac; confirmed breeding	AOD
HH073	fvp1	20/07/2023	14:48	Hen Harrier		1	conifer plantation, upland blanket bog and , prey carrying, female in from north with prey soared breifly then settled near nest	adult carrying food/faecal sac; confirmed breeding	AOD
HH074	fvp1	20/07/2023	15:30	Hen Harrier		1	conifer plantation, soaring, female soaring up from nest	suitable nesting habitat; possible breeder	AOD
HH075	fvp1	20/07/2023	16:05	Hen Harrier		3	conifer plantation, upland blanket bog and , chicks at nest, female and two chicks flying over nest together for several mins	adult carrying food/faecal sac; confirmed breeding	AOD

HH076	fvp1	20/07/2023	16:13	Hen Harrier		1	conifer plantation, fly, female flying north	suitable nesting habitat; possible breeder	AOD
HH077	fvp1	20/07/2023	16:50	Hen Harrier		3	conifer plantation, soaring/foraging, female and two chicks soaring at nest. Female soar up nw out from nest	adult carrying food/faecal sac; confirmed breeding	AOD
HH078	fvp1	21/07/2023	10:20	Hen Harrier		4	upland blanket bog, conifer plantation and , prey carry, male in with prey met by three chicks. Male then lost in wd4	adult carrying food/faecal sac; confirmed breeding	AOD
HH079	fvp1	21/07/2023	10:55	Hen Harrier		1	conifer plantation, upland blanket bog and , prey carrying, female in with prey from south dropped to nest area then flew off west	adult carrying food/faecal sac; confirmed breeding	AOD
HH080	fvp1	21/07/2023	11:28	Hen Harrier		4	conifer plantation, upland blanket bog and , prey carry/foraging, male in from north with prey met by three chicks then flew off sw	adult carrying food/faecal sac; confirmed breeding	AOD
HH081	fvp1	25/07/2023	13:25	Hen Harrier		4	upland blanket bog, prey carry/foraging, female in with prey to three chicks.female then soared and moved off west foraging	adult carrying food/faecal sac; confirmed breeding	AOD
HH082	fvp1	25/07/2023	13:29	Hen Harrier		3	upland blanket bog, chicks at nest, chasing at nest.one chick visibly smaller possibly 2f 1m	#N/A	AOD
HH083	fvp1	25/07/2023	14:51	Hen Harrier		2	upland blanket bog, conifer plantation and , prey carry, female in with prey met by one chick approx 500m from nest	adult carrying food/faecal sac; confirmed breeding	AOD
HH084	fvp1	25/07/2023	15:24	Hen Harrier		1	upland blanket bog, foraging, soared up from nest several mins then flew up saddle hill foraging	suitable nesting habitat; possible breeder	AOD
HH085	fvp1	01/08/2023	12:25	Hen Harrier		1	upland blanket bog, foraging, chick foraging near nest	#N/A	AOD
HH086	fvp1	01/08/2023	12:31	Hen Harrier		2	upland blanket bog, conifer plantation and , prey carrying/foraging, female in w prey for one chick.female flew off ne	adult carrying food/faecal sac; confirmed breeding	AOD
HH087	fvp1	01/08/2023	12:57	Hen Harrier		3	upland blanket bog, conifer plantation and , foraging, female in with prey met by two chicks west of nest area.female movedmout foraging to se	adult carrying food/faecal sac; confirmed breeding	AOD
HH088	fvp1	01/08/2023	15:09	Hen Harrier		3	conifer plantation, upland blanket bog and , prey carry/foraging, female in from nw met by 2 chicks.female then flew off north	adult carrying food/faecal sac; confirmed breeding	AOD

HH089	fvp2	01/08/2023	16:15	Hen Harrier		3	conifer plantation, prey carry/foraging, female in two chicks met female.female flew out back west	adult carrying food/faecal sac; confirmed breeding	AOD
HH090	fvp2	01/08/2023	16:34	Hen Harrier		2	upland blanket bog, foraging, two chicks practicing foraging	fledged young; confirmed breeding	AOD
HH091	fvp2	01/08/2023	17:05	Hen Harrier		4	conifer plantation, prey carry/travelling/foraging, male in w prey met by three chicks at nest.flew off west	adult carrying food/faecal sac; confirmed breeding	AOD
HH092	fvp2	01/08/2023	17:23	Hen Harrier		1	conifer plantation, wet grassland and upland blanket bog, prey/carry foraging, male in w prey gave to unseen chick.malew flew back out west	adult carrying food/faecal sac; confirmed breeding	AOD
HH093	fvp2	01/08/2023	18:10	Hen Harrier		2	conifer plantation, upland blanket bog and , prey carry/foraging, male in w prey met one chick. then flew up saddle hill foraging	adult carrying food/faecal sac; confirmed breeding	AOD
HH094	fvp2	02/08/2023	11:49	Hen Harrier		1	wet grassland, conifer plantation and , foraging, male foraging saddle hill	suitable nesting habitat; possible breeder	AOD
HH095	fvp2	02/08/2023	13:28	Hen Harrier		1	upland blanket bog, chick foraging, chick flying low/foraging near nest	fledged young; confirmed breeding	AOD
HH096	fvp1	03/08/2023	19:32	Hen Harrier		1	conifer plantation, fly, chick flying at nest	fledged young; confirmed breeding	AOD
HH097	fvp1	03/08/2023	20:57	Hen Harrier		2	conifer plantation, upland blanket bog and , soaring, two chicks soaring at nest	fledged young; confirmed breeding	AOD
HH098	fvp1	03/08/2023	21:22	Hen Harrier		1	upland blanket bog, fly, male in flight around nest	suitable nesting habitat; possible breeder	AOD
HH099	fvp2	04/08/2023	16:14	Hen Harrier		1	conifer plantation, upland blanket bog and , soaring/foraging, chick around nest area	fledged young; confirmed breeding	AOD

Appendix 2 Table 7 Incidental Survey Data

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
HH015	Vantage Point Survey; VP1	13/04 /2023	09:08	Hen Harrier	1	improved agricultural grassland; flying, male flew across site briefly mobbed by 2 hc	RV

HH016	Vantage Point Survey; VP2	20/04 /2023	08:44	Hen Harrier	1	conifer plantation; flying, male circled up and flew around before landing close to 2021 nest	RV
HH017	Vantage Point Survey; VP2	20/04 /2023	08:46	Hen Harrier	1	conifer plantation; flying, same male flew back to where it originally came from	RV
LB048	Breeding Raptor Survey; TAWNYLUST	03/05 /2023	14:22	Lesser Black-backed Gull	4	conifer plantation; flying over	AOD
RG017	Breeding Raptor Survey; DOUGH MTN	09/05 /2023	12:47	Red Grouse	1	upland blanket bog; call/fly, male	AOD
RG018	Breeding Raptor Survey; Dough mtn	09/05 /2023	15:39	Red Grouse	2	upland blanket bog; fly/call, 2 males	AOD
SN070	Breeding Raptor Survey; DOUGH MTN	09/05 /2023	14:50	Snipe	1	upland blanket bog; drumming	AOD
SN071	Breeding Raptor Survey; DOUGH MTN	09/05 /2023	15:40	Snipe	2	upland blanket bog; chipping/flushed	AOD
SN072	Breeding Raptor Survey; DOUGH MTN	09/05 /2023	14:41	Snipe	1	upland blanket bog; chipping	AOD
SN073	Vantage Point Survey; VP4 approach	10/05 /2023	22:30	Snipe	13	improved agricultural grassland, scrub and semi-natural grassland; persistent display calls and flights in darkness on return from survey, accurate numbers were impossible due to the darkness, above count is an estimate	NM
MA003	Breeding Raptor Survey; KILLEA	11/05 /2023	13:10	Mallard	1	conifer plantation and upland blanket bog; fly, male fly over	AOD
GL006	Breeding Raptor Survey; BOLEYBOY	23/05 /2023	13:38	Grey Wagtail	2	watercourses; nest, pair at nest	AOD
RG019	Breeding Raptor Survey; KILLEA	07/06 /2023	19:47	Red Grouse	1	upland blanket bog; call	AOD
SN074	Breeding Raptor Survey; RAHEELIN	22/06 /2023	19:19	Snipe	1	wet grassland; drumming, drumming	AOD

LB049	Foraging Vantage Point; tawnyfeacle	27/06/2023	07:43	Lesser Black-backed Gull	1	conifer plantation; travelling, adult	AOD
H.006	Foraging Vantage Point; tawnyfeacle	27/06/2023	08:52	Grey Heron	1	eroding/upland rivers; travelling foraging	AOD
LB050	Foraging Vantage Point; tawnyfeacle	27/06/2023	09:38	Lesser Black-backed Gull	1	upland blanket bog; travelling, adult flying low	AOD
BZ022	Foraging Vantage Point; tawnyfeacle	27/06/2023	09:44	Buzzard	1	riparian woodland; perched	AOD
HH018	Foraging Vantage Point; Lisnabrack	27/06/2023	13:45	Hen Harrier	1	wet grassland; foraging, female foraging. observed after survey end on way home	AOD
BZ023	Breeding Raptor Survey; SADDLE HILL	05/07/2023	11:57	Buzzard	1	wet grassland; foraging	AOD
LB051	Foraging Vantage Point; fvp1	06/07/2023	14:42	Lesser Black-backed Gull	2	conifer plantation; travelling, adults	AOD
LB052	Foraging Vantage Point; tawnyfeacle	07/07/2023	11:32	Lesser Black-backed Gull	1	conifer plantation; travelling, adult	AOD
LB053	Breeding Raptor Survey; BOLEYBOY	11/07/2023	13:23	Lesser Black-backed Gull	1	conifer plantation; flying over, adult	AOD
HH019	Breeding Raptor Survey; BOLEYBOY	11/07/2023	13:37	Hen Harrier	1	conifer plantation; soaring, male soaring over nest	AOD
BZ024	Breeding Raptor Survey; TAWNYFEACLE	18/07/2023	12:17	Buzzard	1	mixed broadleaved/conifer woodland; fly/perch, fly to perch	AOD
BZ025	Breeding Raptor Survey; TAWNYFEACLE	18/07/2023	17:02	Buzzard	1	conifer plantation and wet grassland; soaring	AOD
BZ026	Breeding Raptor Survey; KILLEA	19/07/2023	16:56	Buzzard	1	upland blanket bog and conifer plantation; fly	AOD
SH016	Breeding Raptor Survey; BOLEYBOY	20/07/2023	12:51	Sparrowhawk	1	conifer plantation; soaring, soaring	AOD
BZ027	Breeding Raptor Survey; TAWNYFEACLE	25/07/2023	13:47	Buzzard	3	conifer plantation; begging chick, 2 adult 1 chick soaring begging	AOD
SH017	Breeding Red Grouse Survey; TAWNYFEACLE	01/08/2023	12:32	Sparrowhawk	1	conifer plantation; soaring, female	AOD

SH018	Breeding Raptor Survey; FAUGHERY	01/08/2023	16:39	Sparrowhawk	2	conifer plantation; fl, recently fledged chicks between trees and begging	AOD
LB054	Breeding Raptor Survey; RAHEELIN	02/08/2023	15:44	Lesser Black-backed Gull	1	wet grassland; travelling, adult	AOD
SH019	Breeding Raptor Survey; FAUGHERY	02/08/2023	14:00	Sparrowhawk	1	wet grassland; fly over, female	AOD
CA001	Breeding Raptor Survey;	04/08/2023	12:59	Cormorant	1	wet grassland and improved agricultural grassland; travelling	AOD
SH020	Breeding Raptor Survey; FAUGHERY	04/08/2023	16:15	Sparrowhawk	1	conifer plantation; begging, juv begging	AOD
GL007	Breeding Raptor Survey; DOUGH MTN	17/08/2023	14:04	Grey Wagtail	1	conifer plantation; fly	AOD
SN075	Breeding Raptor Survey; DOUGH MTN	17/08/2023	14:24	Snipe	1	upland blanket bog; fly, flushed	AOD
K.004	Vantage Point Survey; Access into VP4	29/08/2023	14:13	Kestrel	1	improved agricultural grassland, scrub and bogs; hunting and hovering over rough farmland and boggy fringes	NM
SN076	Vantage Point Survey; Access into VP4	29/08/2023	07:47	Snipe	3	improved agricultural grassland and scrub; flying frantically and alarm calling across rough farmland	NM

APPENDIX 3

CONFIDENTIAL APPENDIX

Appendix 6-8

Bird Survey Report Breeding 2024

Breeding Bird Survey Report 2024

Lissinagroagh Wind Farm, Co. Leitrim

DOCUMENT DETAILS

Client:	**FuturEnergy Ireland**
Project Title:	**Lissinagroagh Wind Farm, Co. Leitrim**
Project Number:	**200217-i**
Document Title:	**Breeding Bird Survey Report 2024**
Document File Name:	**FEI Lissinagroagh Breeding Bird Surveys End of Season Report 2024 – F1- 18_12_24 200217-i**
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Planning and Environmental Consultants

Rev	Status	Date	Author	Approved By
01	Final	10/02/2	AO'D	PM

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1. SUMMARY

Ornithological surveys have been undertaken at the site of Lissinagroagh Wind Farm, Manorhamilton, Co. Leitrim since 2018. This report outlines the findings from surveys completed during the 2024 breeding season. The following surveys were undertaken:

- Vantage Point Surveys (VPs)
- Breeding Raptor Surveys
- Foraging Vantage Point Surveys (FVPs)

The key observations during surveys relate to breeding hen harrier. Hen harrier was recorded frequently, with multiple birds present. Two breeding pairs were confirmed, with one pair nesting approximately 800m from the site boundary to the south of site, and a second pair nesting north of site, approximately 1.5km from the site boundary. Locations are presented in Confidential Appendix 3 Figure 6.0.

2. INTRODUCTION

MKO was appointed to carry out ornithological surveys at Lissinagroagh Wind Farm, Manorhamilton, Co. Leitrim (hereafter "the site") for the 2024 breeding season. This report describes the survey methods and findings for the period April 2024 to September 2024 inclusive.

2.1 Site Description

The site is located north of Manorhamilton (Grid Ref: X 591484.00 Y 842226.00). The dominant habitat on site is forestry, upland blanket bog and rough grassland. The wider surroundings are predominantly upland blanket bog, rough grassland, forestry, and improved agricultural grassland.

2.2 Details of Proposed Development

Appendix 1 Figure 1.0 shows the wind farm site boundary, based on the most up to date 14 turbine layout at the time of preparing this report.

2.3 Purpose of this Report

This report describes the ornithological survey methods employed, and survey data collected at Lissinagroagh Wind Farm for the period April 2024 to September 2024 inclusive. It does not include an assessment or discussion of the potential impacts of the proposed development on birds. Instead, this report aims to provide robust baseline ornithological survey data for the breeding period. This data will be used to inform a separate ecological impact assessment and appropriate assessment for the proposed wind farm.

2.4 Relevant Legislation

The following key legislative provisions are applicable to wild birds in Ireland: Irish Wildlife Acts 1976 to 2022.; the European Union Birds Directive (EU Directive 2009/147/EC on the conservation of wild birds); the European Communities (Birds and Natural Habitats) Regulations 2011, as amended (S.I. no. 477 of 2011) and the International Convention on Wetlands of International Importance (the Ramsar Convention), 1971.

3. METHODS

3.1 Scope

3.1.1 Description of Study Area

The ornithology study area was defined as a 500m radius of the viable area for turbines (see Figure 1.0). This boundary accounts for both detecting birds that use the wind farm site occasionally and spatial inaccuracies in observational data, as well as ancillary structures. The ornithology study area was used for vantage point surveys, following Scottish Natural Heritage (SNH; now NatureScot) 2017 guidance (SNH, 2017) that flight activity surveys encompass an area extending 500m beyond the potential outermost proposed turbines. A 5km radius of the ornithology study area boundary was used for breeding raptor surveys, based on the core foraging range of hen harrier, which this area is known to support. The novel foraging vantage point surveys (FVPs) were located at the nest sites as they were located, irrespective of the wind farm site boundary.

3.1.2 Ecological Features Considered

Ecological features considered in the scope of the surveys were the habitats present on the site and hinterland, as reviewed by aerial photography and reconnaissance visits, and the Special Protection Areas (SPA) designated under the Birds and Habitats (92/43/EEC) Directives Natura 2000 network within foraging range for SCI species and/or 15km of the site. Bird species' of conservation interest were also considered, including those listed on Annex I of the Birds Directive that occur in Ireland, species that are a Special Conservation Interest (SCI) of SPAs within foraging range for SCI species and/or 15km of the site, species on the Red List of Birds of Conservation Concern in Ireland (Gilbert *et al.*, 2021) and all raptor species that occur in Ireland, because these species are particularly sensitive to wind farm developments.

3.1.3 Consultation

MKO undertook a consultation exercise to inform the scope of the surveys. Table 3-1 provides a list of the organisations consulted and notes where responses have been received.

Table 3-1 Consultation Response Summary

No.	Consultee	Response to Consultation
1	BirdWatch Ireland	No Response
2	National Parks and Wildlife Service (NPWS)	Initial response received 18/06/2018. Confirmation received 30/12/2019 from NPWS that no more recent information was available.

3.2 Desk Study

A comprehensive desk study was undertaken in 2019, and updated during the preparation of this report, to search for any relevant information on species of conservation concern which potentially use the site. The assessment included a thorough review of the available ornithological data including:

- Review of sites designated for birds.
- Review of breeding bird atlases (Balmer *et al.*, 2013).
- Review of Birds of Conservation Concern (BoCCI) in Ireland 2020-2026 (Gilbert *et al.* 2021).
- Review of specially requested records from the NPWS Rare and Protected Species Database. An information request was sent to the NPWS requesting records from the Rare and Protected Species Database.

- Review of the 2022 National Survey of Breeding Hen Harrier in Ireland Report (Ruddock *et al.*, 2024).

3.3 Field Surveys

The approach to breeding bird surveys for the proposed wind farm is based on recommendations outlined in NatureScot (2017). This guidance is recognised as standard good practice guidance throughout the UK and Ireland for surveying birds to inform impact assessment for onshore wind farms. Field surveys were undertaken from April 2024 to September 2024 inclusive. Individual survey types are described below.

3.3.1 Flight Activity Surveys

Vantage point surveys were undertaken following the guidance of NatureScot (2017) from four vantage point locations during the 2024 breeding season. Vantage point surveys aim to quantify the flight activity of primary and secondary 'target species' within the study area. The main purpose of vantage point surveys is to collect data on primary target species that will enable estimates to be made of:

- The time spent flying over the site.
- The relative use by birds of different parts of the site.
- The proportion of flying time spent within the provisional upper and lower risk height limits as determined by the potential rotor diameter and rotor hub height.
- The analysis of the potential risk of collision of birds with rotating turbines.

Vantage Point Locations and Viewshed Analysis

Viewshed analysis was carried out to confirm the sufficiency of the chosen vantage point locations (VP1 at ITM X592930 Y842236, VP2 at ITM X592615 Y842428, VP3 at ITM X593496 Y843692 and VP4 at ITM X 590407 Y 840997). The initial viewshed analysis was conducted in 2018 and reviewed in 2020. Viewsheds were calculated using Resoft Wind Farm ZTV (Zone of Theoretical Visibility) software in combination with MapInfo Professional (Version 10.0) using a notional layer suspended at 25m, which is representative of the minimum height considered for the Potential Collision Risk Area based on the turbine model at the time the vantage point locations were selected. Note that while the relevance of being able to view as much of the site to ground level is acknowledged, the SNH guidance emphasises the importance of visibility of the 'collision risk volume' when the data is to be used to estimate the risk of collision with turbines by birds. Therefore, the viewshed analysis aims to identify the most suitable locations to site vantage points such that the airspace of the turbine rotor swept area is in view using the fewest possible number of vantage points. The vantage point locations were tested for visibility coverage by creating a viewshed point 1.75m in height (to represent the height of observer) on a map using 10m contours terrain data. The relative height of any surrounding trees and its effects on visibility is also accounted for in the analysis. Using the ZTV software, a viewshed of 360° was produced calculating an area 25m from ground level up to a 2km radius. The resulting viewshed image was then cropped to 180° to give the viewshed.

Survey Effort

A total of 36 hours of watches was undertaken at each of the four vantage point locations from April to September 2024 inclusive. This equates to a total of six hours per vantage point per month. Survey effort undertaken during the 2024 breeding season is summarised in Table 3-2 and full details are presented in Appendix 2 of this report, including dates, times, duration, and weather conditions. A map of the vantage point locations if provided in Appendix 1 Figure 1.1.

Table 3.2 Summary of vantage point survey effort undertaken at the proposed Lissinagroagh Wind Farm from April 2024 to September 2024.

	VP1 ITM [1] X 592930 Y 842236	VP2 ITM X 592615 Y 842428	VP3 ITM X 593496 Y 843692	VP4 ITM X 590407 Y 840997
Month	**Hours**			
April	4/4/24 6 hours	2/4/24 6 hours	3/4/24 6 hours	29/4/24 6 hours
May	31/5/24 6 hours	14/5/24 6 hours	15/5/24 6 hours	7/5/24 6 hours
June	12/6/24 6 hours	10/6/24 6 hours	13/6/24 6 hours	6/6/24 6 hours
July	8/7/24 6 hours	3/7/24 6 hours	5/7/24 6 hours	10/7/24 6 hours
August	14/8/24 6 hours	30/8/24 6 hours	15/8/24 6 hours	2/8/24 3 hours 19/8/24 3 hours
September	20/9/24 6 hours	19/9/24 6 hours	26/9/23 6 hours	20/9/24 6 hours
Total Hours	**36**	**36**	**36**	**36**

Primary Target Species

The target species for vantage point surveys were defined by legal and/or conservation status, following SNH (2017) guidance, which states that "*in most circumstances the target species will be limited to those species which are afforded a higher level of legislative protection.*" A list of primary target species was draw from the following sources:

- Species that are SCIs of the SPAs within 15km of the site.
- Species listed on Annex I of the Birds Directive that occur in Ireland.
- Species listed on the Red List of Birds of Conservation Concern in Ireland (Gilbert *et al.*, 2021) with the exception of Red List passerines, as these are generally not significantly impacted by wind energy developments.

Secondary Target Species

SNH (2017) also states that "*local circumstances may indicate that survey information should also be acquired on other species, especially those of regional conservation concern*". A list of secondary target species comprised:

- All raptors that occur in Ireland that are not included as primary target species.

Data Collection

Data on bird observations and flight activity was collected by the surveyor by scanning the arc of 180° and a 2km radius from the fixed location. Surveys were scheduled to provide a spread over the full daylight period including at dawn and dusk (starting or ending an hour before dawn or an hour after dusk on alternate months for April, May, August, and September) to coincide with the highest peaks of bird activity and to record any wildfowl migration or crepuscular species. Breaks of at least 30 minutes were taken every 3 hours to minimise observer fatigue. A 10-minute settling in period was allowed for at the start of each vantage point to allow the surveyor to get into place, and to minimise the impact of surveyor disturbance on flight activity. For each primary target species observation, the following details were recorded:

- Date, time, and location of observation.

[1] Irish Transverse Mercator Co-Ordinates

- Number of species recorded.
- Total duration of flightline observation.
- Duration at each of flightline at each height band.
- Species age and sex (where determinable).
- Habitat(s).
- Behaviour.

Recording height bands were determined based on the likely turbine specifications under consideration at the time of survey (upper tip height 175m and lower tip height 25m). Flight heights were attributed to four distinct height bands as follows:

- Band 1 = 0 - 15m (below the likely rotor swept area).
- Band 2 = 15 - 25m (potentially within the likely rotor swept area, at least in part).
- Band 3 = 25 - 175m (within the likely rotor swept area, potential collision height, PCH).
- Band 4 = >175m (above the likely rotor swept area).

Although recording of secondary species is subsidiary to recording of primary target species, secondary target species were also recorded to provide an index of flight activity for secondary target species within the site.

3.3.2 Foraging Vantage Point Surveys

Foraging vantage point surveys (FVPs) were undertaken to provide additional information on foraging areas utilised by hen harrier breeding in the study area. FVPs were selected based on the number of nests located and the available viewshed in each case. Given the large core foraging area of birds and the extensive effort required to cover all potential foraging areas simultaneously, it was decided the nest sites would be directly observed and all visible activity recorded to provide as much information on areas utilised for foraging as possible given limitations on survey effort. Surveys were carried out during daylight hours and in accordance with peak activity hours for the species where possible. Surveys lasted from 3 to 6 hours.

FVPs began in June 2024 once the nest sites had been identified and continued into July 2024 until observations at nest sites declined. The southern nest site identified was surveyed from two FVPs. The northern nest site was surveyed from three FVPs, with equal total survey effort spent at each nest. The FVPs were selected with the aim of monitoring routes to and from the nests adequately. On each occasion a bird was observed its flight path was followed until it was lost from view. The key undertaking during these observations was to identify the areas utilised by foraging hen harrier. For each hen harrier observation, the following details were recorded:

- Flightline including direction of flight.
- Date, time, and location of observation.
- Number of species recorded.
- Species age and sex (where determinable).
- Habitat(s).
- Behaviour.

FVP locations are presented in Appendix 1 Figure 4.0.

3.3.3 Breeding Raptor Surveys

Breeding raptor (i.e. birds of prey) surveys were undertaken to identify occupied raptor territories and ascertain whether breeding was successful. Surveys were carried out during the core breeding season period from April to August 2024.

Methodology followed Hardey *et al.* (2013). Surveys involved a combination of raptor vantage point watches of 3 hours and transects in areas deemed most likely to hold breeding raptors based on habitat and observed movements of raptor species in the study area. There were 12 breeding raptor survey locations. Once breeding activity was observed, vantage point and transect locations were adjusted with the aim of pinpointing breeding locations. Each breeding raptor survey location was visited four times to complete a full round of breeding season surveys. The purpose of the four visits is (1) to establish occupancy, (2) to establish active nests, (2) to check for chicks and (4) to check for fledglings. Timings of these visits vary by species as set out in Hardey *et al.* (2013). Although visits between April and July are advised, nests identified during surveys were still active at the end of July, therefore surveys were extended into August. Survey effort is provided in Appendix 2 of this report, including dates, times, duration and weather conditions. A map of the breeding raptor survey locations is presented in Appendix 1 Figure 3.0.

3.4 Project Team

This report has been prepared by Andrew O'Donoghue (B.Sc.), Project Ornithologist with MKO and reviewed by Patrick Manley (B.Sc.), Senior Ornithologist. Both are suitably qualified ornithologists with experience in completing avifaunal assessments and competent experts for the purposes of the preparation of this report, following SNH (2017) and CIEEM (2017) ecological reporting guidelines.

3.4.1 Field Survey Team

The field surveys were undertaken in the 2024 breeding season by Andrew O'Donoghue and Niall McHugh (B.Sc.). Surveyors are suitably qualified competent experts in field ornithology. Andrew has eight years of experience in ornithological surveysand Niall has five years of experience, including vantage point, breeding raptor and breeding walkover surveys.

3.5 Survey Limitations

A comprehensive suite of bird surveys was undertaken at the site between April and September 2024, as detailed in this report. There were no significant gaps in viewsheds during vantage point surveys. It was possible to schedule surveys to avoid potential human disturbances (e.g., forestry operations, agriculture, peat extraction, recreational activity). Surveys were not carried out in unsuitable weather conditions where visibility or bird activity would be impacted. On occasions where weather turned unsuitable or dangerous (e.g. lightning) after the survey had begun, surveys were postponed. Results from the 2024 breeding season are derived from a continuous six months of surveying undertaken following best practice guidance (NatureScot, 2017). The survey duration and scope are considered entirely satisfactory.

The foraging vantage points mentioned above in Section 3.3.2, were selected to identify where nesting hen harriers were foraging. And foraging areas were successfully identified. However, as hen harriers forage over a large area, the five No. FVP locations are unlikely to have provided full coverage of all areas utilised for foraging by the two identified nesting pairs.

4. RESULTS

4.1 Desk Study

4.1.1 Sites Designated for Nature Conservation

Using GIS software, sites designated for nature conservation within the potential zone of influence of the proposed wind farm development were identified. In the absence of any specific European or Irish guidance, NatureScot (2016) was consulted. This document provides guidance in relation to the identification of connectivity between proposed development proposals and SPAs. It takes into consideration the distances some species may travel beyond the boundary of their SPAs and outlines information on dispersal and foraging ranges of certain bird species. In addition, taking a precautionary approach, sites within a 15km radius of the proposed wind farm were identified. Sites designated for birds are listed below in Table 4-1.

Table 4-1 Designated sites within 15km of the site

Designated site and code	Distance from proposed works (km)
Special Protection Areas (SPA)	
Sligo/Leitrim Uplands (002384)	9.2
Natural Heritage Areas (NHA)	
Dough/Thur Mountains (002384)	0.1
Aghavoghil Bog (002430)	4.2
Crockauns/Keelogyboy Bogs (002435)	9.0

4.1.2 Previous Survey Data

4.1.2.1 Breeding Bird Atlas Records

'Bird Atlas 2007-11: *The breeding and wintering birds of Britain and Ireland'* (Balmer *et al.*, 2013) is the most recent comprehensive work on breeding birds in Ireland. It provides information on species and their breeding status in 10km hectads. The site lies within hectad G94. Table 5-1 presents a list of nine species of conservation interest recorded within this hectad.

Table 5-1 Bird atlas 2007-11 records

Species Name	Hectad (G94)	Conservation Status
Golden plover	Non-Breeding	Annex I EU Birds Directive, BoCCI Red Listed
Peregrine	Probable Breeding	Annex I EU Birds Directive, SCI of SPA within 15km
Hen harrier	Confirmed Breeding	Annex I EU Birds Directive
Merlin	Possible Breeding	Annex I EU Birds Directive

Species Name	Hectad (G94)	Conservation Status
Red grouse	Probable Breeding	BoCCI Red Listed

4.1.2.2 Rare and Protected Species Dataset

An information request was sent to the NPWS requesting records from the Rare and Protected Species Database. The sections below provide records obtained from the NPWS (on 18th of June 2018) of the rare and protected breeding bird species hen harrier, peregrine and red grouse.

Hen Harrier

Table 5-2 below presents the NPWS records for hen harrier nest sites to defined radii of the development site.

Table 5-2 NPWS Hen Harrier Nest Site Records

Year	Within site boundary	0-1km from site boundary	1-3km from site boundary	3-5km from site boundary
2015	No Records	1 confirmed breeding site	No Records	1 confirmed breeding site
2010	No Records	3 confirmed breeding sites	1 sighting	1 confirmed breeding site, 1 additional sighting
2005	No Records	3 sightings	No records	No records
1998-2004	No Records	No Records	No Records	No records

Peregrine

The NPWS identified one confirmed peregrine nest site within 3-5km of the site. The observation was recorded during a survey in 2002.

Red Grouse

The NPWS hold records of red grouse in the area. Between 2000 and 2011 this species was recorded on nine occasions. One observation was recorded on site. There were two records located approximately 500m from the site - one just south of Dough Mountain and the other just north of Killea. The remainder of the observations were recorded over 3km from the site, three of which were in the vicinity of Thur Mountain.

4.2 Field Surveys

4.2.1 Flight Activity Surveys

During vantage point surveys, hen harrier were recorded regularly on site, including some time spent at potential collision height (PCH). White -tailed eagle, merlin, golden plover, snipe, woodcock, buzzard, and kestrel were also recorded on site, including at PCH (Individual species accounts of primary and secondary target species are provided below).

4.2.1.1 Primary Target Species

White tailed eagle

White tailed eagle was observed once during surveys. In August a single bird was observed soaring at Boleyboy and Dough Mountain. A total of 270 seconds were recorded at PCH. Maps are presented in Appendix 1 Figure 1.3.

Golden plover

Golden plover were recorded twice during vantage point surveys. A total of 68 seconds of flight were recorded at PCH. Observations involved flocks of up to 15 birds in flight at Dough Mountain. Maps are presented in Appendix 1 Figure 1.4.

Hen harrier

Hen harrier were observed 17 times during vantage point surveys. A total of 370 seconds of flight were recorded at PCH. All observations involved adult male or female birds flying, hunting, foraging, and perched. Maps are presented in Appendix 1 Figure 1.5.

Merlin

Merlin were recorded five times during vantage point surveys. There were no observations at PCH. All observations involved female birds in flight, hunting or perched around Killea on site and within 500m of site. Maps are presented in Appendix 1 Figure 1.6.

Snipe

Snipe were recorded 74 times during vantage point surveys, all on site or within 500m of the site. A total of 6,925 seconds were recorded at PCH. Observations involved single birds or small flocks in flight, calling and displaying. Displaying birds were observed near Killea, Tawnyfeacle, and Dough Mountain. Maps are presented in Appendix 1 Figure 1.7.

Kestrel

Kestrel were recorded 28 times during vantage point surveys. A total of 7,430s were spent at PCH. Observations involved single birds foraging, hovering or travelling. Maps are presented in Appendix 1 Figure 1.8.

4.2.1.2 Secondary Target Species

Sparrowhawk

Sparrowhawk was recorded on one occasion during vantage point surveys. A single female was observed in flight on site. A total of 120s were recored at PCH. Maps are presented in Appendix 1 Figure 1.9.

Buzzard

Buzzard were recorded 60 times during vantage point surveys, all on site or within 500m of the site. A total of 25,255 bird seconds were recorded at PCH. Observations included single birds or pairs soaring, travelling, or foraging in both the northern and southern sections of the site. Maps are presented in Appendix 1 Figure 1.10.

4.2.2 Breeding Raptor Surveys

Hen harrier

Hen harrier were observed 85 times during breeding raptor surveys. To the south of site, on the 5th of April an adult male and immature male were observed both displaying and the older bird chasing the younger in the vicinity of a historic nest site. On the 19th of April three adult males were observed sky dancing (displaying) over the historic nest sites on site and within 500m of site, between [redacted]. On the same day, a single female was observed in flight with at least one of these displaying males on site. On the 30th of May a food pass was observed between an adult male and female, with the female dropping back with prey to the same location as the 2023 nest site. This confirms nesting in the same location this year. Provisioning flights and food passes were observed in the following weeks. On the 27th of June the male and female were observed at the nest site including provisioning flights and carrying prey. They were not observed again at this location despite extensive survey effort. It is likely this nest failed and breeding was unsuccessful given the sharp drop off in observations.

To the north of site, one of the three displaying males on the 19th of April was displaying on the south side of Dough Mountain moving northwest towards Killea, indicating an occupied territory to the north. In May a male was recorded in flight displaying on a number of occasions near the historic nest site at [redacted]. On the 30th of May a food pass was observed between a male and a female at the same location. The female returned to the ground with prey confirming a nest approx. 100m from the historic nest site here. Observations dropped off in June indicating that this nest likely also failed.

Maps are presented in Confidential Appendix 3 Figure 6.1.

Osprey

Osprey were recorded on one occasion during breeding raptor surveys. On the 23rd of May and adult was observed soaring high over the north of site from the direction of Lough Melvin. The bird then flew off site to the northeast. Maps are presented in Appendix 1 Figure 3.2.

Merlin

Merlin were observed on five occasions during breeding raptor surveys. In June and July, a female was observed in flight, hunting and perched within 500m of site on the top of Dough Mountain. No breeding behaviour was observed. Maps are presented in Appendix 1 Figure 3.3.

Kestrel

Kestrel were recorded 22 times during breeding raptor surveys. Observations all involved single birds flying and hunting/foraging on and off site. No breeding behaviour was observed. Observations centred around Saddle Hill, Faughery, and Dough Mountain. Maps are presented in Appendix 1 Figure 3.4.

Buzzard

Buzzard were recorded 41 times during breeding raptor surveys. Single birds or groups of up to three were recorded. Juvenile birds were recorded on site at Killea and within 500m of site at Tawnylust confirming breeding in these areas. A displaying bird off site at Raheelin also indicates probable breeding there. The remaining observations were of birds travelling, hunting or soaring. Maps are presented in Appendix 1 Figure 3.5.

Sparrowhawk

Sparrowhawk were recorded nine times during breeding raptor surveys. Observations involved single birds in flight, foraging, displaying or carrying prey. Breeding was confirmed off site at Tawnyfeacle and Raheelin with adults carrying prey recorded in both areas. Maps are presented in Appendix 1 Figure 3.6.

4.2.3 Foraging Vantage Point Surveys

Hen harrier

Hen harrier were observed 11 times during FVPs, of these, nine observations involved foraging behaviour throughout or for part of the observation. Prey carrying and food passes were observed four times. Individual adult male or female birds and pairs were observed. To the south, foraging observations centred around Faughery, the South of Saddle Hill, and in suitable habitat in the vicinity of the nest site at [redacted]. To the north, two foraging observations were recorded northeast of saddle hill. Maps are presented in Appendix 1 Figure 4.1.

4.2.4 Incidental Observations

Golden plover

Golden plover were recorded once as an incidental observation. On the 19th of April a flock of 80 birds were recorded in flight on Dough Mountain within 500m of site. No breeding evidence was recorded. Maps are presented in Appendix 1 Figure 5.0.

Hen harrier

Hen harrier were observed once as incidental observations. In May, an adult male was recorded foraging and travelling at Faughery on site and within 500m of site. Maps are presented in Appendix 1 Figure 5.1.

Red grouse

Red grouse were recorded six times as incidental observations. Observations involved single birds or pairs. Birds were recorded calling at Dough Mountain, Killea, and Saddle Hill on site and within 500m of site, indicating probable breeding in these areas. Maps are presented in Appendix 1 Figure 5.2.

Snipe

Snipe were recorded 37 times as incidental observations. Behaviours included flying, flushed by the observer, chipping (display song), alarm calling and drumming (displaying). Probable breeding was indicated with the presence of displaying birds at Faughery, Dough Mountain, Saddle Hill, and Killea, all on site or within 500m of the site. Maps are presented in Appendix 1 Figure 5.3.

Kestrel

Kestrel were recorded twice as incidental observations. Single birds were observed in flight and foraging at Tawnyfeacle in July and Lissinagroagh in August. Maps are presented in Appendix 1 Figure 5.4.

Sparrowhawk

Sparrowhawk were recorded on six occasions as incidental observations. Single birds were recorded in flight, soaring, foraging and hunting on site at Tawnyfeacle, Boleyboy and Faughery. In July male and female were recorded carrying prey at Tawnyfeacle confirming breeding at this location, off site. Maps are presented in Appendix 1 Figure 5.5.

Buzzard

Buzzard were recorded twice as an incidental observations. A pair were recorded calling and in flight at Boleyboy in April indicating possible breeding here. A single bird was also observed in flight at Skreeny. Maps are presented in Appendix 1 Figure 5.6

Long-Eared Owl

Long eared owl were recorded twice as incidental observations. In June juvenile begging call were recorded on site at Faughery, confirming breeding here. Additionally, in June probable breeding was recorded off site at Raheelin with the presence of an alarm calling adult bird. Maps are presented in Appendix 1 Figure 5.7.

5. DISCUSSION

Ornithological surveys were conducted at the Lissinagroagh wind farm site from April to September 2024 inclusive. During these surveys, breeding territories were identified for hen harrier, red grouse, snipe, buzzard, long-eared owl and sparrowhawk.

Hen harrier were regularly recorded on site during surveys. In April three adult males, one immature male, and at least one female were observed engaging in display flights and courtship behaviour across the site in the vicinity of previously occupied territories/ nest sites.

To the south, on the 30th of May, a food pass was observed between an adult male and female, with the female dropping back with prey to the same location as the 2023 nest site. This confirmed nesting in that same location (Figure 6.0). Provisioning flights and food passes were observed in the following weeks. FVPs here indicated foraging centred around Faughery, the South of Saddle Hill, and in suitable habitat in the vicinity of the nest site at [redacted]. On the 27th of June, the male and female were observed at the nest site including provisioning flights and carrying prey. They were not observed again at this location despite extensive survey effort. It is likely this nest failed, and breeding was unsuccessful given the sharp drop off in observations.

To the north of site, in April and May a male hen harrier was recorded in flight displaying on a number of occasions on site at Killea and near the historic nest site at [redacted]. On the 30th of May, a food pass was observed between a male and a female at the same location. The female returned to the ground with prey confirming a nest approx. 100m from a historic nest site (last occupied in 2021) (Figure 6.0). FVPs at this nest recorded foraging northeast of Saddle Hill. This nest was particularly difficult to observe due to vegetation and topography.

Following the identification of the nest sites, FVPs were undertaken from early June and ended in July. These surveys aimed to identify where hen harrier were foraging. Observations at both nest sites sharply declined in late June indicating failure at both nests. There was no obvious reason for this. All other previously identified historic nest sites to the north and south of the site (i.e. to the north, on site at Killea, to the south, historic nest sites on site around Boleyboy, and off site at Curraghfore) were unoccupied.

Red grouse were classified as probable breeding (as evidenced by the presence of calling birds) on site and within 500m of the site at Saddle Hill, Dough Mountain and Killea. Snipe were also considered to be probable breeders with displaying birds recorded within 500m of the site at Saddle Hill, Faughery, Killea, Dough Mountain, and off site at Raheelin and Tawnyfeacle.

Merlin were recorded infrequently but consistently throughout the breeding season around the northern side of Dough Mountain. However, no breeding behaviour was recorded. Sparrowhawk were confirmed breeding in two locations off site at Raheelin and Tawnyfeacle. Long eared owl breeding was confirmed on site at Faughery and probable breeding off site at Raheelin. Buzzard were also confirmed breeding on site at Killea and Tawnylust, with probable breeding also recorded at Boleyboy.

Other birds of conservation concern recorded during the surveys were osprey, white-tailed eagle, and golden plover. These species were observed on site or within 500m of the site during the breeding season. There was a low frequency of observations, and no breeding behaviour was observed.

REFERENCES

Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. & Fuller, R.J. (2013) *Bird Atlas 2007-11: The breeding and wintering birds of Britain and Ireland*. BTO Books, Thetford.

Council Directive 92/43/EEC 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31992L0043

Council Directive 2009/147/EC 30 November 2009 on the conservation of wild birds. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32009L0147

Gilbert, G., Gibbons, D.W. and Evans, J. (1998) *Bird Monitoring Methods.* Bedfordshire, England: Pelagic Publishing, Royal Society for the protection of Birds.

Gilbert, G., Stanbury, A. and Lewis, A. (2021). Birds of Conservation Concern in Ireland 4: 2020-2026. *Irish Birds,* 43:1-22. Available at: https://birdwatchireland.ie/birds-of-conservation-concern-in-ireland/

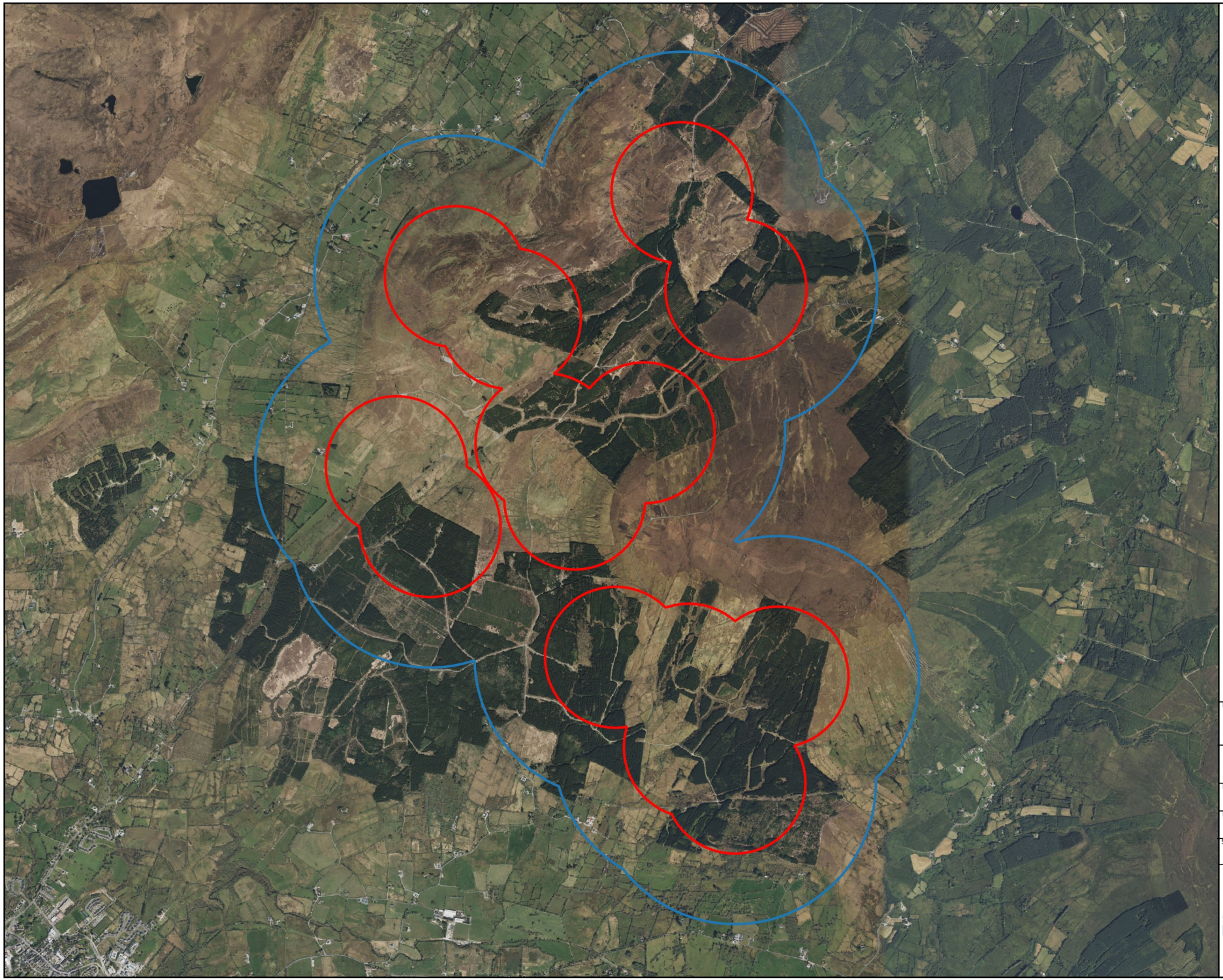
Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. and Thompson, D. (2013) *Raptors. A field Guide for Surveys and Monitoring.* The Stationary Office, Edinburgh.

SNH (2016). Assessing connectivity with Special Protection Areas (SPAs). Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2018-08/Assessing%20connectivity%20with%20special%20protection%20areas.pdf

SNH (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms. Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2018-06/Guidance%20Note%20-%20Recommended%20bird%20survey%20methods%20to%20inform%20impact%20assessment%20of%20onshore%20windfarms.pdf

APPENDIX 1

FIGURES



Map Legend

Site Boundary

500m Radius of Site Boundary

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Drawing Title

Site Boundary (14T Layout)

Project Title

Lissinagroagh

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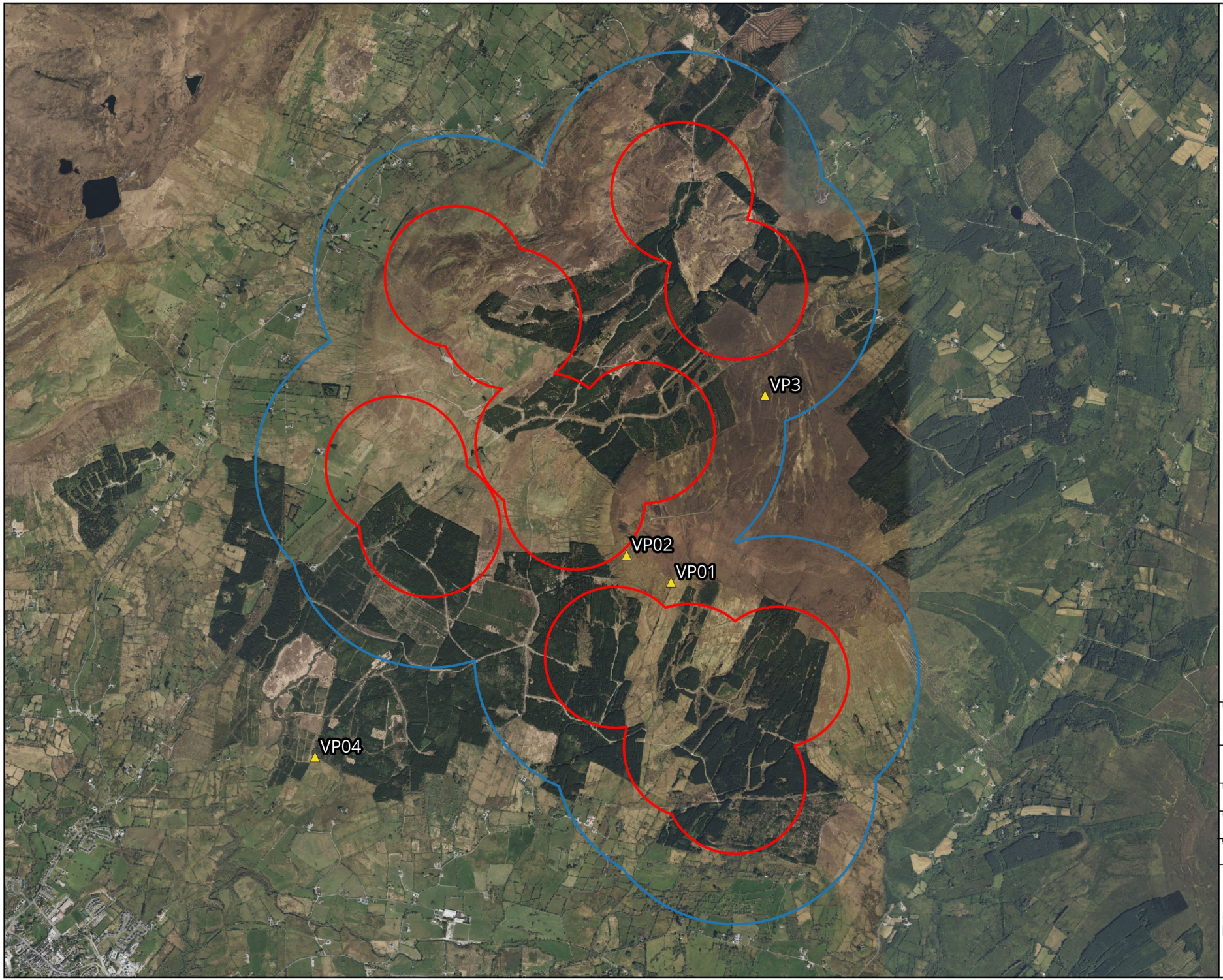

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Vantage Point Locations

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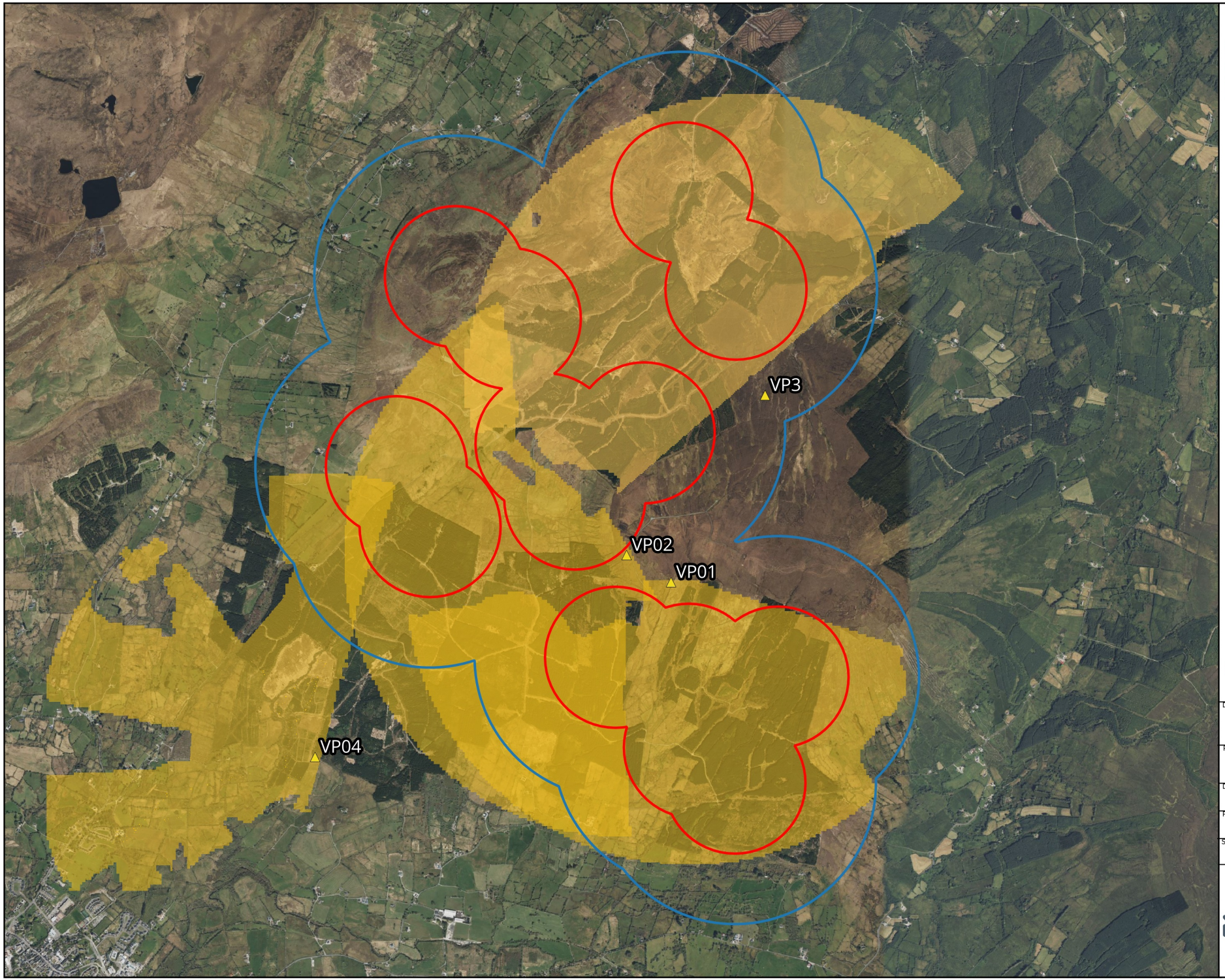

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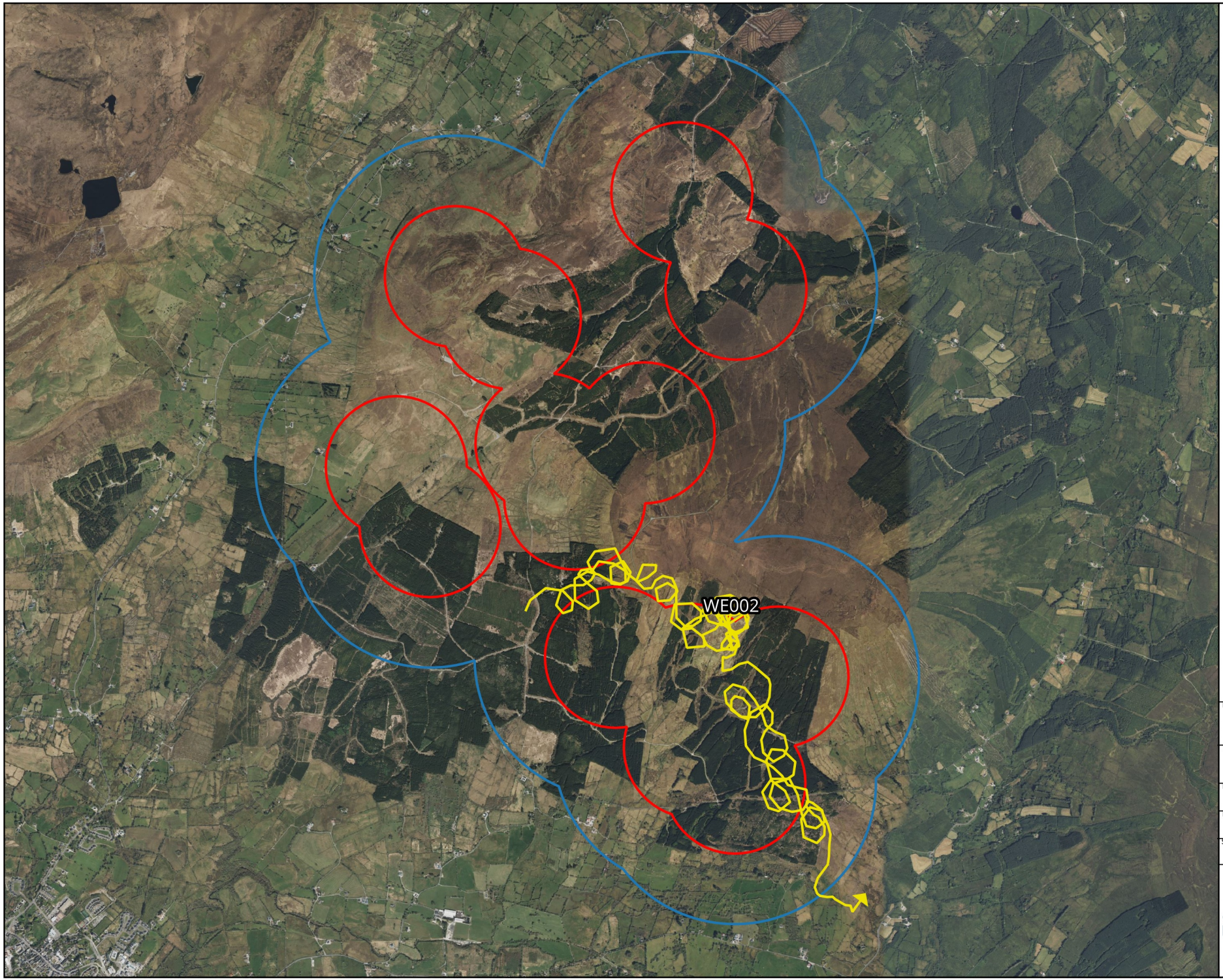

Map Legend

Site Boundary

500m Radius of Site Boundary

Observation Flightline

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Drawing Title

White Tailed Eagle Vantage Point Surveys

Project Title

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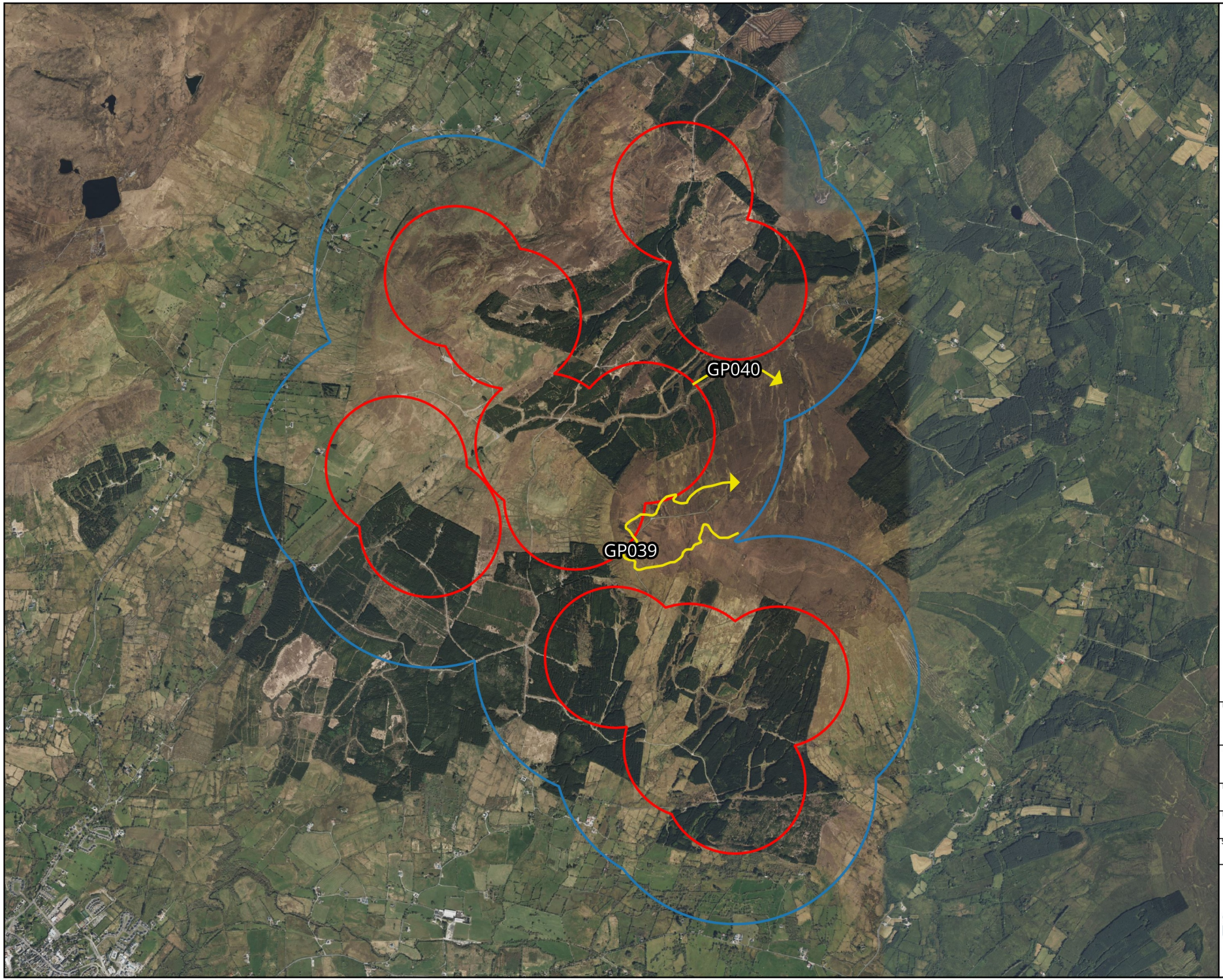

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Observation Flightline

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Golden Plover
Vantage Point Surveys

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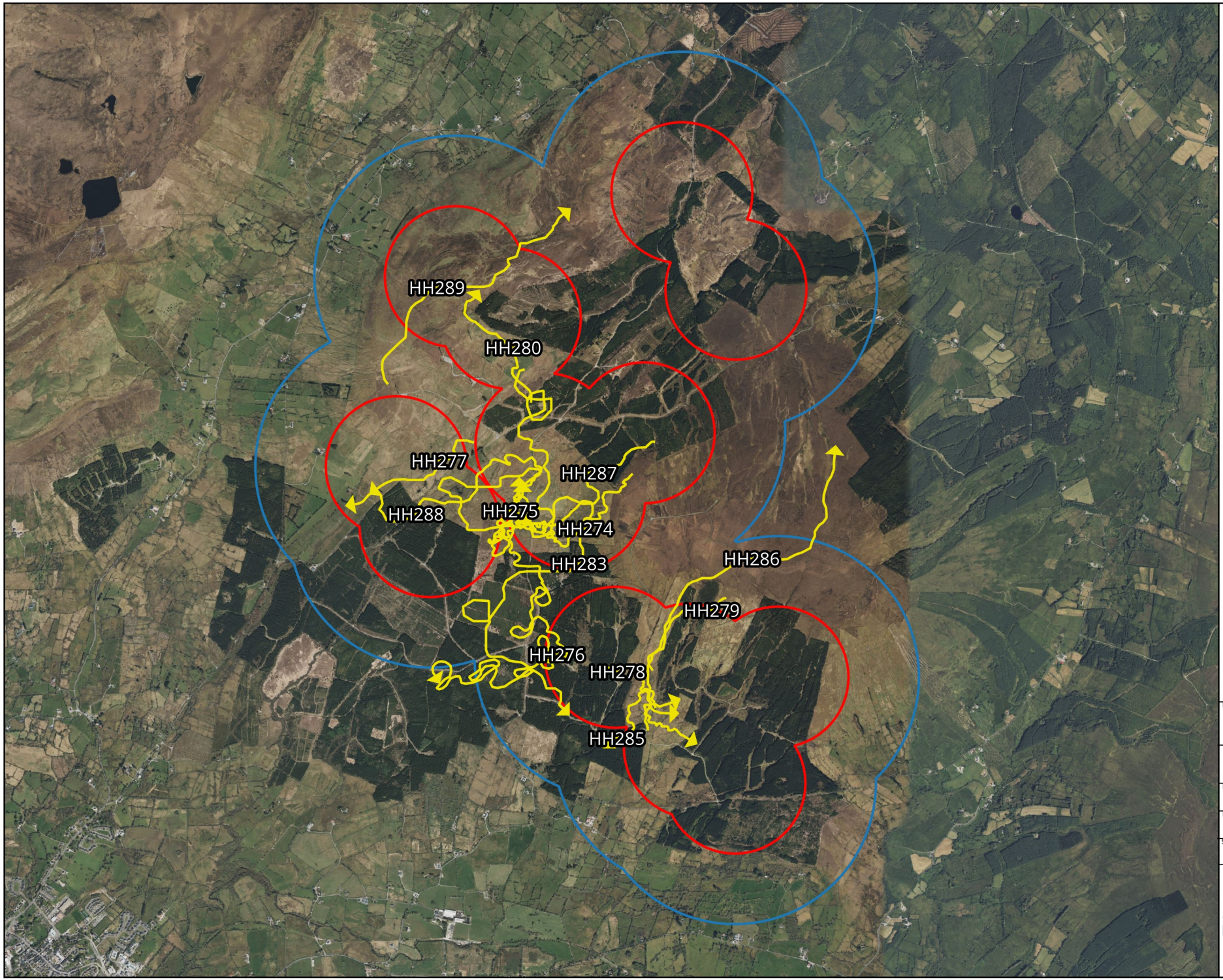

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Hen Harrier
Vantage Point Surveys

Project Title

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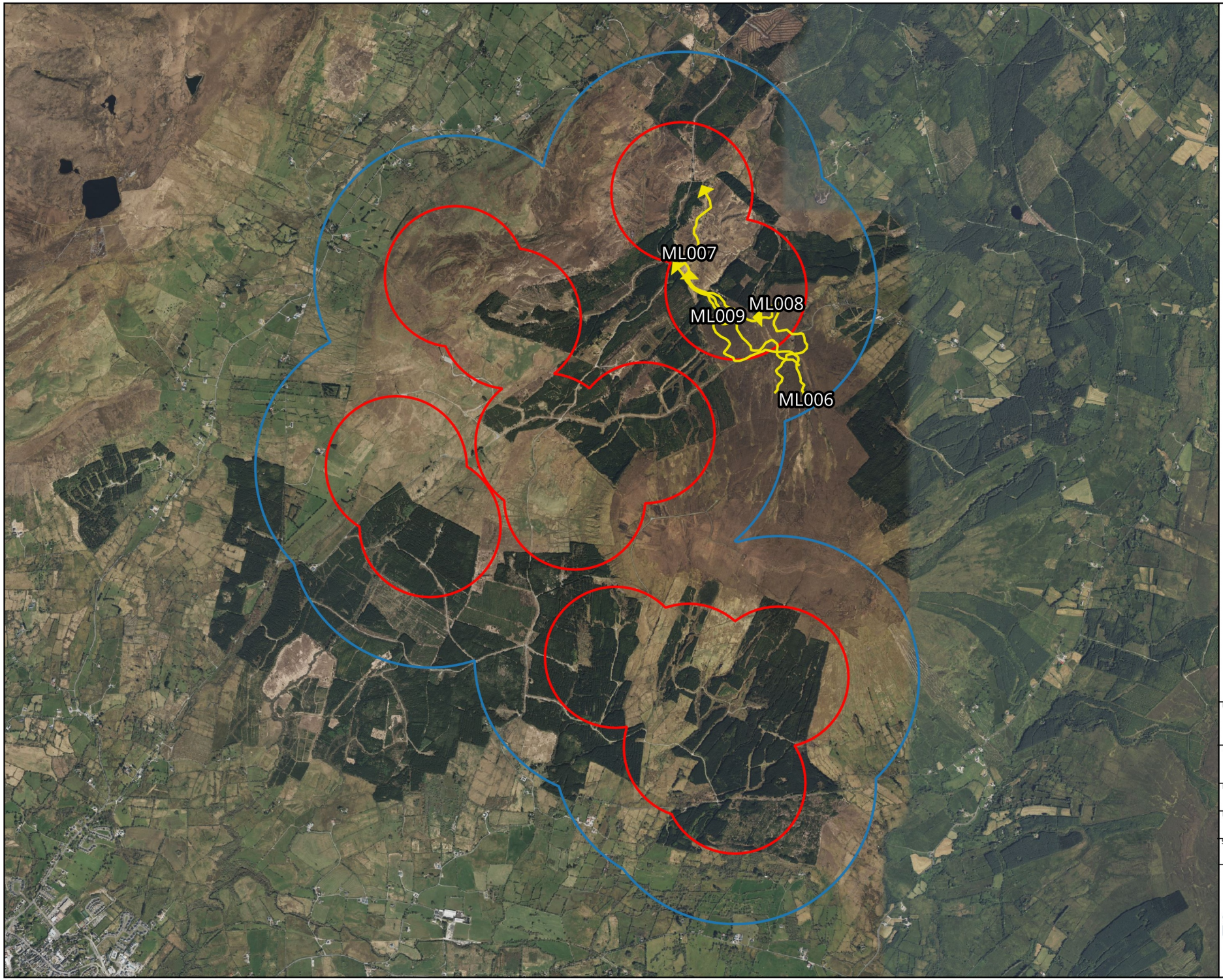

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Drawing Title

Merlin
Vantage Point Surveys

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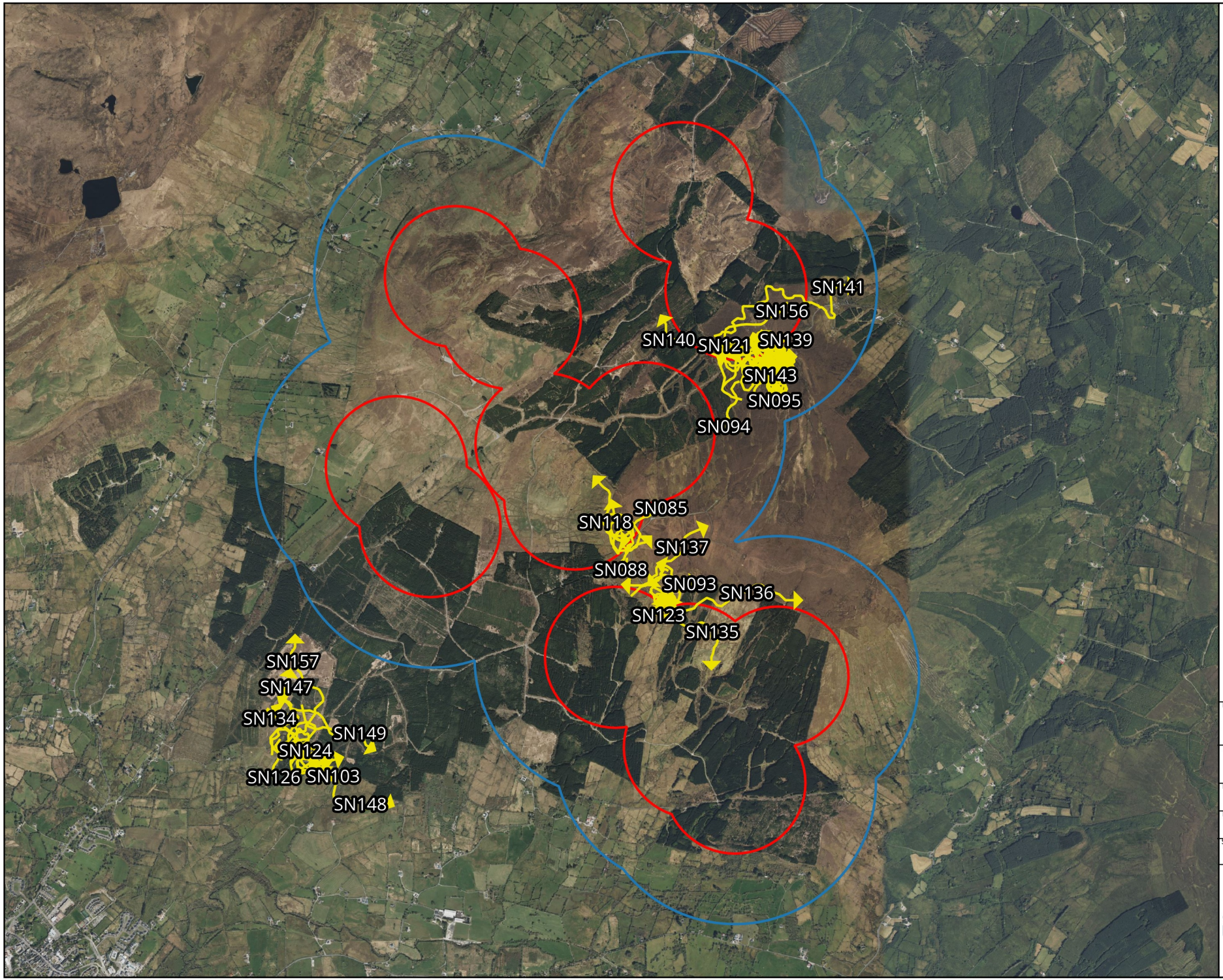

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Site Boundary

500m Radius of Site Boundary

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Drawing Title

Snipe
Vantage Point Surveys

Project Title

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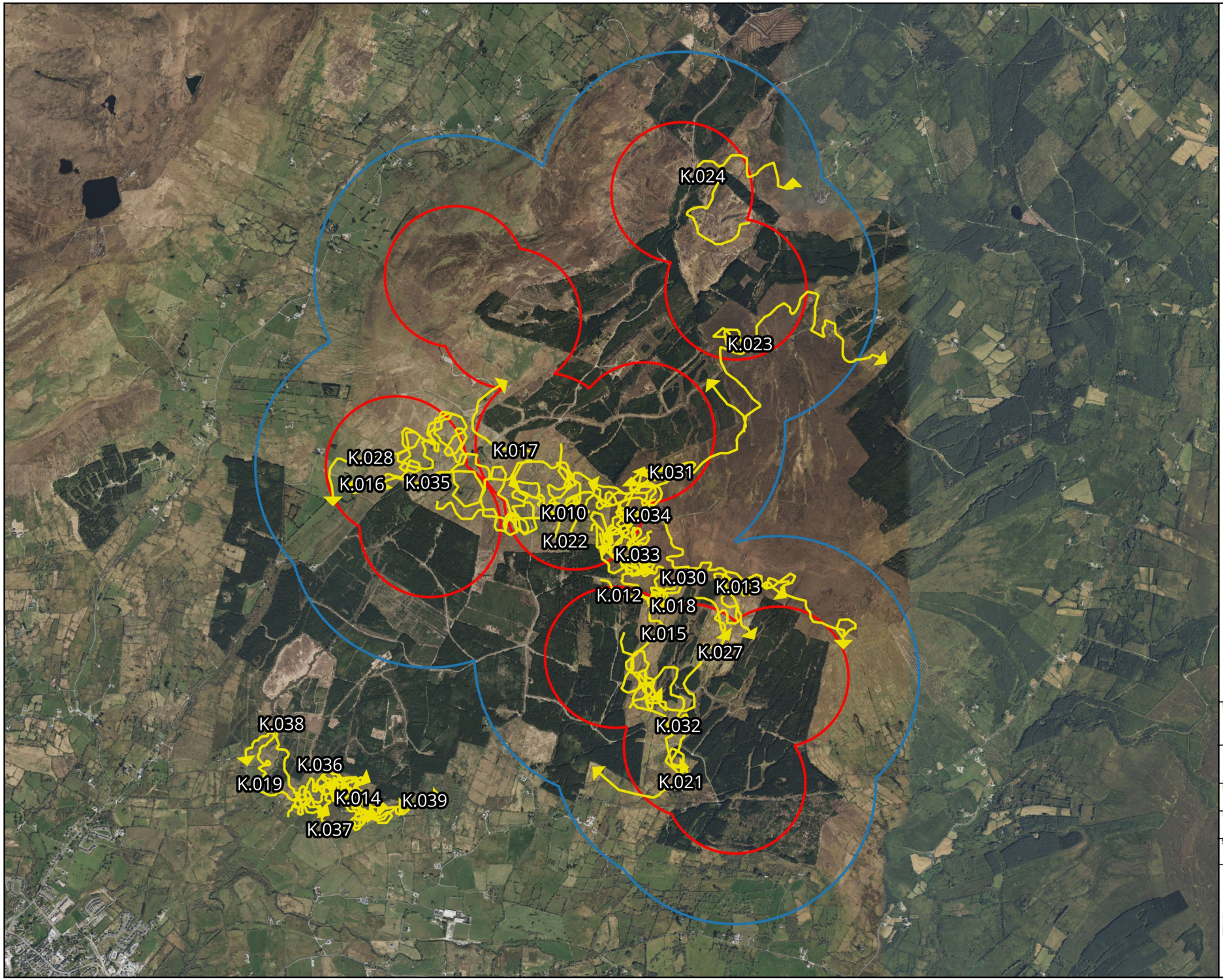

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Drawing Title

Kestrel
Vantage Point Surveys

Project Title

Lissinagroagh

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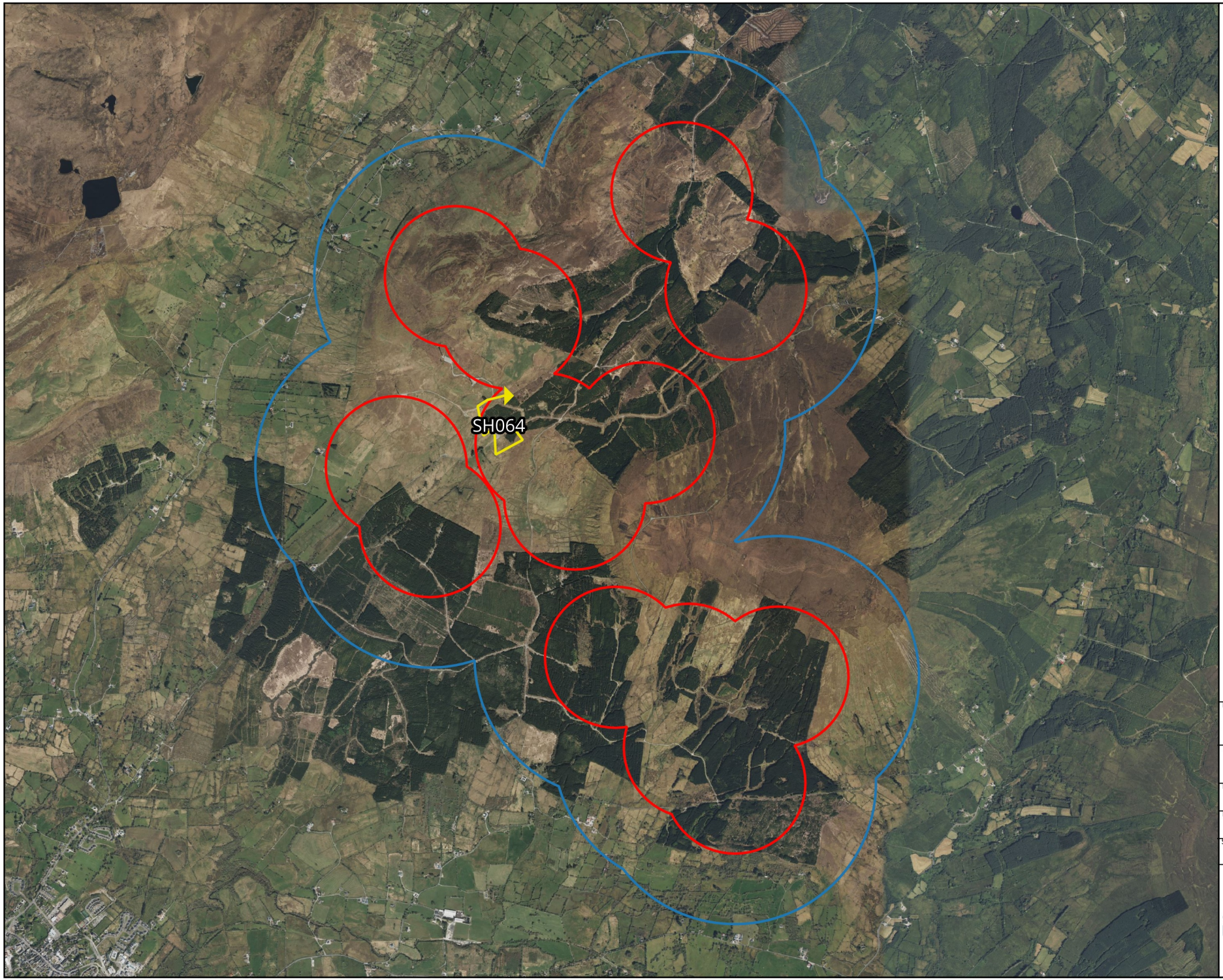

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Drawing Title

Sparrowhawk
Vantage Point Surveys

Project Title

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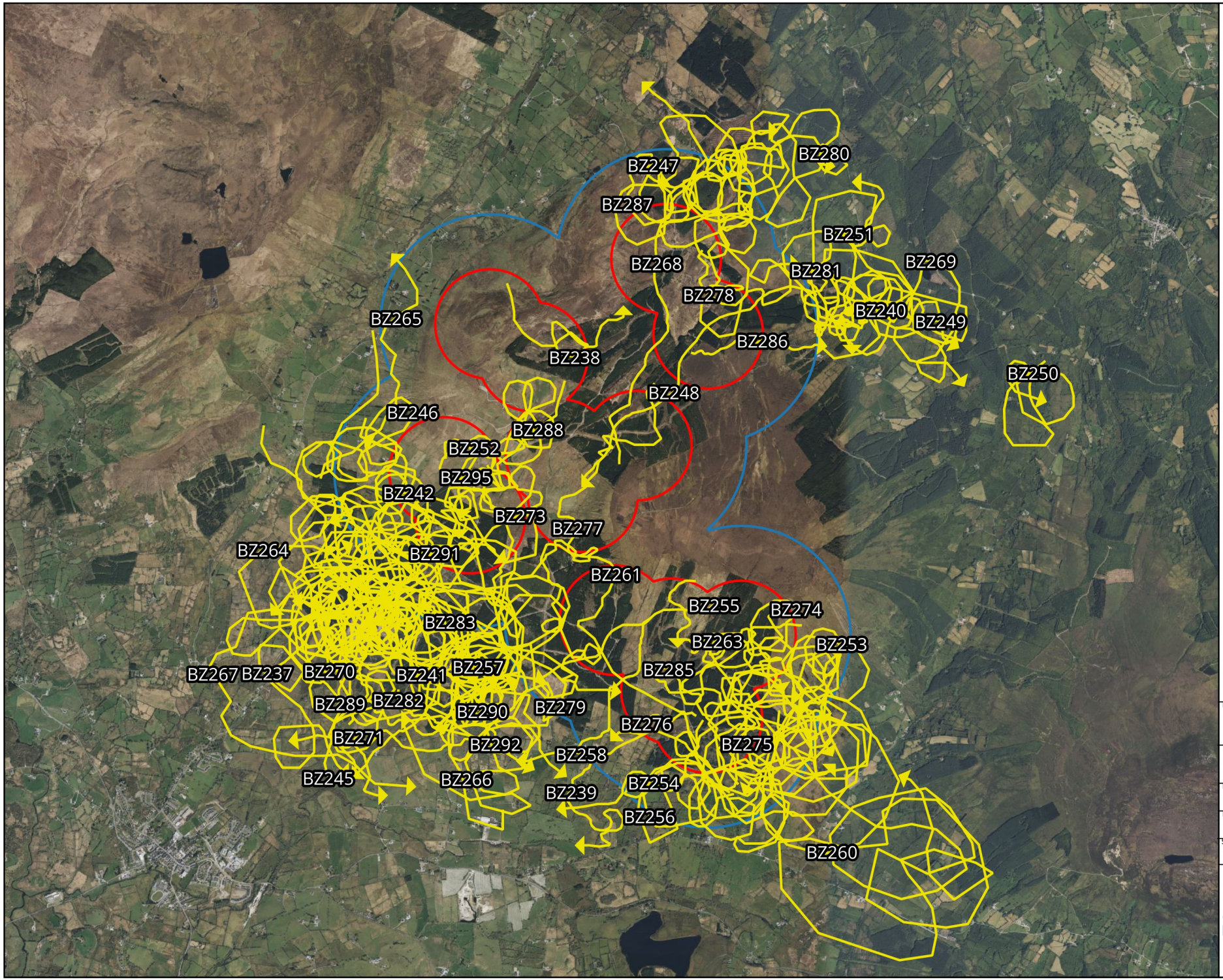

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Drawing Title

Buzzard
Vantage Point Surveys

Project Title

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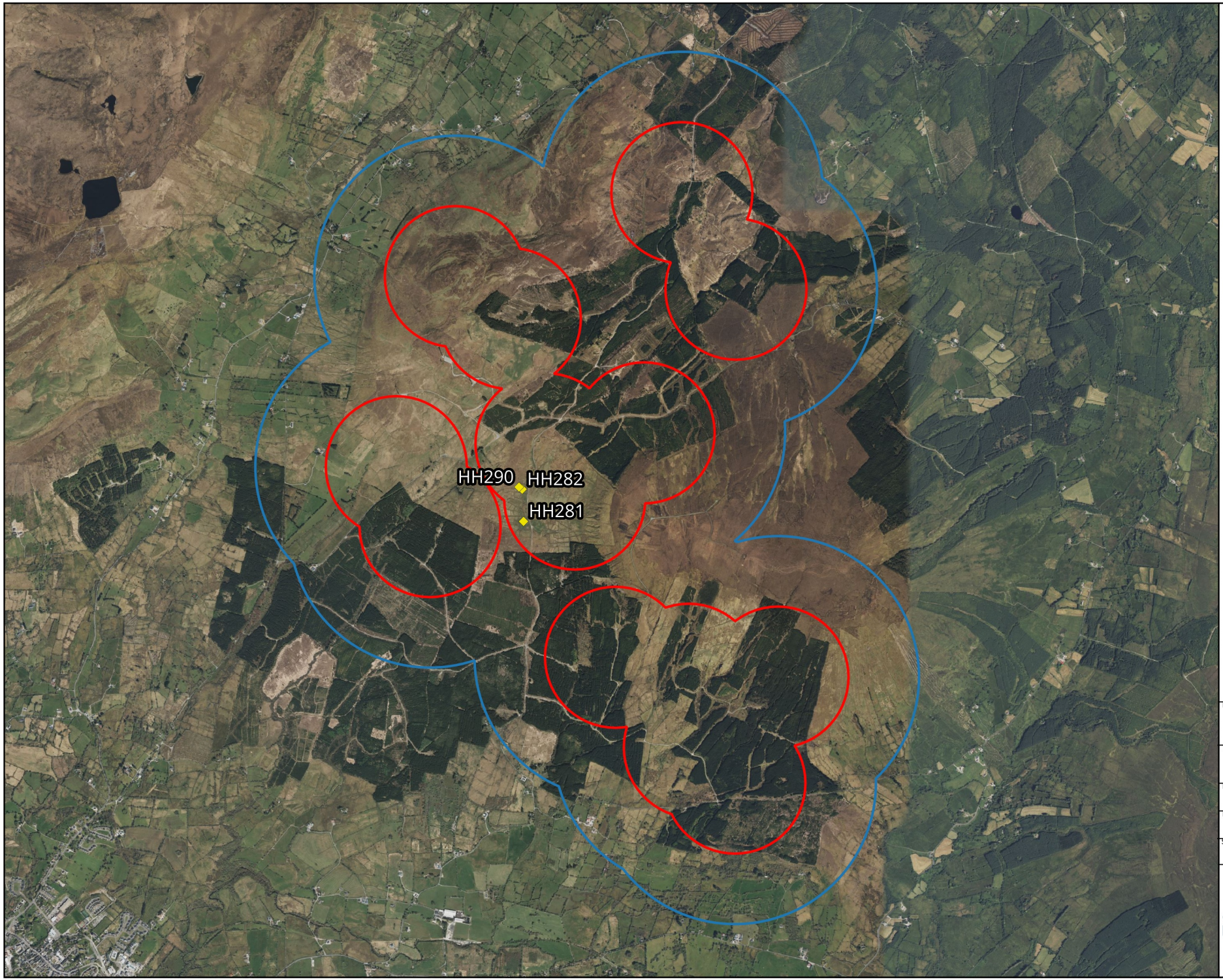

Map Legend

Site Boundary

500m Radius of Site Boundary

Observation

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Drawing Title

Hen Harrier
Vantage Point Surveys
(Non Flight)

Project Title

Lissinagroagh

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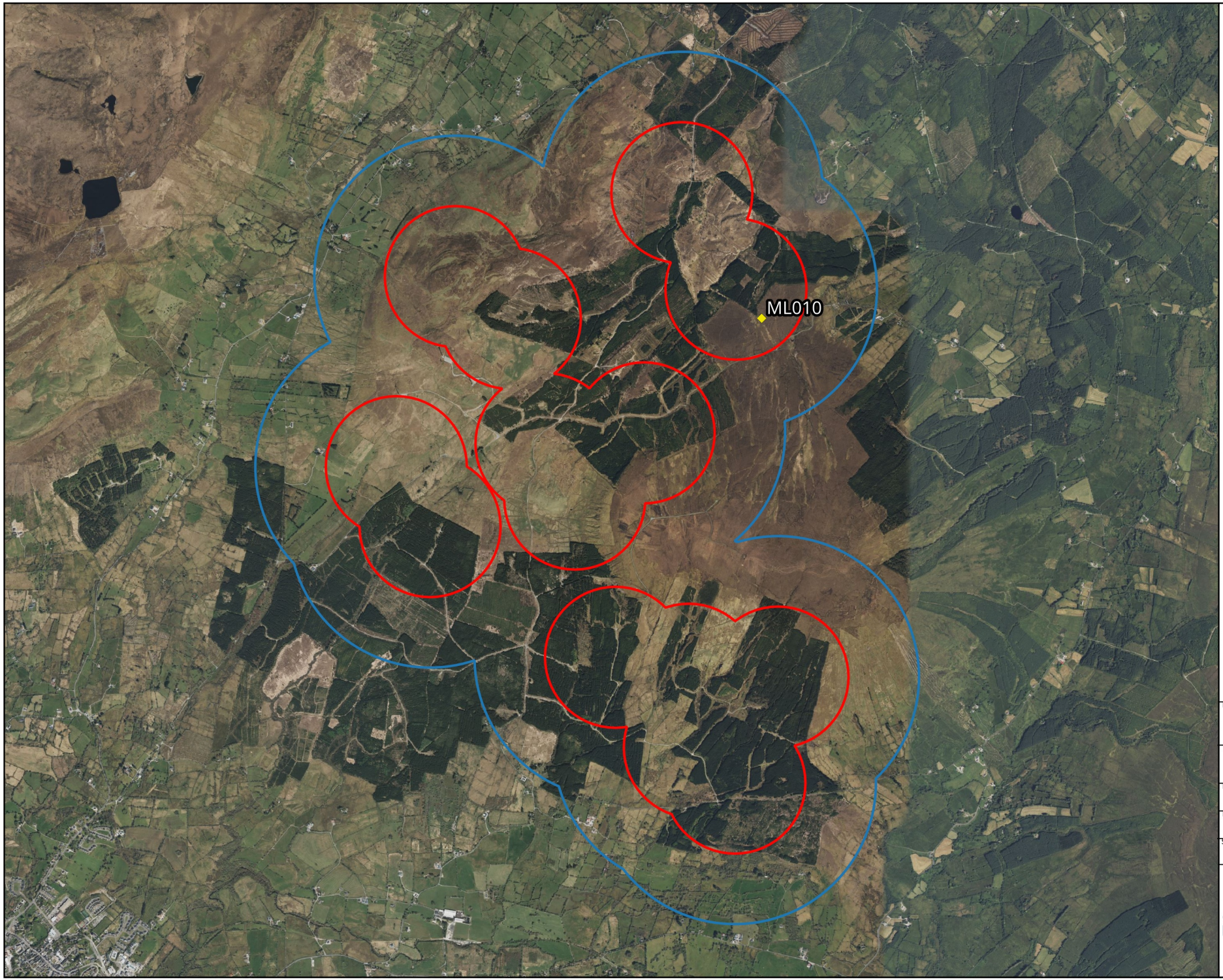

Map Legend

Site Boundary

500m Radius of Site Boundary

Observation

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Drawing Title

Merlin
Vantage Point Surveys
(Non Flight)

Project Title

Lissinagroagh

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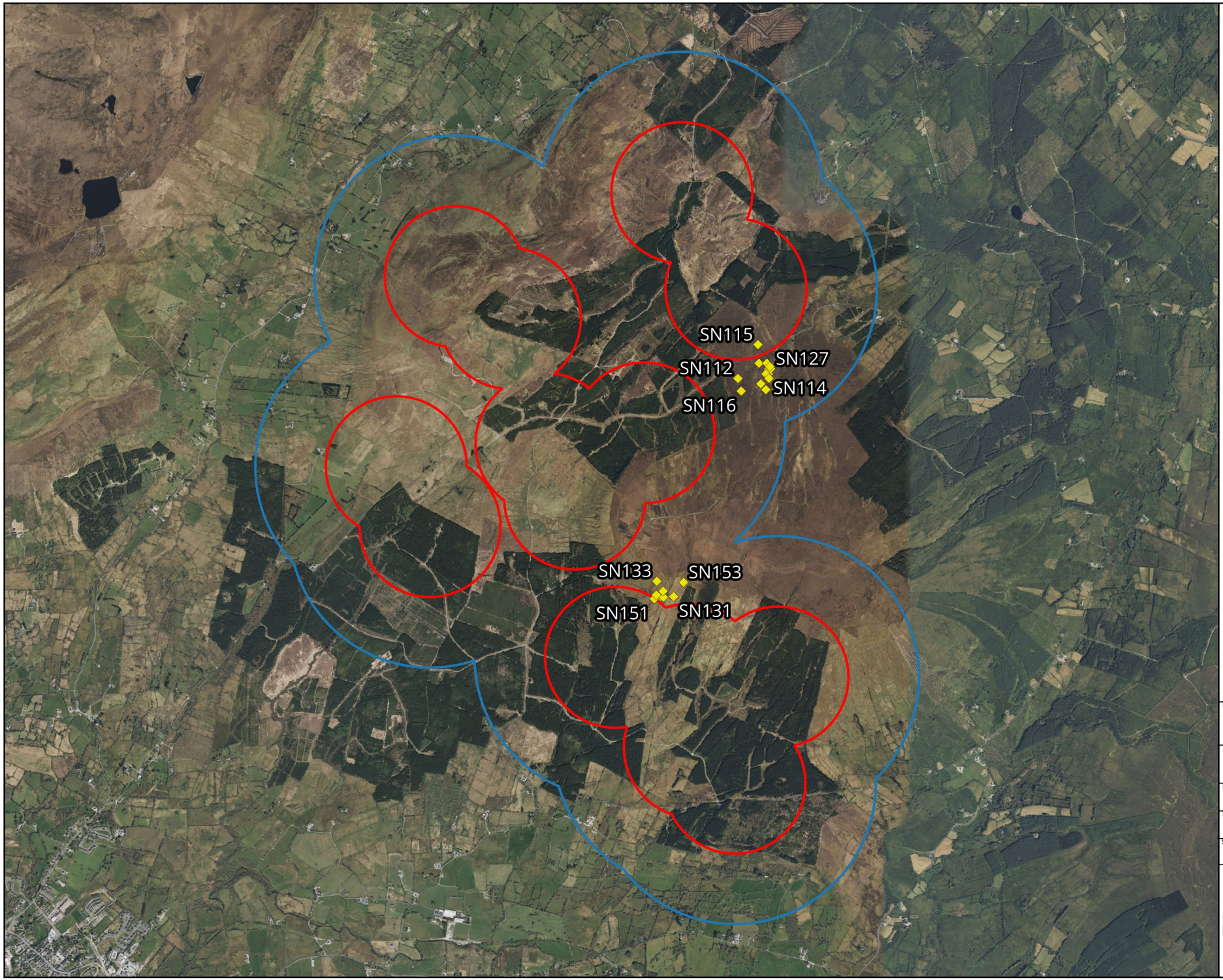

Map Legend

- Site Boundary
- 500m Radius of Site Boundary
- Observation

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Drawing Title
Snipe
Vantage Point Surveys
(Non Flight)

Project Title
Lissinagroagh

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Project No.	Drawing No.
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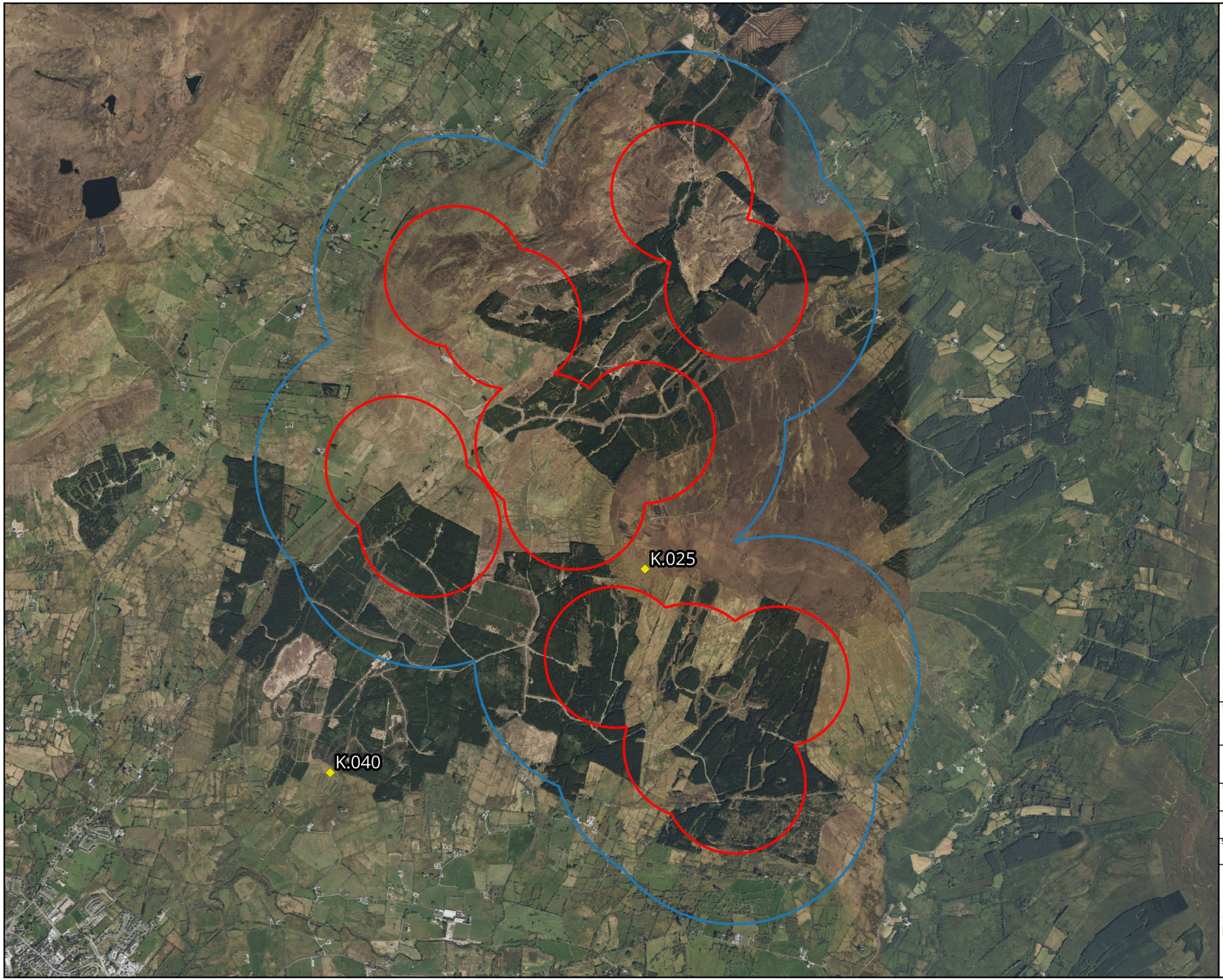

Map Legend

Site Boundary

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Observation

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Drawing Title

Kestrel
Vantage Point Surveys
(Non Flight)

Project Title

Lissinagroagh

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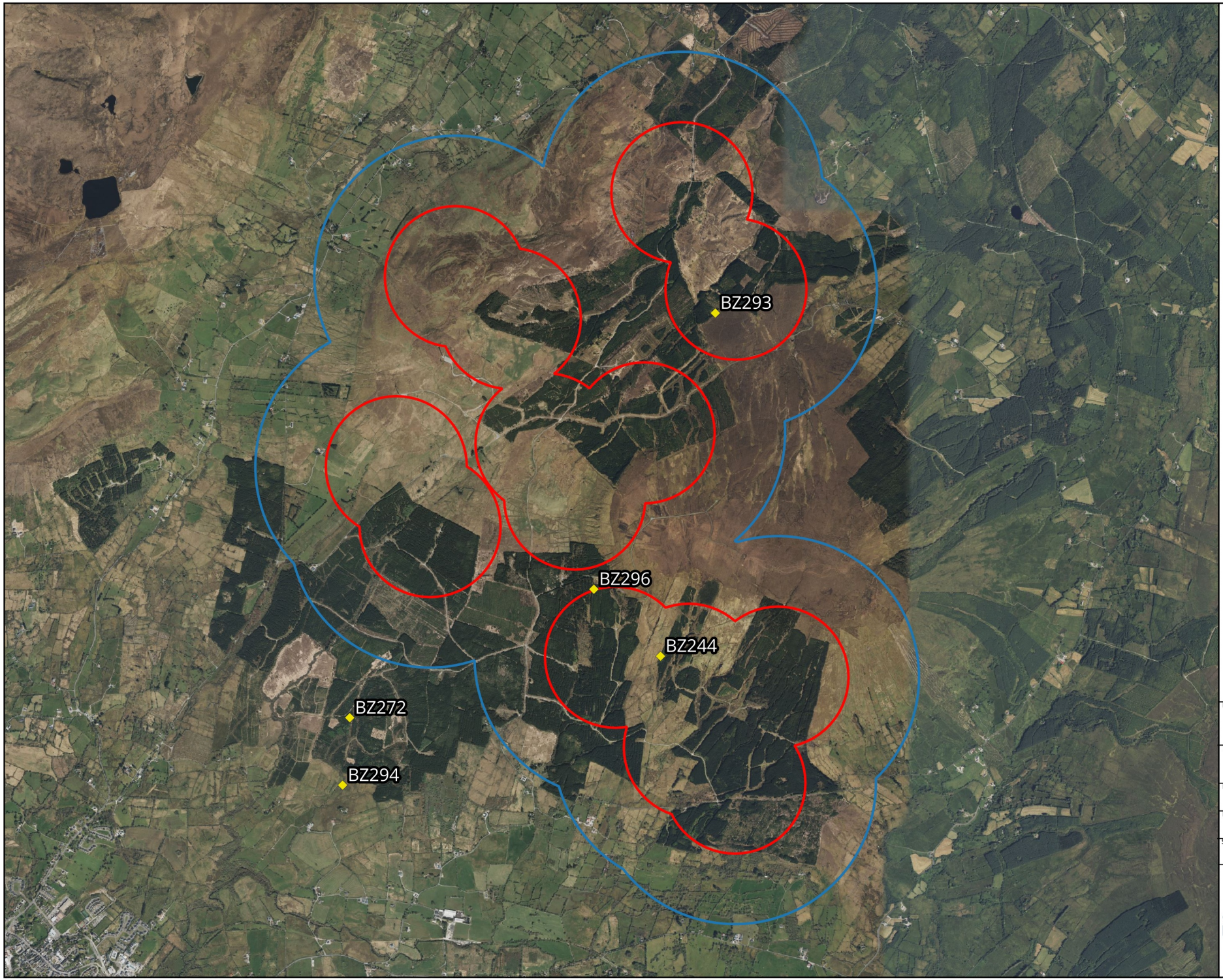

Map Legend

- Site Boundary
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- Observation

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Drawing Title

Buzzard
Vantage Point Surveys
(Non Flight)

Project Title

Lissinagroagh

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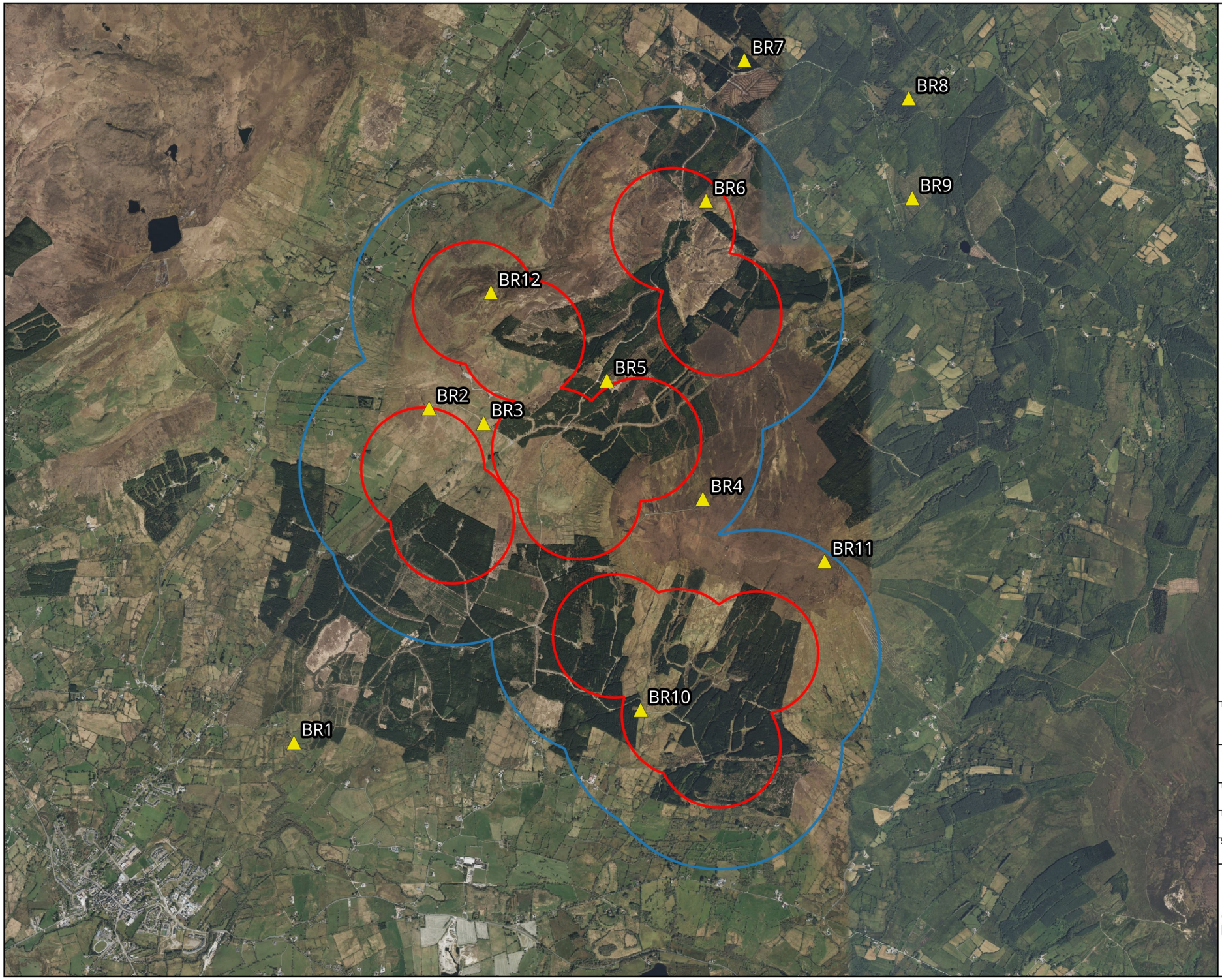

Map Legend

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Drawing Title

Breeding Raptor VP Locations

Project Title

Lissinagroagh

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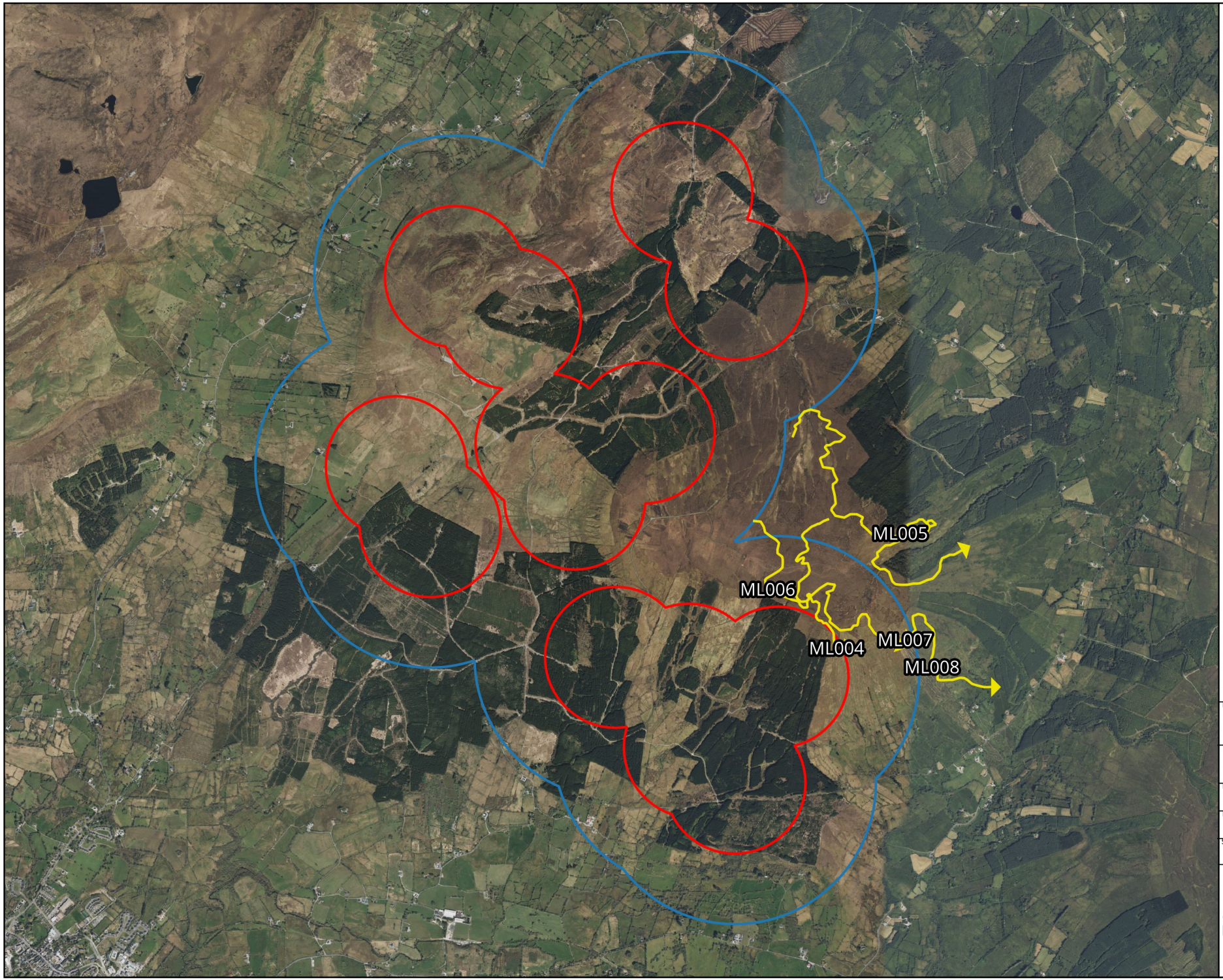

Map Legend

Site Boundary

500m Radius of Site Boundary

Observation Flightline

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Drawing Title

Merlin
Breeding Raptor Surveys

Project Title

Lissinagroagh

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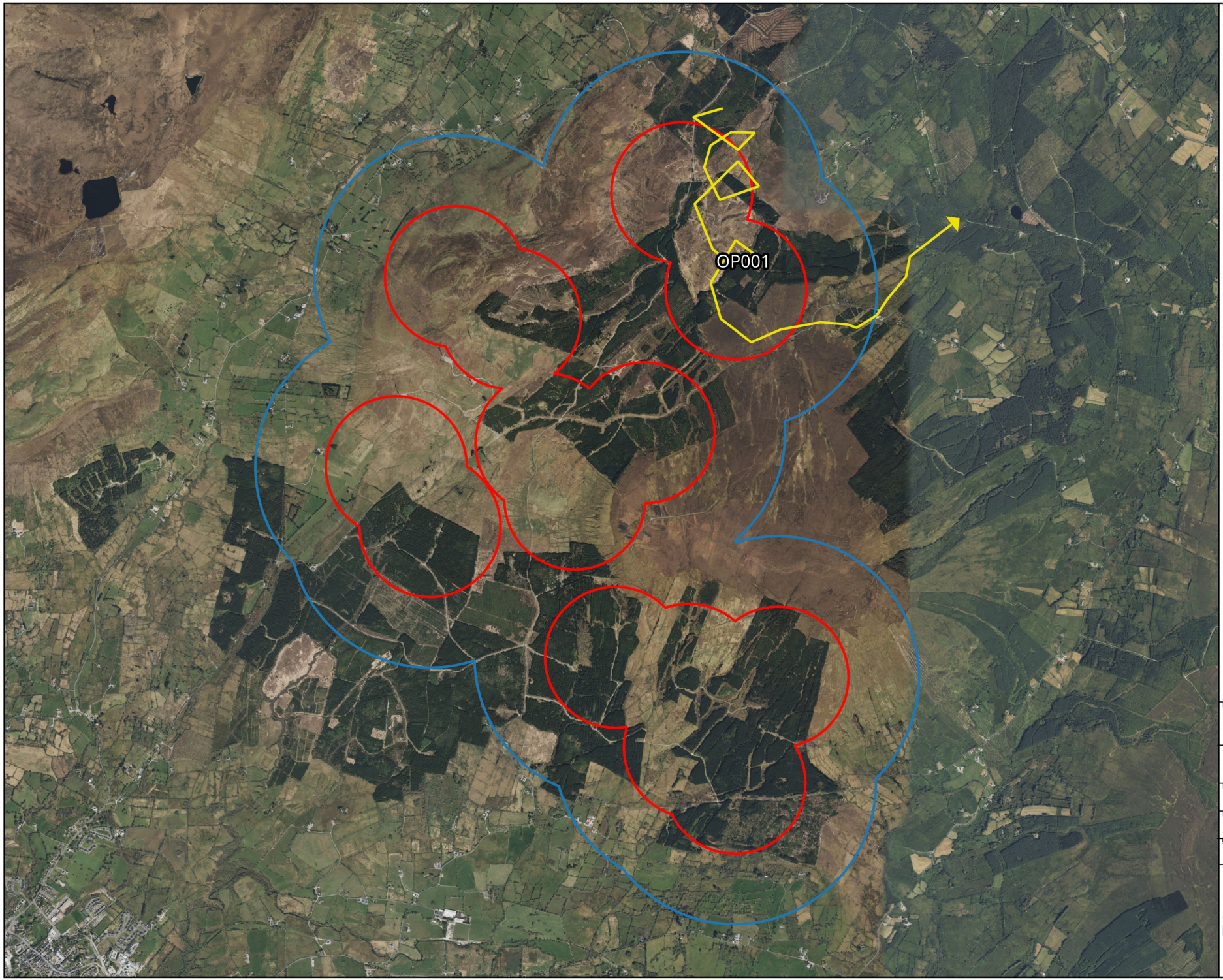

Map Legend

Site Boundary

500m Radius of Site Boundary

Observation Flightline

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N

Drawing Title

Osprey
Breeding Raptor Surveys

Project Title

Lissinagroagh

Drawn By	Checked By
AO'D	PC
Project No.	Drawing No.
200217	Fig 3.2
Scale	Date
1:35,000	16/12/24

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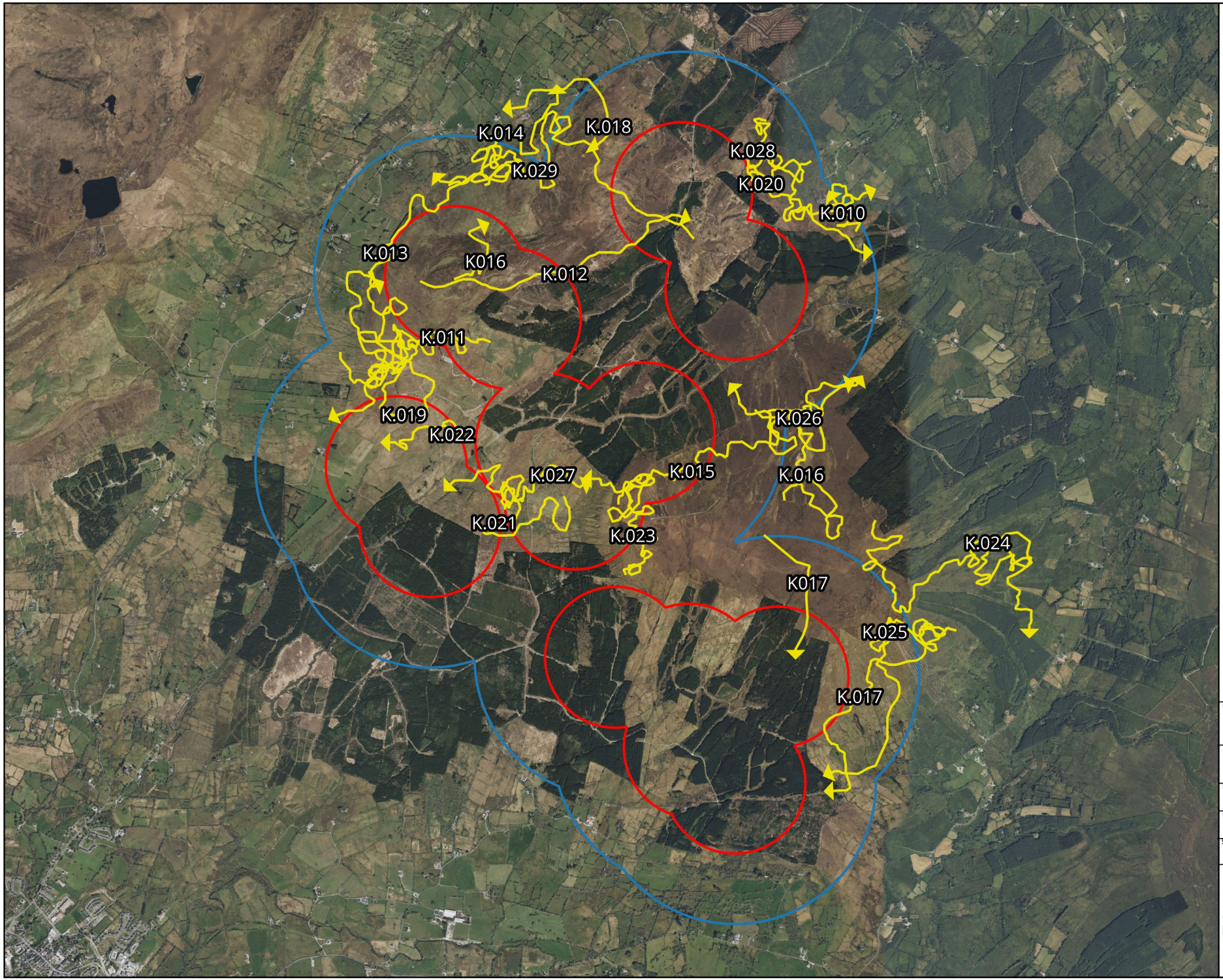

Map Legend

- Site Boundary
- 500m Radius of Site Boundary
- Observation Flightline

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Drawing Title

Kestrel
Breeding Raptor Surveys

Project Title

Lissinagroagh

Drawn By	Checked By
AO'D	PC
Project No.	Drawing No.
200217	Fig 3.3
Scale	Date
1:35,000	16/12/24

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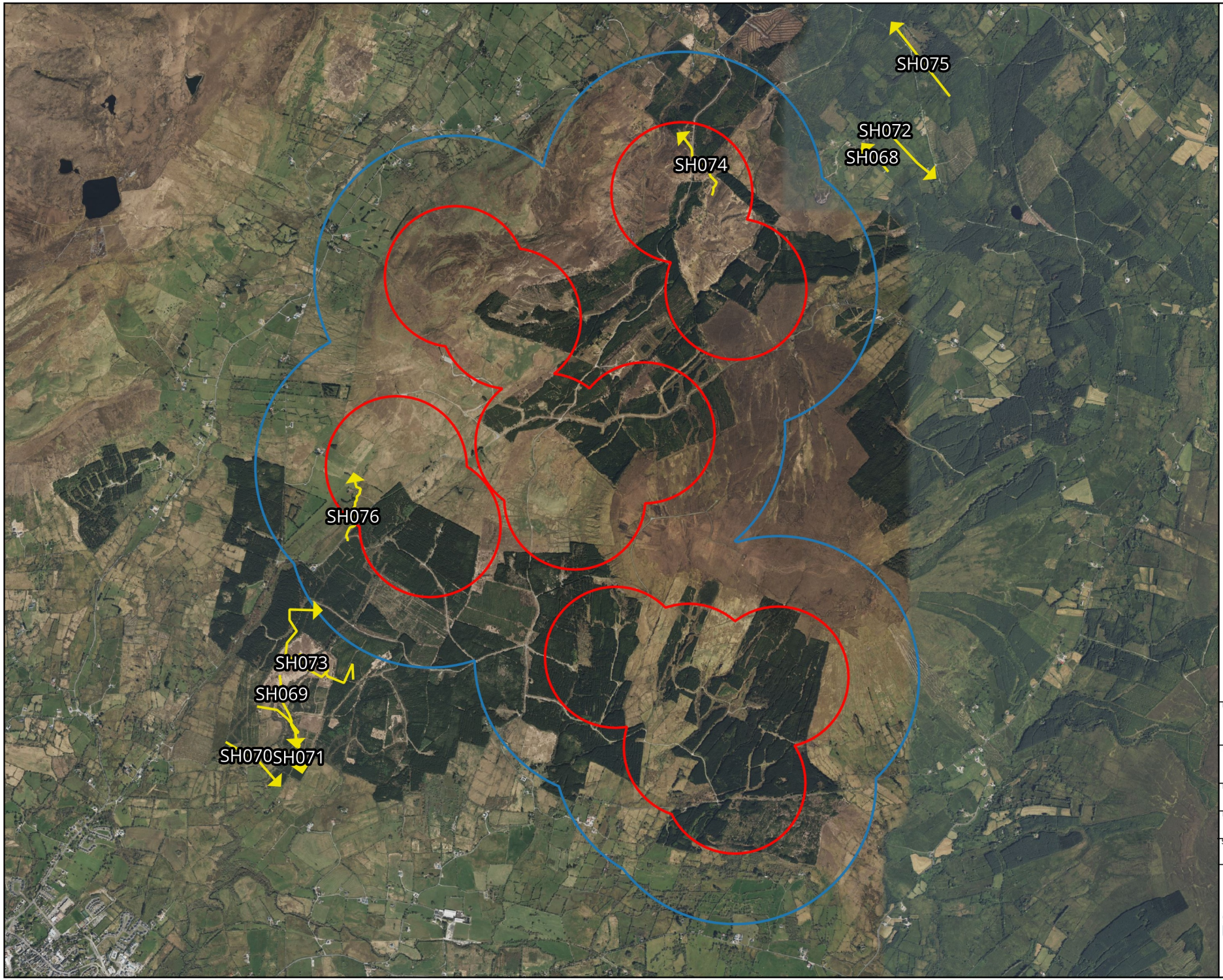

Map Legend

- Site Boundary
- 500m Radius of Site Boundary
- Observation Flightline

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Drawing Title

Sparrowhawk
Breeding Raptor Surveys

Project Title

Lissinagroagh

Drawn By	Checked By
AO'D	PC
Project No.	Drawing No.
200217	Fig 3.4
Scale	Date
1:35,000	16/12/24

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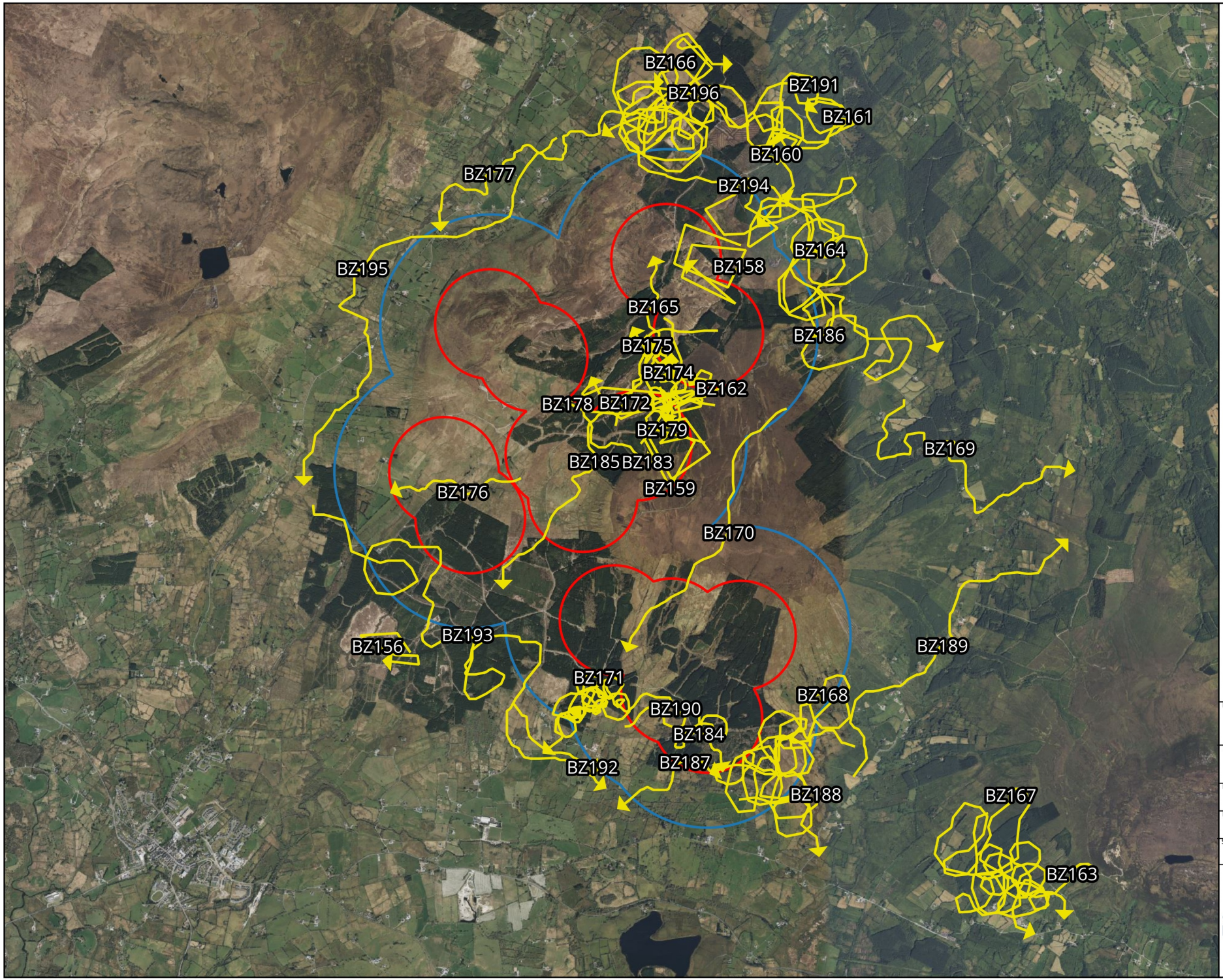

Map Legend

- Site Boundary
- 500m Radius of Site Boundary
- Observation Flightline

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N

Drawing Title

Buzzard
Breeding Raptor Surveys

Project Title

Lissinagroagh

Drawn By	Checked By
AO'D	PC
Project No.	Drawing No.
200217	Fig 3.5
Scale	Date
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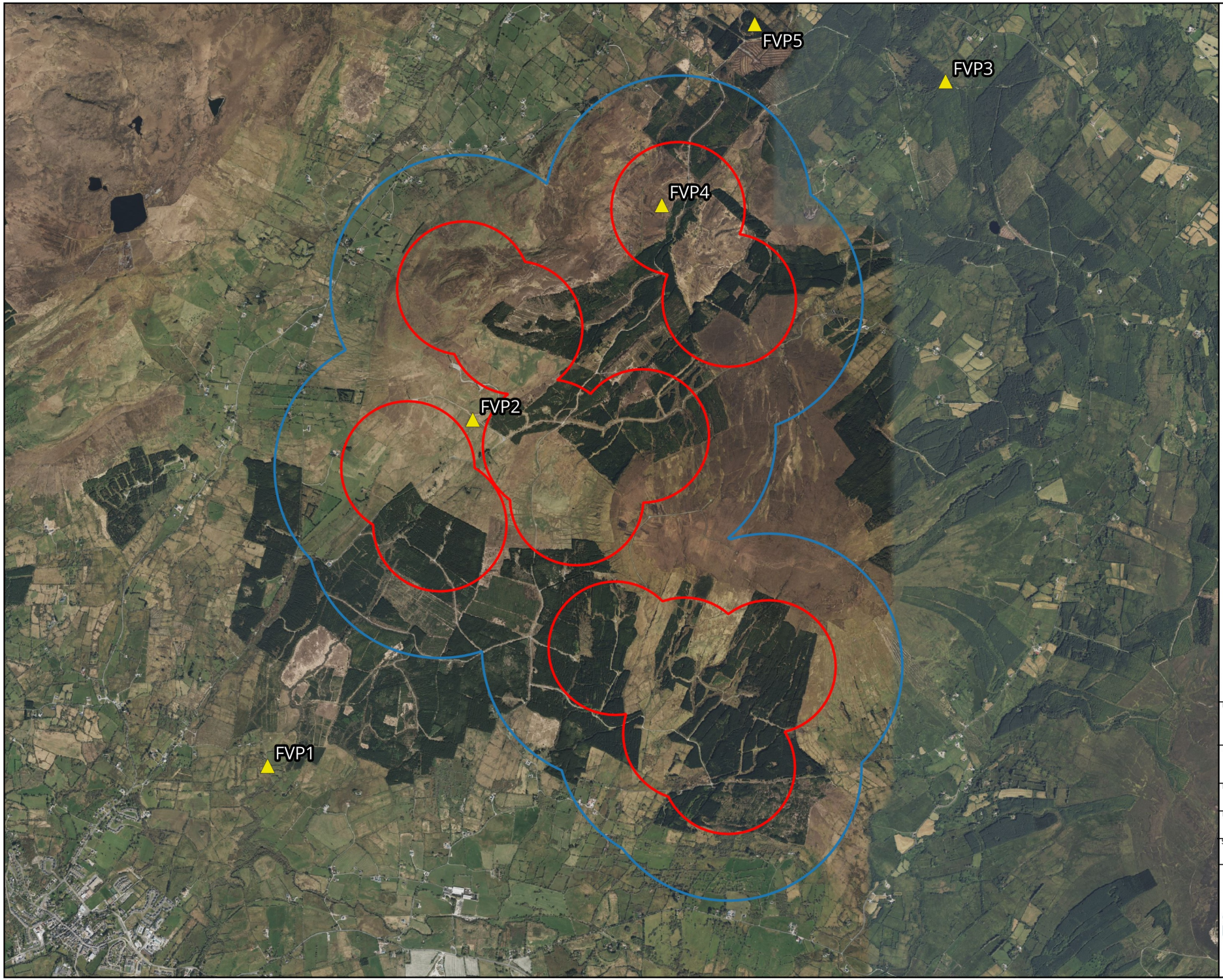

Map Legend

Site Boundary

500m Radius of Site Boundary

FVP Location

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N

Drawing Title: Foraging VP Locations

Project Title: Lissinagroagh

Drawn By	Checked By
AO'D	PC
Project No.	Drawing No.
200217	Fig 4.0
Scale	Date
1:37,000	16/12/24

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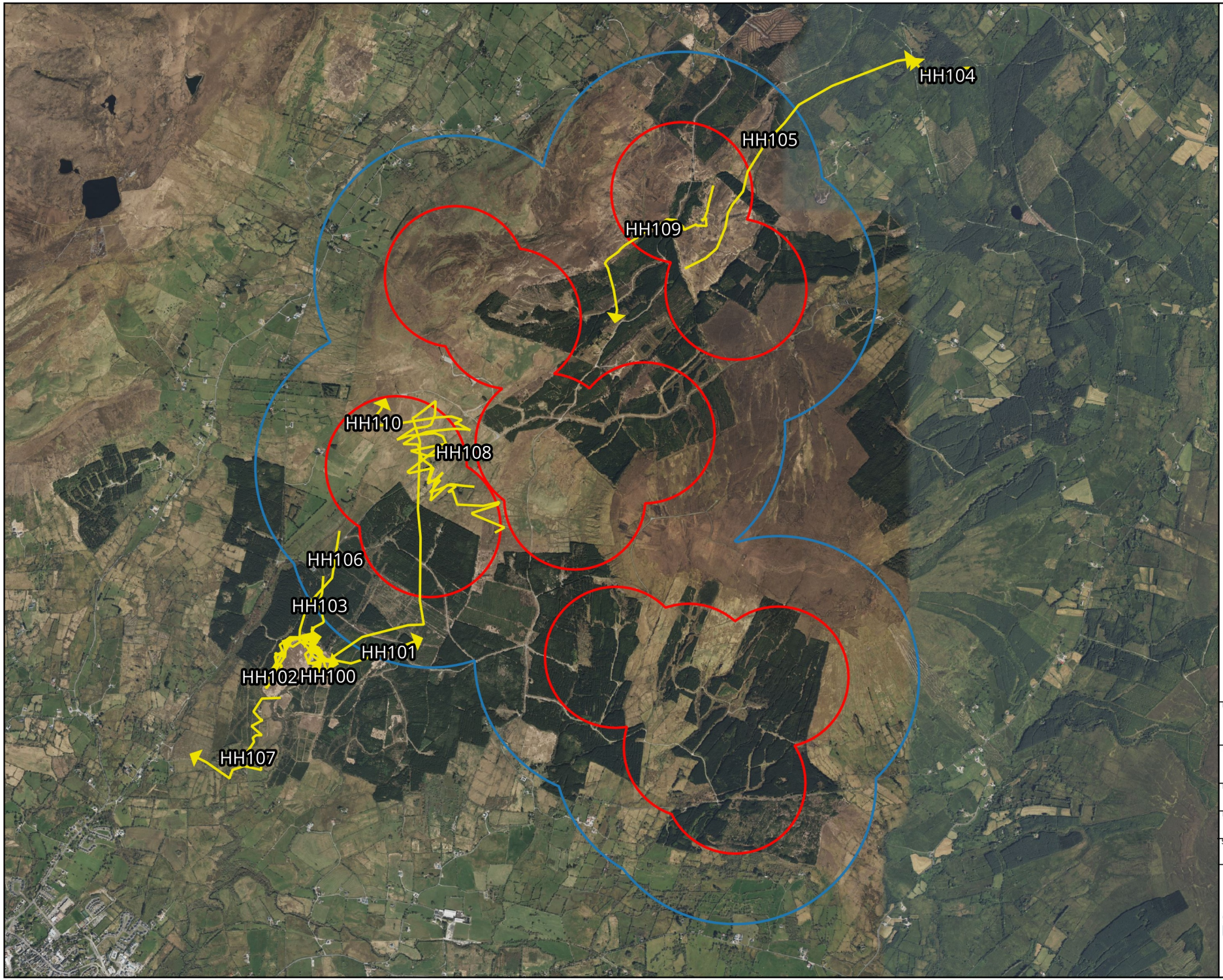

Map Legend

- Site Boundary
- 500m Radius of Site Boundary
- Observation Flightline

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Drawing Title

Hen Harrier
Foraging VP Surveys

Project Title

Lissinagroagh

Drawn By	Checked By
AO'D	PC
Project No.	Drawing No.
200217	Fig 4.1
Scale	Date
1:35,000	16/12/24

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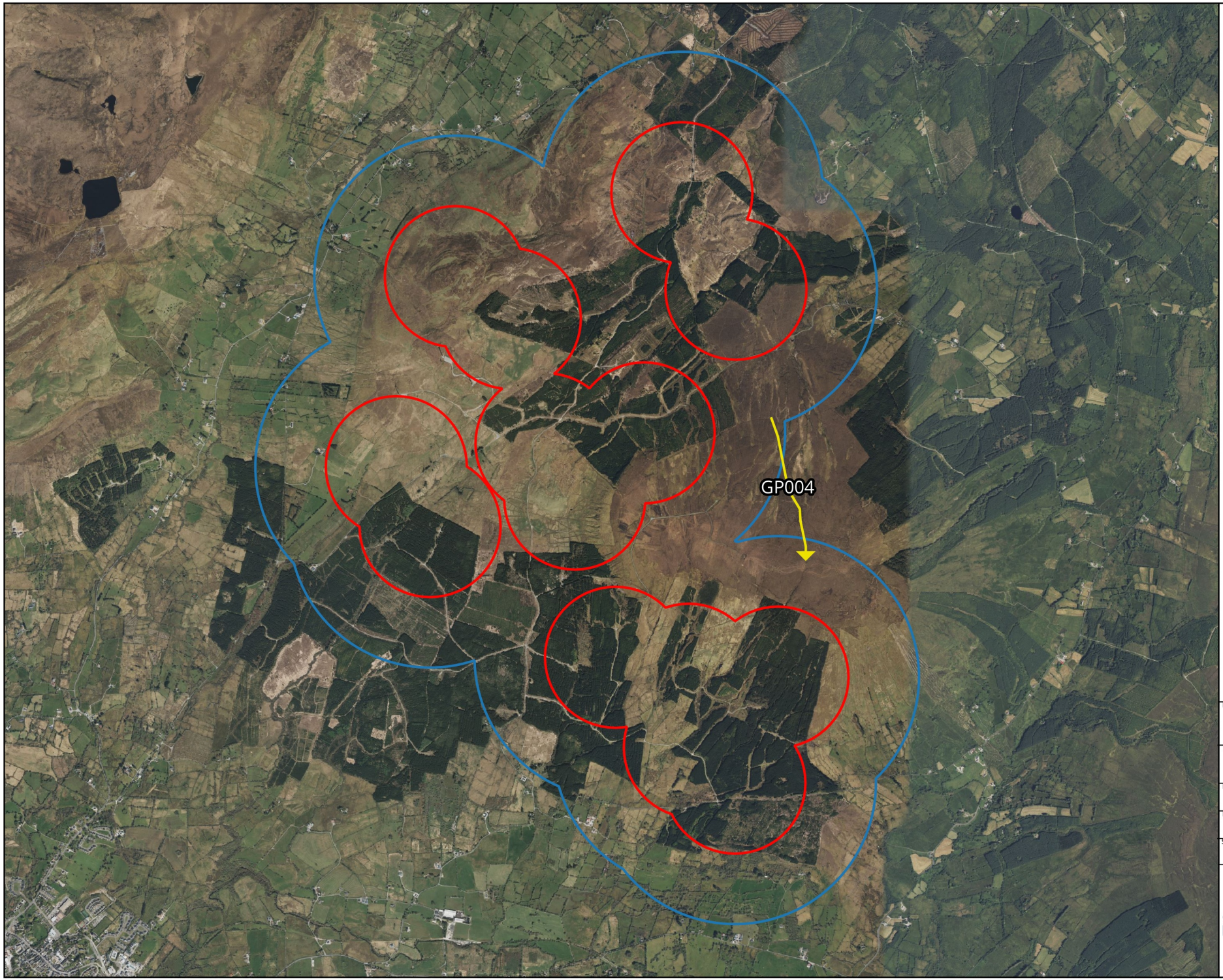

Map Legend

Site Boundary

500m Radius of Site Boundary

Observation Flightline

N

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Drawing Title

Golden Plover Incidental Observations

Project Title

Lissinagroagh

Drawn By	Checked By
AO'D	PC
Project No.	Drawing No.
200217	Fig 5.0
Scale	Date
1:35,000	16/12/24

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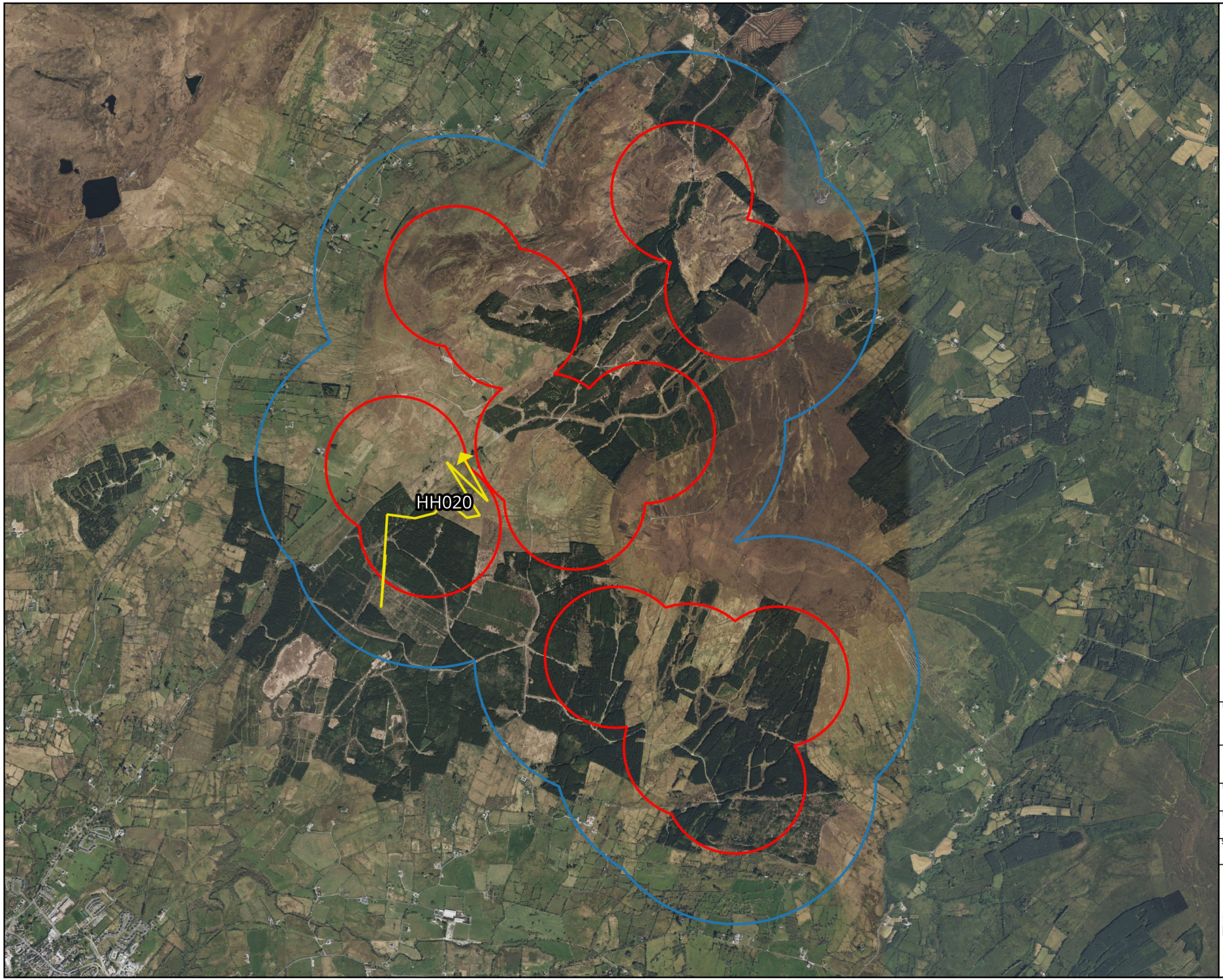

Map Legend

Site Boundary

500m Radius of Site Boundary

Observation Flightline

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Drawing Title

Hen Harrier Incidental Observations

Project Title

Lissinagroagh

Drawn By	Checked By
AO'D	PC
Project No.	Drawing No.
200217	Fig 5.1
Scale	Date
1:35,000	16/12/24

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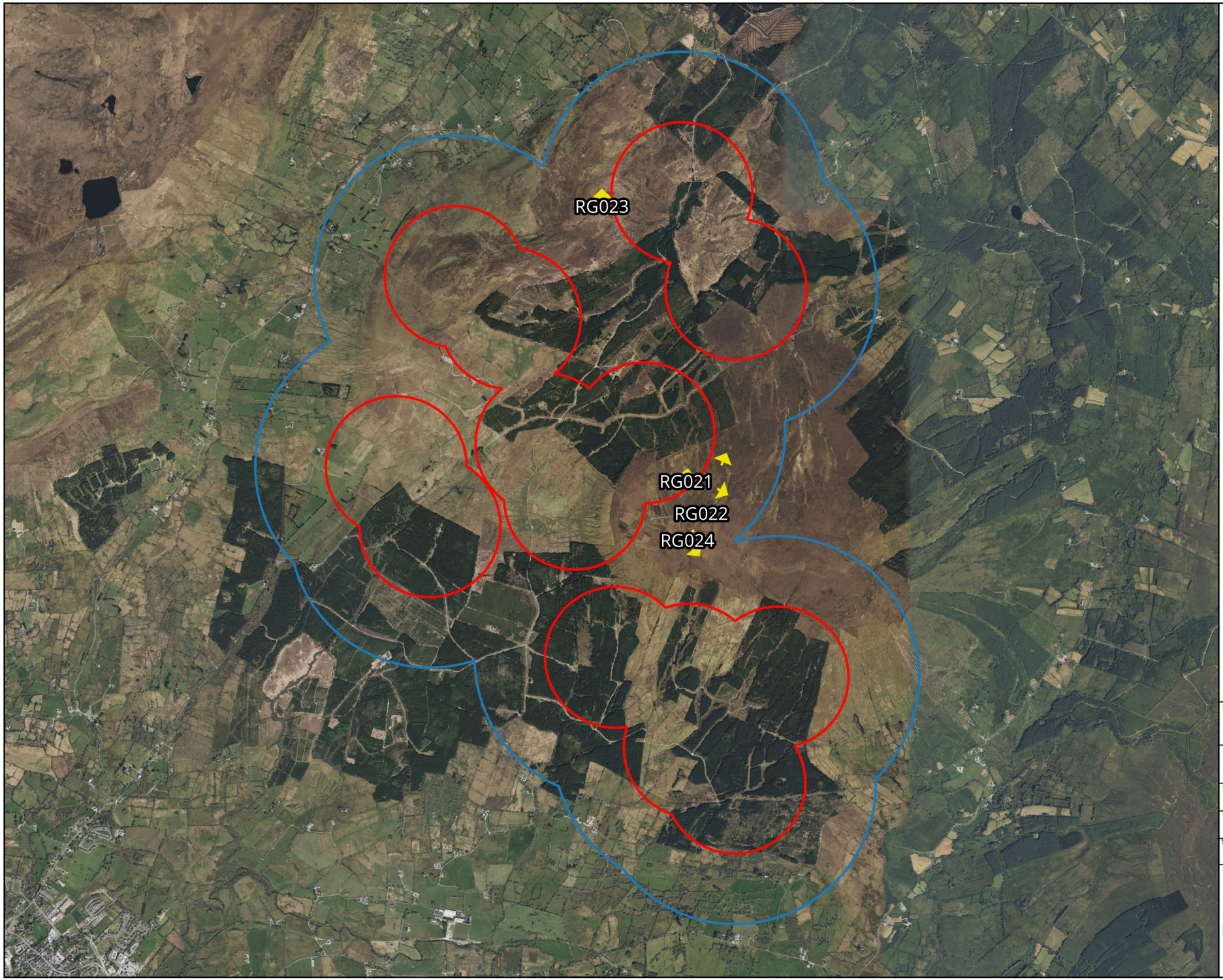

Map Legend

- Site Boundary
- 500m Radius of Site Boundary
- Observation Flightline

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Drawing Title

Red Grouse
Incidental Observations

Project Title

Lissinagroagh

Drawn By	Checked By
AO'D	PC
Project No.	Drawing No.
200217	Fig 5.2
Scale	Date
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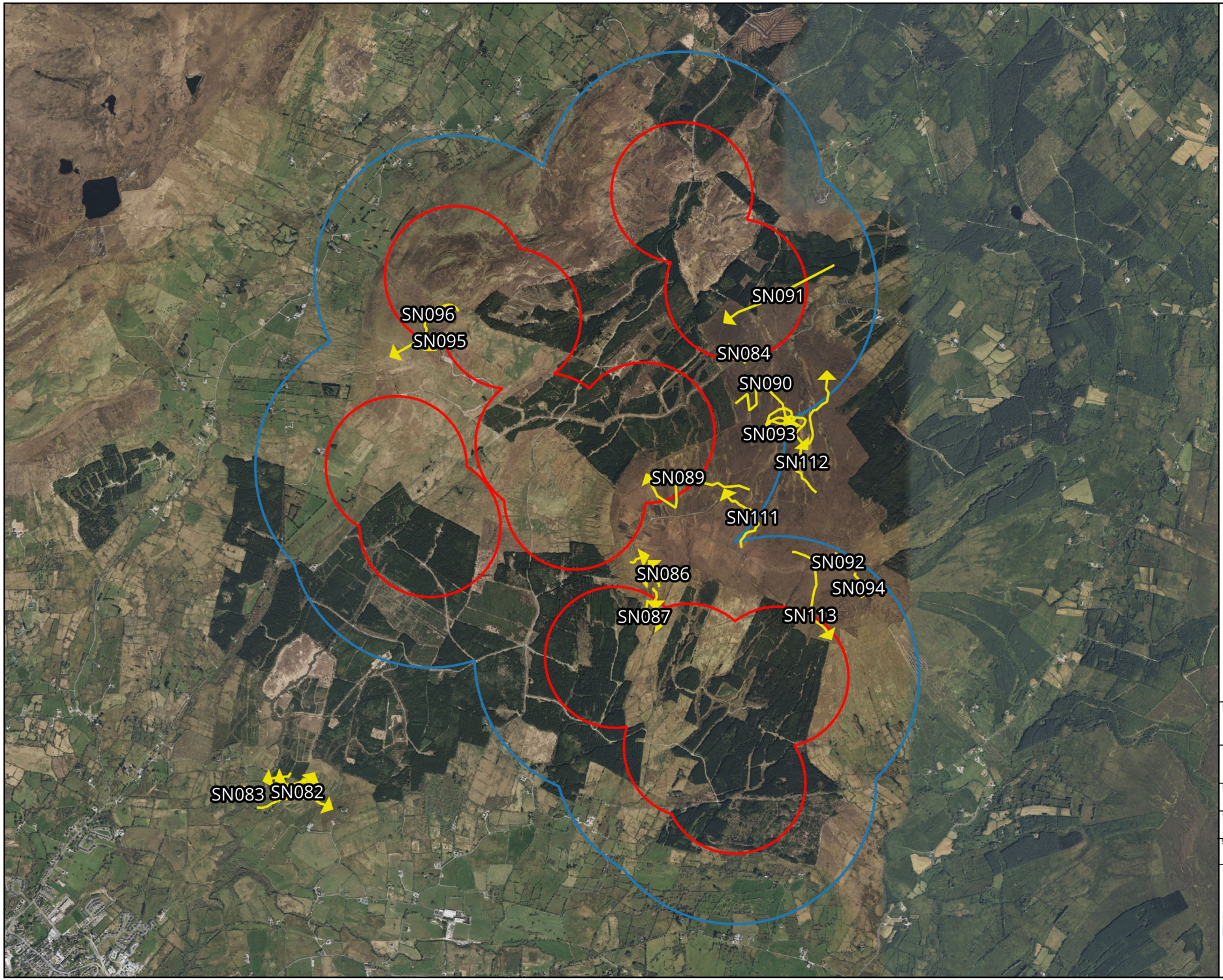

Map Legend

- Site Boundary
- 500m Radius of Site Boundary
- Observation Flightline

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Drawing Title

Snipe
Incidental Observations

Project Title

Lissinagroagh

Drawn By	Checked By
AO'D	PC
Project No.	Drawing No.
200217	Fig 5.3
Scale	Date
1:35,000	16/12/24

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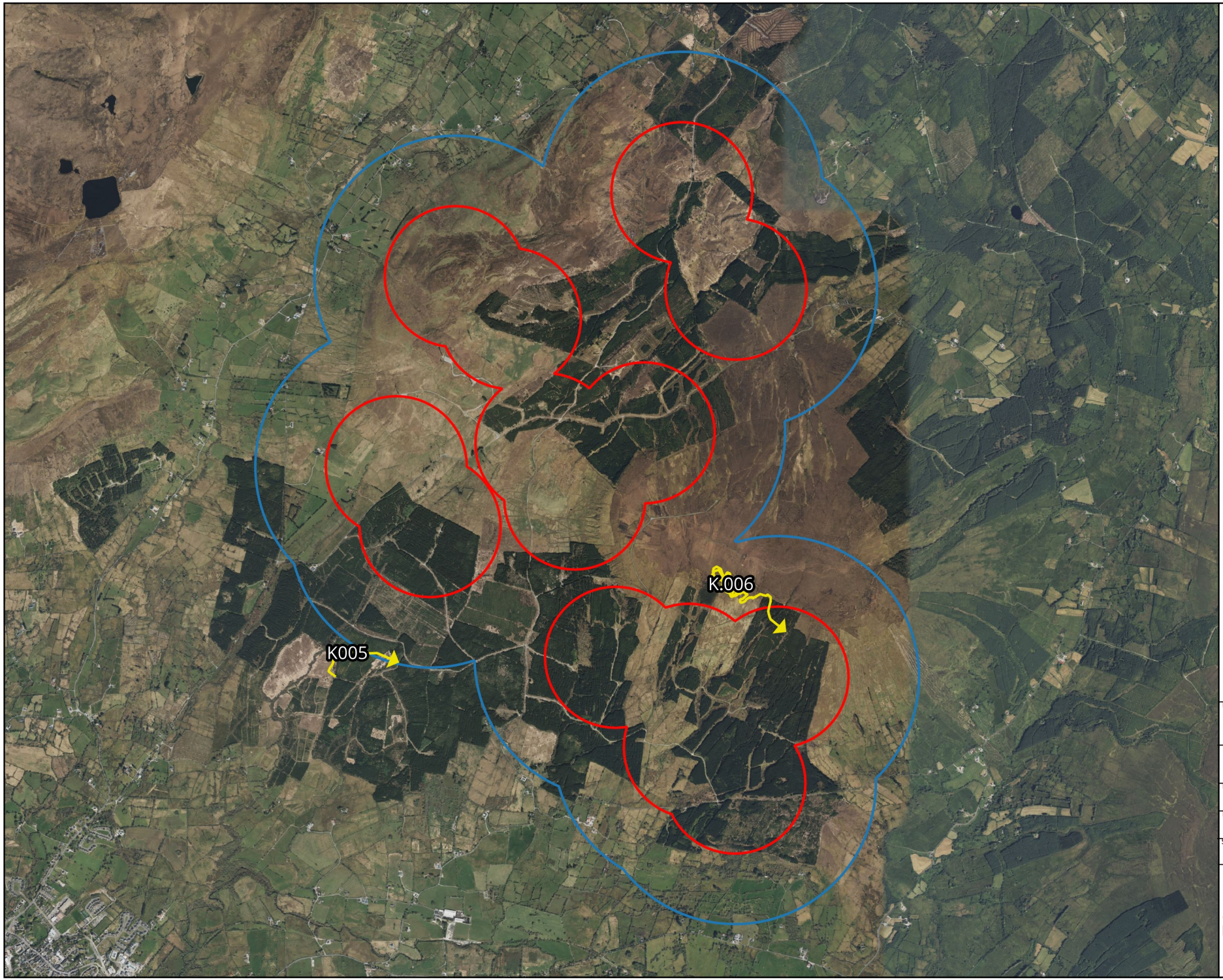

Map Legend

Site Boundary

500m Radius of Site Boundary

Observation Flightline

N

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Drawing Title

Kestrel
Incidental Observations

Project Title

Lissinagroagh

Drawn By	Checked By
AO'D	PC
Project No.	Drawing No.
200217	Fig 5.4
Scale	Date
1:35,000	16/12/24

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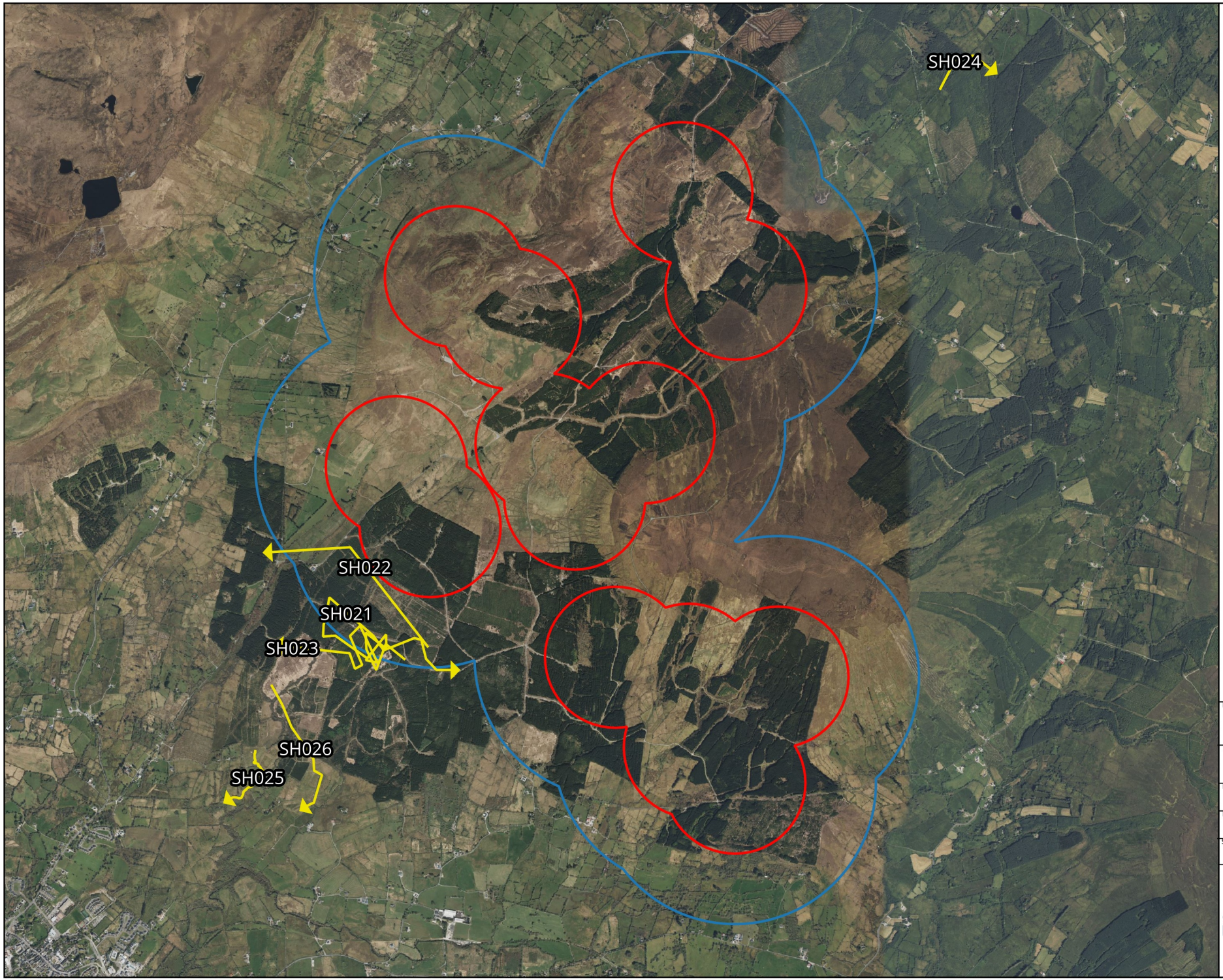

Map Legend

- Site Boundary
- 500m Radius of Site Boundary
- Observation Flightline

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Drawing Title

Sparrowhawk Incidental Observations

Project Title

Lissinagroagh

Drawn By	Checked By
AO'D	PC
Project No.	Drawing No.
200217	Fig 5.5
Scale	Date
1:35,000	16/12/24

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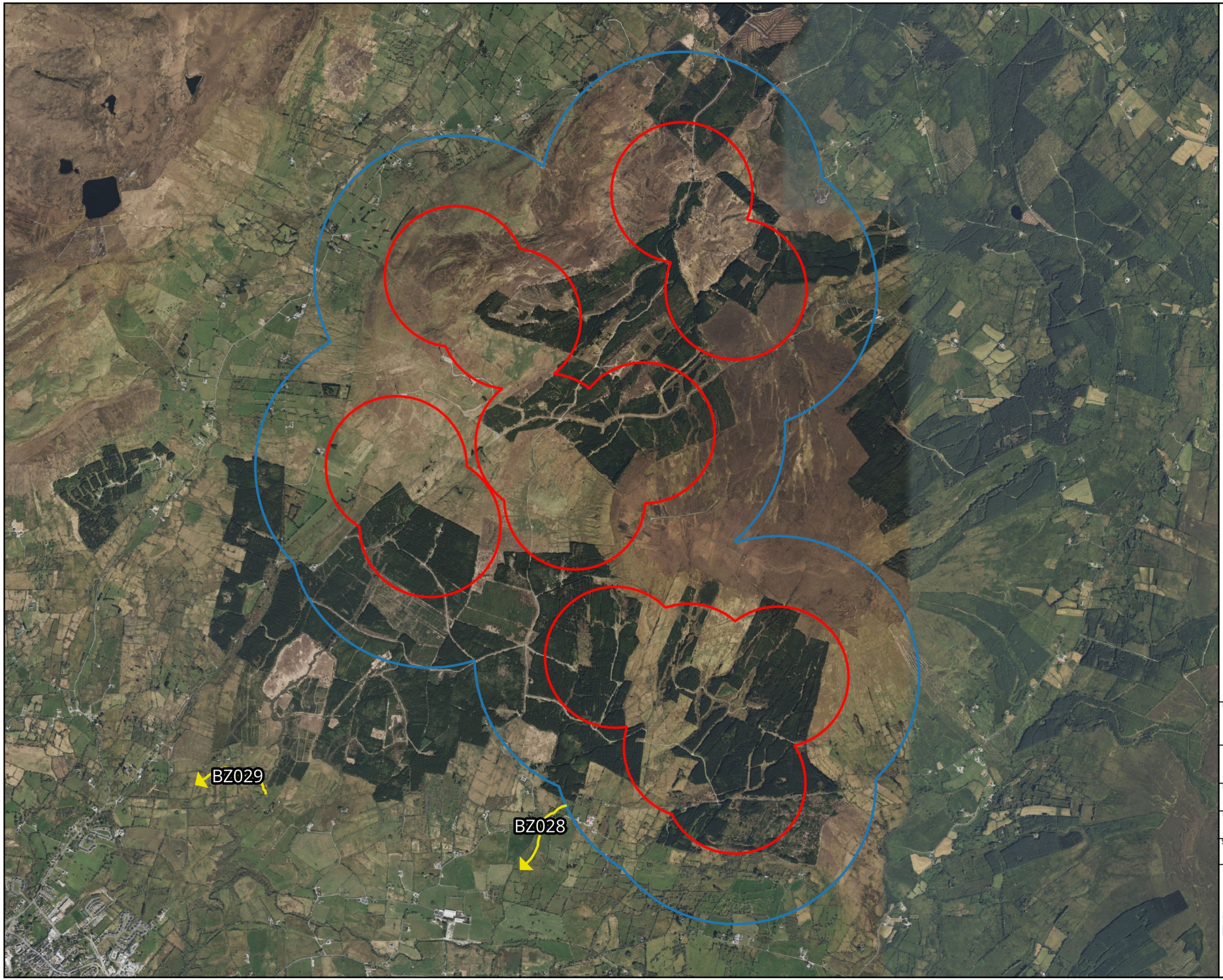

Map Legend

Site Boundary

500m Radius of Site Boundary

Observation Flightline

N

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Drawing Title

Buzzard Incidental Observations

Project Title

Lissinagroagh

Drawn By	Checked By
AO'D	PC
Project No.	Drawing No.
200217	Fig 5.6
Scale	Date
1:35,000	16/12/24

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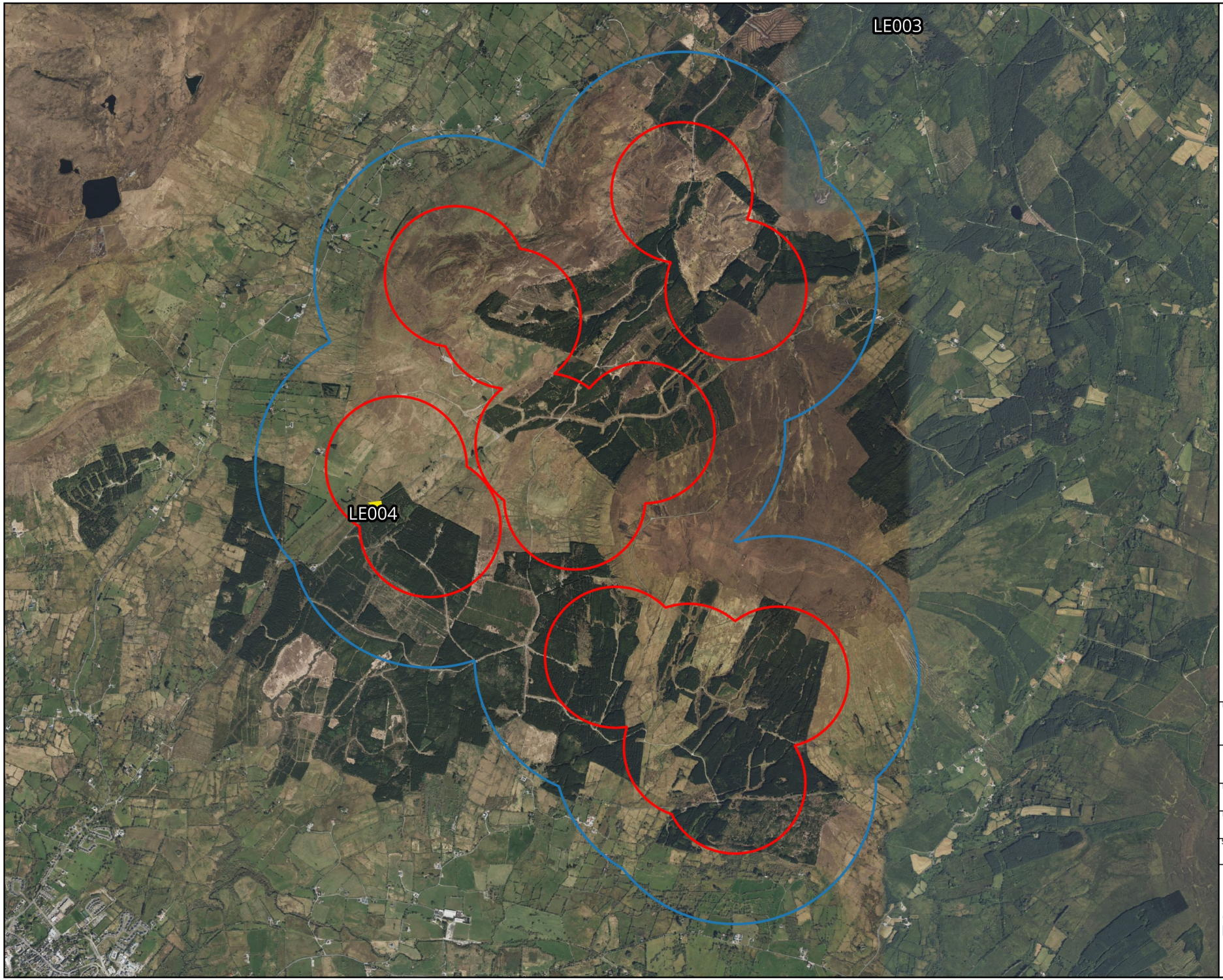

Map Legend

- Site Boundary
- 500m Radius of Site Boundary
- Observation Flightline

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Drawing Title

Long-Eared Owl Incidental Observations

Project Title

Lissinagroagh

Drawn By	Checked By
AO'D	PC
Project No.	Drawing No.
200217	Fig 5.7
Scale	Date
1:35,000	16/12/24

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APPENDIX 2

DETAILED SURVEY DATA

Table 1.0 Survey Effort

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
05/04/2024	Breeding Raptor Survey	BR1	3:00 starting at 11:15	Visibility: poor; Wind speed and direction: fresh breeze SW; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD
05/04/2024	Breeding Raptor Survey	BR9	3:00 starting at 14:25	Visibility: poor; Wind speed and direction: fresh breeze SW; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD
19/04/2024	Breeding Raptor Survey	BR1	3:00 starting at 12:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
19/04/2024	Breeding Raptor Survey	BR4	3:00 starting at 15:40	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
22/04/2024	Breeding Raptor Survey	BR4	3:00 starting at 11:30	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
22/04/2024	Breeding Raptor Survey	BR4	1:00 starting at 15:00	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
02/04/2024	Vantage Point Survey	VP2	3:00 starting at 14:45	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Largely fair and clear, cold and wintery throughout, 4 - 8°C	NM
02/04/2024	Vantage Point Survey	VP2	3:00 starting at 18:10	Visibility: moderate; Wind speed and direction: fresh breeze SW; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none	Clouding over gradually, light drizzle and blustery squalls in evening. Dusk survey. Sunset - 20:07	NM

03/04/2024	Vantage Point Survey	VP3	3:00 starting at 14:45	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 33-66% >500m; Rain: drizzle; Frost: none; Snow: none	Largely fair with cloud and occasional drizzle early on. 7 - 13°C	NM
03/04/2024	Vantage Point Survey	VP3	3:00 starting at 18:10	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Staying dry all evening. Dusk survey. Sunset - 20:09	NM
04/04/2024	Vantage Point Survey	VP1	3:00 starting at 14:45	Visibility: good; Wind speed and direction: moderate breeze SSW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Largely fair throughout, blustery squalls throughout, cold and wintery, 5 - 10°C	NM
04/04/2024	Vantage Point Survey	VP1	3:00 starting at 18:10	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: 33-66% >500m; Rain: light showers; Frost: none; Snow: none	Dusk survey. Sunset - 20:11	NM
29/04/2024	Vantage Point Survey	VP4	3:00 starting at 15:30	Visibility: moderate; Wind speed and direction: gentle breeze SSW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none	Persistent light rain at the start but gradually clearing. Visibility hampered at times early on.	NM
29/04/2024	Vantage Point Survey	VP4	3:00 starting at 19:00	Visibility: good; Wind speed and direction: gentle breeze SSW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Clearing in evening. 7 - 12°C. Dusk survey. Sunset - 20:58	NM
01/05/2024	Breeding Raptor Survey	BR1	3:00 starting at 10:40	Visibility: good; Wind speed and direction: moderate breeze E; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
01/05/2024	Breeding Raptor Survey	BR4	3:00 starting at 14:05	Visibility: good; Wind speed and direction: moderate breeze E; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
16/05/2024	Breeding Raptor Survey	BR7	4:00 starting at 11:20	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD

17/05/2024	Breeding Raptor Survey	BR4	3:00 starting at 09:40	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
17/05/2024	Breeding Raptor Survey	BR4	3:00 starting at 12:40	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
21/05/2024	Breeding Raptor Survey	BR1	3:00 starting at 14:00	Visibility: poor; Wind speed and direction: light air S; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
21/05/2024	Breeding Raptor Survey	BR1	3:00 starting at 17:00	Visibility: poor; Wind speed and direction: light air S; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
22/05/2024	Breeding Raptor Survey	BR4	3:00 starting at 12:20	Visibility: good; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
22/05/2024	Breeding Raptor Survey	BR8	3:00 starting at 16:00	Visibility: good; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
23/05/2024	Breeding Raptor Survey	BR6	3:00 starting at 09:00	Visibility: good; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
23/05/2024	Breeding Raptor Survey	BR7	3:00 starting at 12:45	Visibility: good; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
28/05/2024	Breeding Raptor Survey	BR1	3:00 starting at 11:20	Visibility: moderate; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
30/05/2024	Breeding Raptor Survey	BR4	1:00 starting at 12:40	Visibility: limited; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
30/05/2024	Breeding Raptor Survey	BR8	3:00 starting at 13:55	Visibility: poor; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD
30/05/2024	Breeding Raptor Survey	BR3	4:00 starting at 17:30	Visibility: poor; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none		AOD

07/05/2024	Vantage Point Survey	VP4	3:00 starting at 04:45	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Fair throughout. Bright with cloudy spells. 6 - 13°C. Dawn survey. Sunrise - 05:40	NM
07/05/2024	Vantage Point Survey	VP4	3:00 starting at 08:10	Visibility: good; Wind speed and direction: light breeze NE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		NM
14/05/2024	Vantage Point Survey	VP2	3:00 starting at 04:30	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Very damp underfoot. Largely fair and bright. Chill in morning, 5 - 16°C	NM
14/05/2024	Vantage Point Survey	VP2	3:00 starting at 08:00	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Dawn survey. Sunrise - 05:28	NM
15/05/2024	Vantage Point Survey	VP3	3:00 starting at 04:25	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Clear and bright throughout. Dawn survey. Sunrise - 05:26	NM
15/05/2024	Vantage Point Survey	VP3	3:00 starting at 07:50	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		NM
31/05/2024	Vantage Point Survey	VP1	3:00 starting at 04:05	Visibility: moderate; Wind speed and direction: moderate breeze WNW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Largely fair with cooling breeze. Visibility poor enough early in the morning due to haze and mist - burned off buy 05:45am. Dawn survey. Sunrise - 05:06	NM
31/05/2024	Vantage Point Survey	VP1	3:00 starting at 07:30	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Continued to be fair. Wind dropping as survey progressed. 9 - 17°C	NM

07/06/2024	Foraging VP	FVP4	3:00 starting at 11:35	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		AOD
07/06/2024	Foraging VP	FVP2	3:00 starting at 15:00	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
11/06/2024	Foraging VP	FVP2	3:00 starting at 11:55	Visibility: good; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
11/06/2024	Breeding Raptor Survey	BR5	3:00 starting at 15:15	Visibility: good; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
12/06/2024	Foraging VP	FVP5	3:00 starting at 12:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
12/06/2024	Foraging VP	FVP4	3:00 starting at 16:00	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
18/06/2024	Breeding Raptor Survey	BR4	3:00 starting at 11:30	Visibility: good; Wind speed and direction: strong breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
18/06/2024	Breeding Raptor Survey	BR2	3:00 starting at 15:00	Visibility: good; Wind speed and direction: strong breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
20/06/2024	Foraging VP	FVP1	3:00 starting at 10:55	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
20/06/2024	Foraging VP	FVP3	3:00 starting at 14:45	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
20/06/2024	Breeding Raptor Survey	BR6	3:00 starting at 18:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
26/06/2024	Breeding Raptor Survey	BR6	3:00 starting at 08:30	Visibility: good; Wind speed and direction: fresh breeze SE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
26/06/2024	Breeding Raptor Survey	BR4	3:00 starting at 12:15	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD

27/06/2024	Breeding Raptor Survey	BR1	3:00 starting at 15:00	Visibility: limited; Wind speed and direction: strong breeze SW; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
27/06/2024	Breeding Raptor Survey	BR2	3:00 starting at 18:10	Visibility: limited; Wind speed and direction: strong breeze SW; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		AOD
28/06/2024	Breeding Raptor Survey	BR4	3:00 starting at 13:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
04/07/2024	Foraging VP	FVP1	3:00 starting at 09:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
04/07/2024	Foraging VP	FVP3	3:00 starting at 12:40	Visibility: good; Wind speed and direction: fresh breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
05/07/2024	Foraging VP	FVP4	3:00 starting at 08:40	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
05/07/2024	Foraging VP	FVP2	3:00 starting at 12:15	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
06/06/2024	Vantage Point Survey	VP4	3:00 starting at 14:00	Visibility: good; Wind speed and direction: moderate breeze WSW; Cloud cover and height: 33-66% >500m; Rain: light showers; Frost: none; Snow: none	Mostly fair with brief showers blowing through. Cool, 8 - 12°C	NM
06/06/2024	Vantage Point Survey	VP4	3:00 starting at 17:30	Visibility: good; Wind speed and direction: moderate breeze WSW; Cloud cover and height: 33-66% >500m; Rain: drizzle; Frost: none; Snow: none	Brightening to some extent in the evening. Occasional drizzle but very light	NM
10/06/2024	Vantage Point Survey	VP2	3:00 starting at 11:30	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Largely fair and clear. Sunny spells and scattered cloud. Cool at times, 9 - 13°C	NM
10/06/2024	Vantage Point Survey	VP2	3:00 starting at 15:00	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		NM
12/06/2024	Vantage Point Survey	VP1	3:00 starting at 14:15	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Fair throughout. Cool, 10 - 14°C	NM

12/06/2024	Vantage Point Survey	VP1	4:00 starting at 17:45	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		NM
13/06/2024	Vantage Point Survey	VP3	3:00 starting at 14:40	Visibility: poor; Wind speed and direction: gentle breeze WNW; Cloud cover and height: 66-100% 150-500m; Rain: persistent; Frost: none; Snow: none	Grey and wholly overcast. Cool W breeze, 9 - 13°C. Persistent rain throughout - clearing gradually. Visibility very poor.	NM
13/06/2024	Vantage Point Survey	VP3	3:00 starting at 17:50	Visibility: moderate; Wind speed and direction: gentle breeze WNW; Cloud cover and height: 66-100% <150m; Rain: light showers; Frost: none; Snow: none	Overcast with low cloud. Light showers. Rain easing off gradually	NM
24/06/2024	Breeding Raptor Survey	BR 10, 11	8:45 starting at 13:15	Visibility: good; Wind speed and direction: moderate breeze SSW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Fair and bright throughout, prolonged sunny periods. Moderate breeze. Warm, 13 - 22°C. Clouding over gradually in the evening, cool with breeze at times	NM
25/06/2024	Breeding Raptor Survey	BR 5, 12	7:40 starting at 14:50	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Largely overcast, sunny spells in evening, 13 - 20°C	NM
12/07/2024	Foraging VP	FVP4	3:00 starting at 07:30	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
12/07/2024	Foraging VP	FVP2	3:00 starting at 11:30	Visibility: good; Wind speed and direction: moderate breeze NW; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
16/07/2024	Foraging VP	FVP1	3:00 starting at 08:45	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
16/07/2024	Breeding Raptor Survey	BR4	3:00 starting at 12:20	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD

18/07/2024	Foraging VP	FVP2	3:00 starting at 15:45	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
24/07/2024	Foraging VP	FVP5	3:00 starting at 14:25	Visibility: moderate; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
26/07/2024	Breeding Raptor Survey	BR4	3:00 starting at 11:50	Visibility: good; Wind speed and direction: fresh breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
26/07/2024	Breeding Raptor Survey	BR11	5:30 starting at 14:00	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
26/07/2024	Breeding Raptor Survey	BR6	1:30 starting at 19:30	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
31/07/2024	Breeding Raptor Survey	BR4	5:00 starting at 07:20	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
31/07/2024	Breeding Raptor Survey	BR1	1:00 starting at 12:55	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
03/07/2024	Vantage Point Survey	VP2	3:00 starting at 12:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Largely fair throughout. Sunny spells. 14 - 19°C	NM
03/07/2024	Vantage Point Survey	VP2	3:00 starting at 16:00	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none	Clouding over gradually	NM
05/07/2024	Vantage Point Survey	VP3	3:00 starting at 15:15	Visibility: moderate; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none	Entirely overcast, light showers blowing through which hampered visibility. Mild, 15 - 21°C	NM
05/07/2024	Vantage Point Survey	VP3	3:00 starting at 18:45	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none	Rain clearing gradually, staying grey and overcast	NM

08/07/2024	Vantage Point Survey	VP1	3:00 starting at 08:00	Visibility: good; Wind speed and direction: moderate breeze NE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Clear and bright in the morning, largely fair throughout. Cool in breeze, 13 - 19°C	NM
08/07/2024	Vantage Point Survey	VP1	3:00 starting at 11:30	Visibility: good; Wind speed and direction: gentle breeze NE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Clouding over gradually, but remaining fair	NM
10/07/2024	Vantage Point Survey	VP4	3:00 starting at 10:00	Visibility: good; Wind speed and direction: gentle breeze N; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none	Grey and overcast throughout. Mild and humid, 15 - 21°C	NM
10/07/2024	Vantage Point Survey	VP4	3:00 starting at 13:30	Visibility: good; Wind speed and direction: gentle breeze NNW; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none	Light drizzle coming and going	NM
15/07/2024	Breeding Raptor Survey	BR1	6:45 starting at 14:00	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none	Largely overcast but bright. Humid and close, 15 - 19°C	NM
16/07/2024	Breeding Raptor Survey	BR10, BR5	7:10 starting at 13:50	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 33-66% >500m; Rain: drizzle; Frost: none; Snow: none	Laregly fair. Cloudy but bright and with occasional sunny spells. Light drizzle in evening	NM
18/07/2024	Breeding Raptor Survey	BR12	4:05 starting at 07:30	Visibility: good; Wind speed and direction: gentle breeze SSW; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none	Overcast and grey with low cloud and persistent misty rain. Blustery breeze. Humid, 12 - 16°C. Clearing somewhat towards the end of survey but remaining wet	NM
18/07/2024	Breeding Raptor Survey	BR6	4:15 starting at 17:30	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Complete opposite conditions to morning. Clear and bright with high wispy cloud. 14 - 18°C	NM

01/08/2024	Breeding Raptor Survey	BR6	3:00 starting at 07:45	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
01/08/2024	Breeding Raptor Survey	BR11	3:00 starting at 11:05	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
14/08/2024	Breeding Raptor Survey	BR3	3:00 starting at 09:40	Visibility: poor; Wind speed and direction: fresh breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
14/08/2024	Breeding Raptor Survey	BR9	3:00 starting at 13:10	Visibility: poor; Wind speed and direction: fresh breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
16/08/2024	Breeding Raptor Survey	BR4	3:00 starting at 07:50	Visibility: good; Wind speed and direction: fresh breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
16/08/2024	Breeding Raptor Survey	BR7	3:00 starting at 11:15	Visibility: good; Wind speed and direction: fresh breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
16/08/2024	Breeding Raptor Survey	BR8	3:00 starting at 14:45	Visibility: good; Wind speed and direction: fresh breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
29/08/2024	Breeding Raptor Survey	BR4	4:00 starting at 10:00	Visibility: moderate; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		AOD
02/08/2024	Vantage Point Survey	VP4	3:00 starting at 06:15	Visibility: good; Wind speed and direction: gentle breeze SSW; Cloud cover and height: 33-66% >500m; Rain: drizzle; Frost: none; Snow: none	Largely fair, occasional drizzle. Changeable.	NM
14/08/2024	Vantage Point Survey	VP1	3:00 starting at 10:00	Visibility: good; Wind speed and direction: moderate breeze SSE; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none	Largely overcast but bright. Fresh gusts. Cool in breeze, 12 - 16°C	NM
14/08/2024	Vantage Point Survey	VP1	3:00 starting at 13:30	Visibility: good; Wind speed and direction: moderate breeze SSE; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none	Brief patches of sun but short and seldom	NM

15/08/2024	Vantage Point Survey	VP3	3:00 starting at 14:00	Visibility: good; Wind speed and direction: moderate breeze WSW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Fresh. Somewhat overcast but clearing. Chill in open, 13 - 17°C.	NM
15/08/2024	Vantage Point Survey	VP3	3:00 starting at 17:30	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Becoming brighter in evening, wind dropping	NM
16/08/2024	Breeding Raptor Survey	BR5, BR10	8:00 starting at 06:00	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none	Grey and overcast but largely fair. Occasional light showers	NM
19/08/2024	Vantage Point Survey	VP4	3:00 starting at 13:00	Visibility: moderate; Wind speed and direction: light breeze N; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none	Thoroughly damp throughout. Constant drizzle with light showers. Cool at times, 13 - 15°C	NM
22/08/2024	Breeding Raptor Survey	BRT1	7:15 starting at 08:45	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none	Largely overcast and unsettled. Light rain coming in afternoon, 11 - 15°C	NM
23/08/2024	Breeding Raptor Survey	BR12, BR6	8:45 starting at 11:00	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none	Largely fair early on, sunny spells and scattered light showers. Largely grey, becoming darker. 12 - 16°C	NM
30/08/2024	Vantage Point Survey	VP2	3:00 starting at 13:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Largely fair and clear, prolonged sunny period. Hazy at distance. 14 - 20°C	NM

30/08/2024	Vantage Point Survey	VP2	3:00 starting at 17:00	Visibility: moderate; Wind speed and direction: gentle breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Cloud cover decreasing. Visibility difficult due to glare from sun in direction of VP	NM
26/09/2024	Vantage Point Survey	vp3	1:00 starting at 06:00	Visibility: none; Wind speed and direction: moderate breeze NNE; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none	987hpa - 9c - f3c	FLM
26/09/2024	Vantage Point Survey	vp3	1:00 starting at 07:00	Visibility: limited; Wind speed and direction: moderate breeze NNE; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none	987hpa - 9c - f2c	FLM
26/09/2024	Vantage Point Survey	vp3	1:00 starting at 08:00	Visibility: moderate; Wind speed and direction: moderate breeze NNE; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none	988hpa - 9c - f2c	FLM
26/09/2024	Vantage Point Survey	vp3	1:00 starting at 09:30	Visibility: moderate; Wind speed and direction: moderate breeze NNE; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none	990hpa - 9c - f0c	FLM
26/09/2024	Vantage Point Survey	vp3	1:00 starting at 10:30	Visibility: good; Wind speed and direction: moderate breeze NNE; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none	990hpa - 8c - f0c	FLM
26/09/2024	Vantage Point Survey	vp3	1:00 starting at 11:30	Visibility: moderate; Wind speed and direction: moderate breeze NNE; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none	991hpa - 8c - f0c	FLM
20/09/2024	Vantage Point Survey	VP4	3:00 starting at 06:10	Visibility: poor; Wind speed and direction: light air ENE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Mist early in the morning - hampered visibility. Dawn survey. Sunrise - 07:12	NM
20/09/2024	Vantage Point Survey	VP4	3:00 starting at 09:30	Visibility: moderate; Wind speed and direction: light breeze ENE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Mist gradually burning off. Remaining hazy, visibility patchy. 9 - 18°	NM
19/09/2024	Vantage Point Survey	VP2	3:00 starting at 06:25	Visibility: good; Wind speed and direction: light breeze SE; Cloud cover and height: 0-33% 150-500m; Rain: none; Frost: none; Snow: none		AOD

19/09/2024	Vantage Point Survey	VP2	3:00 starting at 10:10	Visibility: good; Wind speed and direction: light breeze SE; Cloud cover and height: 0-33% 150-500m; Rain: none; Frost: none; Snow: none		AOD
20/09/2024	Vantage Point Survey	VP1	3:00 starting at 06:20	Visibility: good; Wind speed and direction: gentle breeze SE; Cloud cover and height: 0-33% 150-500m; Rain: none; Frost: none; Snow: none		AOD
20/09/2024	Vantage Point Survey	VP1	3:00 starting at 11:00	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 0-33% 150-500m; Rain: none; Frost: none; Snow: none		AOD

Table 2.0 Vantage Point Surveys

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1 (0-Xm)	Band 2 (X-Xm)	Band 3 (X-Xm)	Band 4 (>Xm)	Habitat and activity	Surveyor
SN084	VP2	02/04/2024	18:14	Snipe	2	25	25	0	0	0	bogs; flushed, alarming	NM
K.088	VP2	02/04/2024	17:56	Kestrel	1	80	0	20	60	0	bogs, improved agricultural grassland and semi-natural grassland; travelling	NM
HH274	VP2	02/04/2024	17:05	Hen Harrier	1	160	120	30	10	0	bogs, semi-natural grassland and improved agricultural grassland; travelling, hunting, landing, male, travelling and fluttering over moorland and rough adjacent grassland	NM
HH275	VP2	02/04/2024	17:26	Hen Harrier	1	100	100	0	0	0	improved agricultural grassland, bogs and semi-natural grassland; fluttering, hunting, landing, same male, over heather and rushy pasture	NM
HH276	VP2	02/04/2024	17:34	Hen Harrier	1	370	50	120	200	0	improved agricultural grassland, bogs and conifer plantation; departing, swirling, soaring, landing, same male, soaring over forestry before landing within	NM
HH277	VP2	02/04/2024	19:49	Hen Harrier	1	45	45	0	0	0	bogs and improved agricultural grassland; travelling, male	NM

K.089	VP2	02/04/2024	17:49	Kestrel	1	85	0	35	50	0	bogs; hunting, soaring	NM
K.090	VP2	02/04/2024	20:12	Kestrel	1	30	0	30	0	0	bogs and mixed conifer woodland; travelling	NM
H.010	VP2	02/04/2024	15:07	Grey Heron	1	70	0	0	70	0	bogs and highly modified/non-native woodland; travelling	NM
H.011	VP2	02/04/2024	16:39	Grey Heron	2	140	0	0	100	40	highly modified/non-native woodland and improved agricultural grassland; soaring, travelling	NM
BZ237	VP2	02/04/2024	18:21	Buzzard	2	780	0	0	0	780	mixed conifer woodland, improved agricultural grassland and bogs; soaring, circling	NM
BZ238	VP2	02/04/2024	15:39	Buzzard	1	75	20	55	0	0	conifer plantation; gliding, low over forestry before disappearing behind	NM
SN085	VP2	02/04/2024	18:27	Snipe	1	35	25	10	0	0	bogs; travelling, alarming	NM
GP039	VP2	02/04/2024	20:22	Golden Plover	15	140	0	90	50	0	bogs; swirling, calling, departing, vanishing northeast	NM
SN084	VP2	02/04/2024	20:29	Snipe	2	25	20	5	0	0	bogs; flushed, calling	NM
SN086	VP2	02/04/2024	08:57	Snipe	1	15	15	0	0	0	bogs; flushed, calling	NM
SN087	VP2	02/04/2024	20:50	Snipe	2	30	0	0	30	0	bogs; alarming	NM
K.091	VP1	04/04/2024	15:49	Kestrel	1	430	0	60	370	0	bogs, semi-natural grassland and highly modified/non-native woodland; hunting, hovering, travelling	NM
BZ239	VP1	04/04/2024	19:32	Buzzard	1	530	50	140	340	0	mixed conifer woodland, improved agricultural grassland and scrub; departing, travelling, soaring, departing from perched, proceeded to soar over farmland off site (to the south)	NM
HH278	VP1	04/04/2024	18:34	Hen Harrier	1	150	110	40	0	0	bogs, semi-natural grassland and scrub; travelling, hunting, fluttering, male, characteristic hen harrier flight style	NM
HH279	VP1	04/04/2024	20:03	Hen Harrier	1	120	60	50	10	0	mixed conifer woodland, bogs and semi-natural grassland; travelling, male, swirling briefly over forestry	NM
LB048	VP1	04/04/2024	19:27	Lesser Black-backed Gull	6	150	0	0	125	25	bogs, conifer plantation and scrub; soaring, travelling	NM

SN089	VP1	04/04/2024	14:47	Snipe	1	25	20	5	0	0	bogs; flushed	NM
#REF!	VP1	04/04/2024	16:03	Snipe	2	25	15	10	0	0	bogs and semi-natural grassland; flushed, alarming	NM
SN090	VP1	04/04/2024	18:39	Snipe	2	50	0	0	50	0	bogs; travelling, alarming	NM
SN091	VP1	04/04/2024	20:07	Snipe	1	30	20	10	0	0	bogs; flushed, alarming	NM
SN092	VP1	04/04/2024	20:49	Snipe	1	20	0	0	20	0	bogs; travelling, alarming	NM
BZ240	VP3	03/04/2024	16:43	Buzzard	1	430	0	50	350	30	improved agricultural grassland and highly modified/non-native woodland; soaring, hunting	NM
SN093	VP3	03/04/2024	19:27	Snipe	3	30	0	0	30	0	bogs and highly modified/non-native woodland; flying, alarming	NM
HH280	VP3	03/04/2024	19:14	Hen Harrier	1	55	0	55	0	0	bogs, improved agricultural grassland and highly modified/non-native woodland; travelling, hunting, male	NM
ML006	VP3	03/04/2024	20:02	Merlin	1	275	245	30	0	0	bogs, scrub and highly modified/non-native woodland; perching, travelling, hunting, female. perched intermitently on posts within moorland	NM
H.012	VP3	03/04/2024	19:47	Grey Heron	1	130	0	0	100	30	bogs, highly modified/non-native woodland and improved agricultural grassland; soaring, travelling	NM
CA003	VP3	03/04/2024	15:06	Cormorant	2	90	0	0	70	20	improved agricultural grassland and bogs; travelling	NM
SN094	VP3	03/04/2024	19:26	Snipe	1	15	0	0	15	0	bogs; drumming	NM
SN095	VP3	03/04/2024	20:38	Snipe	1	90	0	0	90	0	bogs; drumming	NM
SN096	VP3	03/04/2024	20:40	Snipe	1	50	0	15	35	0	bogs; drumming	NM
SN097	VP3	03/04/2024	20:45	Snipe	2	75	0	30	45	0	bogs; drumming, swooping, chasing	NM
SN098	VP3	03/04/2024	20:51	Snipe	1	30	0	0	30	0	bogs; drumming	NM
SN099	VP3	03/04/2024	21:04	Snipe	1	15	0	15	0	0	bogs; drumming	NM

SN100	VP3	03/04/2024	19:24	Snipe	5	160	160	0	0	0	bogs; chirping, perched, on ground, moving with heather moorland	NM
SN101	VP3	03/04/2024	20:11	Snipe	1	35	0	35	0	0	bogs and highly modified/non-native woodland; flying, alarming	NM
K.092	VP4	29/04/2024	20:17	Kestrel	1	680	0	240	440	0	semi-natural grassland and improved agricultural grassland; hunting, travelling	NM
BZ241	VP4	29/04/2024	16:29	Buzzard	1	170	0	80	90	0	conifer plantation; soaring, calling, travelling	NM
BZ242	VP4	29/04/2024	17:43	Buzzard	2	1900	0	0	700	1200	highly modified/non-native woodland, improved agricultural grassland and bogs; soaring, circling	NM
BZ243	VP4	29/04/2024	20:50	Buzzard	1	70	0	20	50	0	highly modified/non-native woodland and scrub/transitional woodland; travelling, calling	NM
LB049	VP4	29/04/2024	18:23	Lesser Black-backed Gull	1	50	0	0	50	0	highly modified/non-native woodland, scrub and improved agricultural grassland; travelling	NM
LB050	VP4	29/04/2024	19:59	Lesser Black-backed Gull	4	110	0	30	80	0	highly modified/non-native woodland, improved agricultural grassland and scrub/transitional woodland; travelling, swooping	NM
SN102	VP4	29/04/2024	15:54	Snipe	2	35	0	0	35	0	highly modified/non-native woodland and improved agricultural grassland; flying, alarming	NM
SN103	VP4	29/04/2024	17:14	Snipe	1	25	0	25	0	0	improved agricultural grassland and highly modified/non-native woodland; flying, alarming	NM
SN104	VP4	29/04/2024	20:50	Snipe	3	30	0	0	30	0	improved agricultural grassland and highly modified/non-native woodland; flying, alarming	NM
SN105	VP4	29/04/2024	21:11	Snipe	1	25	0	0	25	0	improved agricultural grassland and highly modified/non-native woodland; flying, alarming	NM
SN106	VP4	29/04/2024	21:45	Snipe	1	20	0	0	20	0	improved agricultural grassland; alarming	NM
SN107	VP4	29/04/2024	21:33	Snipe	1	450	0	150	300	0	improved agricultural grassland and highly modified/non-native woodland; drumming	NM
SN108	VP4	29/04/2024	21:14	Snipe	2	230	0	60	170	0	improved agricultural grassland; drumming, chasing	NM
HH281	VP2	02/04/2024	17:09	Hen Harrier	1	0	0	0	0	0	improved agricultural grassland and semi-natural grassland; perched, preening, male	NM
HH282	VP2	02/04/2024	17:28	Hen Harrier	1	0	0	0	0	0	improved agricultural grassland and semi-natural grassland; perched, same male	NM
BZ244	VP1	04/04/2024	18:53	Buzzard	1	0	0	0	0	0	mixed conifer woodland and scrub; perched	NM

SN109	VP3	03/04/2024	18:46	Snipe	3	0	0	0	0	0	bogs; chirping	NM
SN110	VP3	03/04/2024	19:16	Snipe	4	0	0	0	0	0	bogs; chirping	NM
SN111	VP3	03/04/2024	19:23	Snipe	2	0	0	0	0	0	bogs; chirping, alarming	NM
SN112	VP3	03/04/2024	20:07	Snipe	3	0	0	0	0	0	bogs; alarming	NM
SN113	VP3	03/04/2024	20:38	Snipe	1	0	0	0	0	0	bogs; chirping	NM
SN114	VP3	03/04/2024	20:49	Snipe	2	0	0	0	0	0	bogs and semi-natural grassland; chirping	NM
SN115	VP3	03/04/2024	20:53	Snipe	2	0	0	0	0	0	bogs; chirping	NM
SN116	VP3	03/04/2024	20:50	Snipe	2	0	0	0	0	0	bogs; chirping, persistent calling from same spot until survey end. numbers were estimates	NM
HH283	VP2	14/05/2024	07:04	Hen Harrier	1	950	550	250	150	0	highly modified/non-native woodland, bogs and improved agricultural grassland; travelling, foraging, male. departing south, swirling over forestry before being lost	NM
K.093	VP2	14/05/2024	09:54	Kestrel	1	770	0	150	620	0	bogs, highly modified/non-native woodland and semi-natural grassland; hunting, hovering, travelling	NM
K.094	VP2	14/05/2024	05:57	Kestrel	1	2000	100	450	1450	0	bogs, highly modified/non-native woodland and semi-natural grassland; hunting, hovering	NM
K.095	VP2	14/05/2024	08:02	Kestrel	1	760	70	140	550	0	semi-natural grassland, bogs and highly modified/non-native woodland; hunting, hovering, departing, male	NM
BZ245	VP2	14/05/2024	07:18	Buzzard	2	1150	0	0	850	300	highly modified/non-native woodland, scrub/transitional woodland and improved agricultural grassland; soaring, circling	NM
BZ246	VP2	14/05/2024	10:28	Buzzard	2	650	0	200	450	0	improved agricultural grassland and highly modified/non-native woodland; soaring, circling, calling, descending and landing in forestry	NM
LB051	VP2	14/05/2024	08:13	Lesser Black-backed Gull	3	75	0	0	75	0	improved agricultural grassland and highly modified/non-native woodland; travelling	NM
LB052	VP2	14/05/2024	08:29	Lesser Black-backed Gull	7	65	0	0	65	0	highly modified/non-native woodland, bogs and improved agricultural grassland; travelling	NM

LB053	VP2	14/05/2024	06:33	Lesser Black-backed Gull	6	90	0	30	60	0	highly modified/non-native woodland and bogs; travelling, swooping	NM
LB054	VP2	14/05/2024	09:17	Lesser Black-backed Gull	12	100	0	60	40	0	improved agricultural grassland; travelling, swooping	NM
LB055	VP2	14/05/2024	09:34	Lesser Black-backed Gull	3	90	0	40	50	0	highly modified/non-native woodland and improved agricultural grassland; travelling	NM
SN117	VP2	14/05/2024	05:15	Snipe	2	1500	0	400	1100	0	bogs and semi-natural grassland; drumming, chasing, separate territories	NM
ML007	VP3	15/05/2024	07:03	Merlin	1	80	60	20	0	0	bogs, highly modified/non-native woodland and scrub/transitional woodland; travelling, foraging, moving rapidly along northeast boundary	NM
H.013	VP3	15/05/2024	09:18	Grey Heron	1	100	0	0	100	0	improved agricultural grassland and highly modified/non-native woodland; travelling	NM
BZ247	VP3	15/05/2024	10:04	Buzzard	1	240	0	0	190	50	highly modified/non-native woodland and bogs; soaring, circling	NM
BZ248	VP3	15/05/2024	05:20	Buzzard	1	90	0	90	0	0	highly modified/non-native woodland and bogs; travelling	NM
BZ249	VP3	15/05/2024	06:04	Buzzard	2	270	0	0	30	250	improved agricultural grassland and scrub/transitional woodland; wd	NM
BZ250	VP3	15/05/2024	07:25	Buzzard	1	80	0	0	80	0	improved agricultural grassland and highly modified/non-native woodland; soaring, circling, far off site	NM
BZ251	VP3	15/05/2024	08:02	Buzzard	1	670	0	0	670	0	improved agricultural grassland and highly modified/non-native woodland; saoring, gliding	NM
BZ252	VP3	15/05/2024	08:56	Buzzard	2	980	0	0	680	300	highly modified/non-native woodland, improved agricultural grassland and bogs; soaring, circling	NM
SN118	VP3	15/05/2024	04:52	Snipe	1	140	0	50	90	0	bogs; drumming	NM
SN119	VP3	15/05/2024	05:16	Snipe	1	360	10	80	280	0	bogs; drumming, landing	NM
SN120	VP3	15/05/2024	05:48	Snipe	2	230	0	40	190	0	bogs; drumming, chasing, separate territories	NM
SN121	VP3	15/05/2024	08:16	Snipe	4	45	45	0	0	0	bogs; chirping, departing, bursting from heather	NM
HH284	VP1	31/05/2024	05:27	Hen Harrier	1	25	25	0	0	0	semi-natural grassland, scrub and bogs; foraging, female	NM

HH285	VP1	31/05/2024	05:58	Hen Harrier	1	45	40	5	0	0	scrub, semi-natural grassland and highly modified/non-native woodland; foraging, travelling, same female. disappearing over forestry	NM
K.096	VP1	31/05/2024	06:43	Kestrel	1	350	0	60	290	0	bogs and highly modified/non-native woodland; hunting, travelling, soaring away southeast	NM
BZ253	VP1	31/05/2024	07:34	Buzzard	2	1000	0	0	600	400	bogs, improved agricultural grassland and highly modified/non-native woodland; soaring, circling	NM
BZ254	VP1	31/05/2024	05:56	Buzzard	1	340	0	140	200	0	highly modified/non-native woodland and improved agricultural grassland; soaring, travelling	NM
BZ255	VP1	31/05/2024	06:32	Buzzard	1	65	0	35	30	0	highly modified/non-native woodland and bogs; travelling, calling	NM
BZ256	VP1	31/05/2024	09:18	Buzzard	3	160	0	0	0	160	highly modified/non-native woodland, improved agricultural grassland and scrub/transitional woodland; soaring, circling	NM
BZ257	VP1	31/05/2024	10:21	Buzzard	1	150	0	40	110	0	highly modified/non-native woodland and improved agricultural grassland; circling, gliding	NM
LB056	VP1	31/05/2024	09:42	Lesser Black-backed Gull	1	65	0	20	45	0	improved agricultural grassland and highly modified/non-native woodland; swooping, travelling, far off site	NM
LB057	VP1	31/05/2024	06:04	Lesser Black-backed Gull	5	100	0	40	60	0	bogs, highly modified/non-native woodland and improved agricultural grassland; travelling	NM
LB058	VP1	31/05/2024	08:09	Lesser Black-backed Gull	2	140	0	0	140	0	highly modified/non-native woodland and bogs; travelling	NM
SN122	VP1	31/05/2024	04:27	Snipe	3	1800	0	450	1350	0	bogs and semi-natural grassland; drumming, separate terrotories. numbers were rough	NM
K.097	VP4	07/05/2024	08:19	Kestrel	1	2100	5	800	1295	0	improved agricultural grassland, highly modified/non-native woodland and semi-natural grassland; hunting, hovering, present for a long period. droppoing abruptly and was not seen again	NM
LB059	VP4	07/05/2024	06:09	Lesser Black-backed Gull	7	120	0	0	120	0	improved agricultural grassland and highly modified/non-native woodland; travelling, swooping	NM
H.014	VP4	07/05/2024	10:53	Grey Heron	2	35	0	0	35	0	improved agricultural grassland; travelling	NM

H.015	VP4	07/05/2024	08:21	Grey Heron	1	40	0	15	25	0	highly modified/non-native woodland, bogs and scrub; travelling	NM
SN123	VP4	07/05/2024	05:02	Snipe	1	360	0	80	280	0	highly modified/non-native woodland, improved agricultural grassland and semi-natural grassland; drumming	NM
SN124	VP4	07/05/2024	05:23	Snipe	2	2700	0	800	1900	0	highly modified/non-native woodland, bogs and improved agricultural grassland; drumming, chasing, separate territories, drumming at same time. numbers were rough	NM
SN125	VP4	07/05/2024	07:42	Snipe	2	40	0	20	20	0	highly modified/non-native woodland, scrub/transitional woodland and improved agricultural grassland; travelling, alarming	NM
SN126	VP3	15/05/2024	04:47	Snipe	1	0	0	0	0	0	bogs; chirping	NM
SN127	VP3	15/05/2024	05:22	Snipe	2	0	0	0	0	0	bogs; chirping	NM
SN128	VP3	15/05/2024	06:04	Snipe	2	0	0	0	0	0	bogs; chirping	NM
SN129	VP3	15/05/2024	09:30	Snipe	2	0	0	0	0	0	bogs; chirping	NM
SN130	VP1	31/05/2024	05:07	Snipe	1	0	0	0	0	0	semi-natural grassland; chirping	NM
SN131	VP1	31/05/2024	06:19	Snipe	1	0	0	0	0	0	semi-natural grassland; chirping	NM
SN132	VP1	31/05/2024	09:50	Snipe	2	0	0	0	0	0	bogs and semi-natural grassland; chirping	NM
HH286	VP1	12/06/2024	20:08	Hen Harrier	1	60	60	0	0	0	bogs and semi-natural grassland; travelling, foraging, following edge of forestry, lost across summit	NM
K.098	VP1	12/06/2024	18:34	Kestrel	1	35	25	10	0	0	bogs and semi-natural grassland; departing, travelling, leaving perch	NM
K.099	VP1	12/06/2024	16:19	Kestrel	1	130	0	40	90	0	improved agricultural grassland, semi-natural grassland and scrub; hunting, hovering, br10 area, dropping abruptly	NM
BZ258	VP1	12/06/2024	14:36	Buzzard	1	45	0	45	0	0	improved agricultural grassland and scrub; travelling	NM

BZ259	VP1	12/06/2024	17:53	Buzzard	1	270	0	100	170	0	highly modified/non-native woodland, scrub and improved agricultural grassland; soaring, gliding, calling	NM
BZ260	VP1	12/06/2024	20:57	Buzzard	2	1300	0	0	400	900	highly modified/non-native woodland and improved agricultural grassland; soaring, circling, off site mostly - tawnyunshinagh	NM
BZ261	VP1	12/06/2024	16:29	Buzzard	1	130	0	45	85	0	improved agricultural grassland and highly modified/non-native woodland; travelling, gliding	NM
BZ262	VP1	12/06/2024	15:52	Buzzard	1	45	0	45	0	0	highly modified/non-native woodland; travelling low, calling, low across forestry	NM
BZ263	VP1	12/06/2024	16:04	Buzzard	1	80	0	60	20	0	highly modified/non-native woodland, bogs and improved agricultural grassland; gliding, calling. travelling, low across forestry, same individual as was seen ~15mins previous	NM
H.016	VP1	12/06/2024	21:19	Grey Heron	1	110	0	0	110	0	improved agricultural grassland and highly modified/non-native woodland; travelling, calling	NM
H.017	VP1	12/06/2024	19:04	Grey Heron	1	70	0	0	55	15	improved agricultural grassland, highly modified/non-native woodland and bogs; travelling, calling	NM
HH287	VP2	10/06/2024	12:35	Hen Harrier	1	100	75	25	0	0	improved agricultural grassland, bogs and highly modified/non-native woodland; travelling, foraging, landing, male. perching on upland farmland	NM
HH288	VP2	10/06/2024	12:57	Hen Harrier	1	70	55	15	0	0	improved agricultural grassland, bogs and highly modified/non-native woodland; foraging, travelling, male - same individual. lost behind forestry	NM
HH289	VP2	10/06/2024	17:25	Hen Harrier	1	50	50	0	0	0	improved agricultural grassland and bogs; travelling, male, traversing saddle hill and vanishing down opposite side (towards br6 area)	NM
K.100	VP2	10/06/2024	15:38	Kestrel	1	320	0	100	220	0	bogs and improved agricultural grassland; hunting, hovering, travelling	NM
BZ264	VP2	10/06/2024	16:19	Buzzard	3	3400	80	550	2570	200	highly modified/non-native woodland; soaring, circling, calling, appeared to be a juvenile with 2 adults, dropping into forestry near to vp4 eventually	NM
BZ265	VP2	10/06/2024	11:47	Buzzard	1	110	0	80	30	0	improved agricultural grassland, bogs and scrub; travelling, off site	NM

BZ266	VP2	10/06/2024	17:52	Buzzard	1	45	0	0	0	45	highly modified/non-native woodland and improved agricultural grassland; soaring, circling, off site	NM
BZ267	VP2	10/06/2024	17:04	Buzzard	1	70	0	0	70	0	improved agricultural grassland and highly modified/non-native woodland; gliding, travelling, off site	NM
LB060	VP2	10/06/2024	13:19	Lesser Black-backed Gull	1	65	0	0	65	0	highly modified/non-native woodland, improved agricultural grassland and bogs; travelling	NM
LB061	VP2	10/06/2024	16:56	Lesser Black-backed Gull	2	40	0	0	40	0	improved agricultural grassland and highly modified/non-native woodland; travelling, swooping	NM
LB062	VP2	10/06/2024	17:07	Lesser Black-backed Gull	7	115	0	0	115	0	improved agricultural grassland, highly modified/non-native woodland and bogs; travelling, swooping	NM
K.101	VP3	13/06/2024	19:07	Kestrel	1	270	0	60	210	0	bogs, improved agricultural grassland and scrub; hunting, hovering	NM
K.102	VP3	13/06/2024	20:04	Kestrel	1	120	5	25	90	0	bogs, highly modified/non-native woodland and scrub; hunting, hovering, dropping abruptly, br6 area	NM
BZ268	VP3	13/06/2024	20:41	Buzzard	1	90	0	80	10	0	bogs and highly modified/non-native woodland; travelling	NM
BZ269	VP3	13/06/2024	15:57	Buzzard	1	540	0	130	410	0	bogs, highly modified/non-native woodland and improved agricultural grassland; soaring, circling, calling, br9 area (raheelin)	NM
H.018	VP3	13/06/2024	18:23	Grey Heron	1	110	0	0	110	0	bogs, highly modified/non-native woodland and scrub; travelling, calling	NM
BZ270	VP4	06/06/2024	19:04	Buzzard	1	1570	0	0	900	670	highly modified/non-native woodland, semi-natural grassland and scrub; soaring, circling	NM
BZ271	VP4	06/06/2024	15:29	Buzzard	1	540	200	340	0	0	improved agricultural grassland and linear woodland/scrub; travelling, calling, perching, perching briefly but continuing low across farmland	NM
H.019	VP4	06/06/2024	16:29	Grey Heron	1	30	0	0	0	30	highly modified/non-native woodland and scrub; travelling high	NM
H.020	VP4	06/06/2024	20:21	Grey Heron	1	45	0	45	0	0	improved agricultural grassland; travelling, calling	NM

LB063	VP4	06/06/2024	17:58	Lesser Black-backed Gull	3	65	0	0	65	0	improved agricultural grassland, linear woodland/scrub and highly modified/non-native woodland; travelling	NM
SN133	VP4	06/06/2024	20:09	Snipe	2	25	5	15	10	0	highly modified/non-native woodland, scrub and semi-natural grassland; flying, calling	NM
K.103	VP1	12/06/2024	18:19	Kestrel	1	0	0	0	0	0	bogs; perched, male	NM
HH290	VP2	10/06/2024	12:37	Hen Harrier	1	0	0	0	0	0	improved agricultural grassland; perched, preening, male	NM
BZ272	VP4	06/06/2024	15:20	Buzzard	1	0	0	0	0	0	highly modified/non-native woodland; calling, calling regularly throughout vp, possible nest site	NM
BZ273	VP1	08/07/2024	09:57	Buzzard	2	1340	0	250	1000	90	highly modified/non-native woodland and scrub; soaring, circling, calling, descending gradually to west	NM
BZ274	VP1	08/07/2024	13:28	Buzzard	1	130	0	20	110	0	highly modified/non-native woodland and bogs; swirling, gliding	NM
BZ275	VP1	08/07/2024	11:36	Buzzard	1	540	0	130	390	20	highly modified/non-native woodland and scrub/transitional woodland; soaring, circling	NM
BZ276	VP1	08/07/2024	08:57	Buzzard	1	45	0	45	0	0	improved agricultural grassland and scrub; travelling, gliding, low within rough farmland	NM
K.104	VP1	08/07/2024	08:12	Kestrel	1	45	0	35	10	0	bogs and semi-natural grassland; hunting, hovering, vp2 area, lost behind terrain	NM
K.105	VP1	08/07/2024	12:22	Kestrel	1	760	40	380	260	0	improved agricultural grassland, highly modified/non-native woodland and bogs; hunting, hovering, moving into and across upland moorland	NM
LB064	VP1	08/07/2024	13:28	Lesser Black-backed Gull	1	100	0	0	100	0	bogs and highly modified/non-native woodland; travelling	NM
LB065	VP1	08/07/2024	08:43	Lesser Black-backed Gull	2	110	0	40	70	0	highly modified/non-native woodland and improved agricultural grassland; travelling	NM
LB066	VP1	08/07/2024	09:10	Lesser Black-backed Gull	12	310	15	125	170	0	highly modified/non-native woodland, improved agricultural grassland and lakes and ponds; travelling, swirling, landing, travelling from northwest, swirling over l. munakill (off site) for a time before landing on rocky shore	NM

SN134	VP1	08/07/2024	08:21	Snipe	2	35	20	15	0	0	bogs, improved agricultural grassland and highly modified/non-native woodland; flushed, alarming, dropping down to southeast	NM
SN135	VP1	08/07/2024	11:36	Snipe	1	40	0	20	20	0	highly modified/non-native woodland and bogs; travelling, alarming	NM
SN136	VP1	08/07/2024	08:41	Snipe	1	25	25	0	0	0	bogs; travelling low, alarming, lost behind terrain	NM
SN138	VP1	08/07/2024	09:13	Snipe	8	340	340	0	0	0	bogs and semi-natural grassland; flitting, chirping, perched, moving across open moorland, sporadically dropping into vegetation but continuing downhill	NM
K.106	VP2	03/07/2024	16:19	Kestrel	1	860	120	330	410	0	bogs, improved agricultural grassland and scrub/transitional woodland; hunting, hovering, male	NM
BZ277	VP2	03/07/2024	13:04	Buzzard	1	490	0	350	140	0	highly modified/non-native woodland, bogs and improved agricultural grassland; travelling, calling, gliding, swooping, gradually dropping into forestry, but lost from view before that	NM
BZ278	VP2	03/07/2024	18:42	Buzzard	1	70	0	0	0	70	highly modified/non-native woodland and bogs; soaring, circling, lost behind terrain	NM
BZ279	VP2	03/07/2024	17:28	Buzzard	2	540	0	70	450	20	highly modified/non-native woodland; soaring, circling, gradually dropping and landing within forestry - adjacent to vp4 area	NM
H.021	VP2	03/07/2024	16:19	Grey Heron	2	70	30	40	0	0	improved agricultural grassland and highly modified/non-native woodland; travelling, calling	NM
H.022	VP2	03/07/2024	18:32	Grey Heron	1	45	0	0	45	0	highly modified/non-native woodland and improved agricultural grassland; travelling, moving off site	NM
LB067	VP2	03/07/2024	18:02	Lesser Black-backed Gull	4	65	0	0	65	0	bogs and highly modified/non-native woodland; travelling, swooping, moving south and off site	NM
H.023	VP3	05/07/2024	18:57	Grey Heron	1	35	0	0	35	0	improved agricultural grassland; wd, off site	NM
ML008	VP3	05/07/2024	21:09	Merlin	1	230	190	40	0	0	bogs; hunting, travelling, perching, male	NM
ML009	VP3	05/07/2024	21:28	Merlin	1	50	40	10	0	0	bogs, highly modified/non-native woodland and scrub; departing, travelling, same male	NM

BZ280	VP3	05/07/2024	18:52	Buzzard	2	470	0	0	60	410	highly modified/non-native woodland, bogs and improved agricultural grassland; soaring, circling, pair off site	NM
BZ281	VP3	05/07/2024	20:19	Buzzard	1	40	0	0	40	0	highly modified/non-native woodland and improved agricultural grassland; gliding, off site. lost behind terrain	NM
SN139	VP3	05/07/2024	19:09	Snipe	6	270	20	50	200	0	bogs; swirling, calling, chasing, swirling over heather moorland for a time before dropping back down, drumming evident but infrequently	NM
SN140	VP3	05/07/2024	16:24	Snipe	3	40	0	0	40	0	bogs and highly modified/non-native woodland; travelling, alarming	NM
SN141	VP3	05/07/2024	19:56	Snipe	1	80	20	60	0	0	bogs and scrub; travelling, swirling, alarming	NM
SN142	VP3	05/07/2024	20:06	Snipe	1	30	0	0	30	0	bogs; drumming, swirling	NM
SN143	VP3	05/07/2024	20:37	Snipe	1	15	0	0	15	0	bogs; drumming	NM
SN144	VP3	05/07/2024	21:17	Snipe	3	450	30	70	350	0	bogs; drumming, circling, swooping, chasing, separate territories	NM
SN145	VP3	05/07/2024	21:39	Snipe	1	30	0	10	20	0	bogs and semi-natural grassland; drumming, circling	NM
LB068	VP4	10/07/2024	12:19	Lesser Black-backed Gull	1	30	0	0	30	0	highly modified/non-native woodland; travelling	NM
LB069	VP4	10/07/2024	15:18	Lesser Black-backed Gull	3	45	0	0	45	0	highly modified/non-native woodland; travelling	NM
LB070	VP4	10/07/2024	15:39	Lesser Black-backed Gull	2	35	0	0	35	0	highly modified/non-native woodland and bogs; travelling	NM
K.107	VP4	10/07/2024	14:05	Kestrel	1	545	40	220	285	0	improved agricultural grassland, semi-natural grassland and linear woodland/scrub; hunting, hovering, travelling, off site	NM
BZ282	VP4	10/07/2024	16:13	Buzzard	1	65	0	65	0	0	highly modified/non-native woodland and improved agricultural grassland; calling, travelling, calling across forestry, moving off site	NM

BZ283	VP4	10/07/2024	10:10	Buzzard	2	190	0	50	140	0	highly modified/non-native woodland; soaring, circling, calling	NM
BZ284	VP4	10/07/2024	11:06	Buzzard	2	60	20	40	0	0	highly modified/non-native woodland and scrub; gliding, calling, flying, fluttering and calling low across forestry, dropping and lost from view within forestry	NM
SN146	VP4	10/07/2024	10:40	Snipe	2	30	0	0	30	0	highly modified/non-native woodland and scrub; travelling, alarming	NM
SN147	VP4	10/07/2024	11:49	Snipe	1	25	0	0	25	0	improved agricultural grassland and highly modified/non-native woodland; travelling, alarming	NM
SN148	VP4	10/07/2024	16:13	Snipe	3	45	15	30	0	0	improved agricultural grassland and highly modified/non-native woodland; travelling, swirling, calling	NM
SN149	VP4	10/07/2024	13:37	Snipe	1	20	0	0	20	0	highly modified/non-native woodland and scrub; travelling, alarming	NM
SN150	VP1	08/07/2024	08:03	Snipe	1	0	0	0	0	0	semi-natural grassland and improved agricultural grassland; chirping, numbers were estimates	NM
SN151	VP1	08/07/2024	08:47	Snipe	1	0	0	0	0	0	semi-natural grassland and bogs; chirping, numbers were estimates	NM
SN152	VP1	08/07/2024	09:54	Snipe	2	0	0	0	0	0	bogs and semi-natural grassland; chirping, numbers were estimates	NM
SN153	VP1	08/07/2024	10:17	Snipe	2	0	0	0	0	0	bogs and semi-natural grassland; chirping, numbers were estimates	NM
SN154	VP1	08/07/2024	10:31	Snipe	3	0	0	0	0	0	semi-natural grassland and bogs; chirping, flurry of chirping calls, numbers were estimates	NM
ML010	VP3	05/07/2024	21:14	Merlin	1	0	0	0	0	0	bogs; perched, preening, male	NM
SN155	VP3	05/07/2024	16:29	Snipe	5	0	0	0	0	0	bogs; chirping on ground, chirping in surrounding moorland throughout vp. never seen, only heard. scattered and sporadic, very hard to get an accurate number -> numbers were very rough, under estimate	NM
BZ285	VP1	14/08/2024	11:13	Buzzard	1	340	0	120	220	0	highly modified/non-native woodland, bogs and scrub; soaring, calling, circling	NM

K.108	VP1	14/08/2024	10:05	Kestrel	1	570	40	330	200	0	bogs, semi-natural grassland and highly modified/non-native woodland; hunting, hovering, disappearing across summit	NM
K.109	VP1	14/08/2024	14:45	Kestrel	1	140	0	70	70	0	bogs and semi-natural grassland; hunting, hovering, over vp2 area	NM
K.110	VP1	14/08/2024	11:39	Kestrel	1	50	30	20	0	0	bogs, highly modified/non-native woodland and improved agricultural grassland; travelling	NM
LB071	VP3	15/08/2024	17:28	Lesser Black-backed Gull	2	80	0	0	80	0	bogs and highly modified/non-native woodland; travelling, disappearing behind saddle hill	NM
H.024	VP3	15/08/2024	17:56	Grey Heron	1	130	0	100	30	0	bogs and highly modified/non-native woodland; travelling, calling	NM
BZ286	VP3	15/08/2024	14:55	Buzzard	1	70	25	45	0	0	bogs, highly modified/non-native woodland and scrub/transitional woodland; departing, travelling	NM
SN156	VP3	15/08/2024	14:56	Snipe	1	20	10	10	0	0	bogs; flushed, calling, flushed by bz flyover, swirling and landing within heather	NM
BZ287	VP3	15/08/2024	18:37	Buzzard	2	1400	0	250	700	450	highly modified/non-native woodland, bogs and scrub; soaring, circling, over br6/7 area, eventually dropping	NM
K.111	VP2	30/08/2024	14:31	Kestrel	1	65	5	30	30	0	bogs and semi-natural grassland; hunting, hovering, dropping abruptly	NM
BZ288	VP2	30/08/2024	15:10	Buzzard	1	70	0	0	40	30	#N/A	NM
K.112	VP2	30/08/2024	15:57	Kestrel	1	40	0	40	0	0	bogs; hovering, soaring	NM
WE002	VP2	30/08/2024	17:10	White-tailed Eagle	1	670	0	0	270	400	bogs and highly modified/non-native woodland; soaring, circling, soaring high, moving southeast. sex not confirmed. shadowed by group of raven	NM
K.113	VP2	30/08/2024	19:33	Kestrel	1	65	20	45	0	0	bogs, improved agricultural grassland and scrub; travelling, male	NM
H.025	VP4	02/08/2024	07:19	Grey Heron	1	65	0	0	65	0	highly modified/non-native woodland, improved agricultural grassland and scrub/transitional woodland; travelling	NM
H.026	VP4	02/08/2024	06:47	Grey Heron	2	35	0	35	0	0	improved agricultural grassland and scrub; travelling, calling, off site	NM

H.027	VP4	02/08/2024	09:02	Grey Heron	1	35	0	0	30	5	highly modified/non-native woodland and improved agricultural grassland; soaring, travelling	NM
LB072	VP4	02/08/2024	07:34	Lesser Black-backed Gull	1	25	0	0	25	0	highly modified/non-native woodland and scrub/transitional woodland; travelling	NM
LB073	VP4	02/08/2024	08:52	Lesser Black-backed Gull	6	50	0	20	30	0	improved agricultural grassland and scrub/transitional woodland; travelling, swooping, off site	NM
BZ289	VP4	02/08/2024	06:56	Buzzard	1	35	0	35	0	0	highly modified/non-native woodland, improved agricultural grassland and scrub/transitional woodland; travelling, calling, perching	NM
BZ290	VP4	02/08/2024	07:17	Buzzard	1	45	10	25	10	0	improved agricultural grassland, highly modified/non-native woodland and scrub; departing, travelling, swooping	NM
BZ291	VP4	02/08/2024	08:43	Buzzard	1	380	0	60	320	0	highly modified/non-native woodland and scrub; soaring, circling	NM
K.114	VP4	19/08/2024	13:04	Kestrel	1	30	25	5	0	0	scrub/transitional woodland, improved agricultural grassland and highly modified/non-native woodland; flushed, travelling, disappearing into forestry fringe	NM
K.115	VP4	19/08/2024	15:09	Kestrel	1	780	0	350	430	0	improved agricultural grassland and semi-natural grassland; hunting, hovering, departing, dropping abruptly numerous times but re-emerging soon after. off site	NM
LB074	VP4	19/08/2024	13:29	Lesser Black-backed Gull	2	60	0	0	60	0	improved agricultural grassland and highly modified/non-native woodland; travelling, across south of site	NM
SN157	VP4	19/08/2024	14:07	Snipe	2	45	5	10	30	0	highly modified/non-native woodland, scrub/transitional woodland and bogs; travelling, alarming, dropping and disappearing	NM
BZ292	VP4	19/08/2024	14:29	Buzzard	1	250	0	80	170	0	highly modified/non-native woodland, improved agricultural grassland and scrub/transitional woodland; travelling, calling, circling, moving southeast and off site	NM
BZ293	VP3	15/08/2024	14:35	Buzzard	1	0	0	0	0	0	highly modified/non-native woodland, bogs and scrub; perched	NM

BZ294	VP4	02/08/2024	06:57	Buzzard	1	0	0	0	0	0	scrub and improved agricultural grassland; perched	NM
GP040	VP3	26/09/2024	09:52	Golden Plover	12	18	0	0	18	0	upland blanket bog; flying	FLM
LB075	VP4	20/09/2024	11:18	Lesser Black-backed Gull	1	50	0	0	50	0	highly modified/non-native woodland, improved agricultural grassland and scrub/transitional woodland; travelling	NM
LB076	VP4	20/09/2024	12:19	Lesser Black-backed Gull	5	70	0	0	40	30	improved agricultural grassland, scrub/transitional woodland and highly modified/non-native woodland; travelling, swooping	NM
HG006	VP4	20/09/2024	10:43	Herring Gull	2	130	0	0	40	90	highly modified/non-native woodland, scrub/transitional woodland and improved agricultural grassland; travelling, moving southwest and off site	NM
K.116	VP4	20/09/2024	10:17	Kestrel	1	220	0	100	120	0	highly modified/non-native woodland, scrub/transitional woodland and improved agricultural grassland; travelling, hunting, dropping abruptly into rough farmland	NM
K.117	VP4	20/09/2024	10:38	Kestrel	1	340	40	160	140	0	improved agricultural grassland and scrub; hunting, hovering, travelling, likely the same indiviual as was seen 10 mins previous	NM
K.118	VP4	20/09/2024	12:26	Kestrel	1	-	-	-	-	-	improved agricultural grassland; perched, preening, within farmland, present when survey ended	NM
SH064	VP2	19/09/2024	10:26	Sparrowhawk	1	120	0	0	120	0	conifer plantation; soaring, female	AOD
BZ295	VP2	19/09/2024	11:15	Buzzard	1	240	0	0	180	60	conifer plantation; soaring	AOD
BZ296	VP2	19/09/2024	07:51	Buzzard	1	-	-	-	-	-	conifer plantation; call	AOD

Table 3.0 Breeding Raptor Surveys

Ref.	BR	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
HH272	BR1	22/04/2024	13:25	Hen Harrier	1	upland blanket bog and conifer plantation, soaring, male	suitable nesting habitat; possible breeder	AOD
HH273	BR1	22/04/2024	13:46	Hen Harrier	1	conifer plantation, displaying, male sky dancing, dropped into wd4 at end	courtship and display; probable breeding	AOD
HH274	BR1	22/04/2024	14:22	Hen Harrier	1	upland blanket bog and conifer plantation, display, male sky dancing	courtship and display; probable breeding	AOD
HH275	BR1	22/04/2024	14:41	Hen Harrier	1	conifer plantation and upland blanket bog, flying, male flying over	suitable nesting habitat; possible breeder	AOD
HH276	BR1	22/04/2024	15:59	Hen Harrier	1	conifer plantation and upland blanket bog, flying, male, mobbed by hc breifly	suitable nesting habitat; possible breeder	AOD
HH277	BR1	05/04/2024	11:25	Hen Harrier	1	conifer plantation, flying over, male near historic nest sites	suitable nesting habitat; possible breeder	AOD
HH278	BR1	05/04/2024	12:21	Hen Harrier	1	upland blanket bog, foraging, male	suitable nesting habitat; possible breeder	AOD
HH279	BR1	05/04/2024	12:30	Hen Harrier	1	conifer plantation, flying over, male	suitable nesting habitat; possible breeder	AOD
HH280	BR1	05/04/2024	13:06	Hen Harrier	2	conifer plantation, display, sky dancing, immature male sky dancing on site followed by an adult male who chased younger bird	courtship and display; probable breeding	AOD
SH068	BR9	05/04/2024	16:45	Sparrowhawk	1	wet grassland, flying over	suitable nesting habitat; possible breeder	AOD
HH281	BR1	19/04/2024	12:47	Hen Harrier	1	conifer plantation, soaring	suitable nesting habitat; possible breeder	AOD
HH282	BR1	19/04/2024	12:55	Hen Harrier	2	conifer plantation, sky dancing, two males flying close together one began sky dancing	courtship and display; probable breeding	AOD

HH283	BR1	19/04/2024	12:57	Hen Harrier	1	conifer plantation, sky dancing, a third adult male began sky dancing away from the other two	courtship and display; probable breeding	AOD
HH284	BR1	19/04/2024	13:09	Hen Harrier	1	conifer plantation and upland blanket bog, sky dancing, same third male dancing up dough mtn and northwards	courtship and display; probable breeding	AOD
HH285	BR1	19/04/2024	13:11	Hen Harrier	1	conifer plantation, wet grassland and upland blanket bog, sky dancing, male sky dancing. three males dancing simultaneously	courtship and display; probable breeding	AOD
HH286	BR1	19/04/2024	13:12	Hen Harrier	1	conifer plantation, flying over, female flying low near historic nest sites	suitable nesting habitat; possible breeder	AOD
HH287	BR1	19/04/2024	13:13	Hen Harrier	1	conifer plantation, flying, male cruising over forestry. now three males visible	suitable nesting habitat; possible breeder	AOD
HH288	BR1	19/04/2024	13:18	Hen Harrier	2	conifer plantation, flying, two males flying close together while third dancing	suitable nesting habitat; possible breeder	AOD
HH289	BR1	19/04/2024	13:18	Hen Harrier	1	conifer plantation, sky dancing, male dancing. three males visible	courtship and display; probable breeding	AOD
HH290	BR1	19/04/2024	13:22	Hen Harrier	2	conifer plantation, courtship flight, male and female flying close interacting near historic nest areas	courtship and display; probable breeding	AOD
HH291	BR1	19/04/2024	13:31	Hen Harrier	1	conifer plantation, flying, another male flying near courting pair	suitable nesting habitat; possible breeder	AOD
HH292	BR1	19/04/2024	13:36	Hen Harrier	2	conifer plantation, soaring, male and female up male perched female soaring up high towards dough mtn alone	suitable nesting habitat; possible breeder	AOD
HH293	BR1	19/04/2024	13:49	Hen Harrier	3	conifer plantation, flying display, three audlt males flying low together around hsitoric nest area flew north chasing each other interacting	courtship and display; probable breeding	AOD
HH294	BR1	19/04/2024	14:00	Hen Harrier	1	conifer plantation, soaring, female	suitable nesting habitat; possible breeder	AOD
HH295	BR1	19/04/2024	14:02	Hen Harrier	2	conifer plantation, display, two males chasing low one began dancing	courtship and display; probable breeding	AOD
SH069	BR1	19/04/2024	14:03	Sparrowhawk	2	conifer plantation and wet grassland, courtship, pair	courtship and display; probable breeding	AOD

BZ156	BR1	19/04/2024	14:03	Buzzard	1	conifer plantation, soaring	suitable nesting habitat; possible breeder	AOD
HH296	BR1	19/04/2024	14:10	Hen Harrier	1	conifer plantation, soaring, sky dancing, male soaring began dancing northwards	courtship and display; probable breeding	AOD
HH297	BR1	19/04/2024	14:12	Hen Harrier	2	conifer plantation, courtship, two males chasing. thirds still visible dancing to north	courtship and display; probable breeding	AOD
HH298	BR1	19/04/2024	14:17	Hen Harrier	1	conifer plantation, soaring, male soaring	suitable nesting habitat; possible breeder	AOD
HH299	BR1	19/04/2024	14:31	Hen Harrier	1	conifer plantation, soaring, male	suitable nesting habitat; possible breeder	AOD
HH300	BR1	19/04/2024	14:39	Hen Harrier	1	wet grassland and upland blanket bog, soaring, male soaring	suitable nesting habitat; possible breeder	AOD
HH301	BR1	19/04/2024	14:39	Hen Harrier	1	conifer plantation, soaring, male soaring two visible	suitable nesting habitat; possible breeder	AOD
HH302	BR1	19/04/2024	14:44	Hen Harrier	1	conifer plantation, sky dancing, male	courtship and display; probable breeding	AOD
HH303	BR4	19/04/2024	15:42	Hen Harrier	1	upland blanket bog, foraging, prey carrying, male hunting caught prey flew off towards historic nest area	courtship and display; probable breeding	AOD
HH304	BR4	19/04/2024	16:02	Hen Harrier	1	upland blanket bog and conifer plantation, flying, sky dancing, likely same male as previous obs up from north began dancing heading south	courtship and display; probable breeding	AOD
HH305	BR4	19/04/2024	16:20	Hen Harrier	1	conifer plantation and upland blanket bog, sky dancing, male dancing over site historic nest site then soaring high to north	courtship and display; probable breeding	AOD
HH306	BR4	19/04/2024	16:38	Hen Harrier	1	upland blanket bog, foraging, female	suitable nesting habitat; possible breeder	AOD
HH307	BR4	19/04/2024	09:43	Hen Harrier	1	upland blanket bog, foraging, male likely following female	suitable nesting habitat; possible breeder	AOD
HH308	BR4	19/04/2024	17:10	Hen Harrier	1	conifer plantation and upland blanket bog, foraging, male	suitable nesting habitat; possible breeder	AOD

HH309	BR4	19/04/2024	17:38	Hen Harrier	1	conifer plantation, flying, male	suitable nesting habitat; possible breeder	AOD
BZ157	BR4	19/04/2024	18:10	Buzzard	1	upland blanket bog, foraging	suitable nesting habitat; possible breeder	AOD
HH310	BR4	22/04/2024	12:20	Hen Harrier	1	conifer plantation, soaring, foraging, sky dancing, male foraging on site then began dancing south	courtship and display; probable breeding	AOD
HH311	BR4	22/04/2024	13:15	Hen Harrier	1	conifer plantation and upland blanket bog, sky dancing, male dancing over historic nest areas on site and off site	courtship and display; probable breeding	AOD
HH312	BR4	22/04/2024	13:12	Hen Harrier	1	conifer plantation, flying, female flew up from forestry near male	suitable nesting habitat; possible breeder	AOD
HH313	BR1	01/05/2024	11:25	Hen Harrier	1	wet grassland, foraging, male foraging	suitable nesting habitat; possible breeder	AOD
HH314	BR1	01/05/2024	11:37	Hen Harrier	1	conifer plantation, fly, male low over trees	suitable nesting habitat; possible breeder	AOD
HH315	BR1	01/05/2024	12:19	Hen Harrier	1	conifer plantation, fly, male low lost in trees	suitable nesting habitat; possible breeder	AOD
HH316	BR1	01/05/2024	13:06	Hen Harrier	1	conifer plantation and wet grassland, flying, foraging, male up from forestry same area lost in previous obs. flew north began foraging up saddle hill	suitable nesting habitat; possible breeder	AOD
HH317	BR1	01/05/2024	13:14	Hen Harrier	1	conifer plantation, soaring, male.likely different bird to previous obs	suitable nesting habitat; possible breeder	AOD
HH318	BR1	01/05/2024	13:17	Hen Harrier	1	conifer plantation and upland blanket bog, fly, male	suitable nesting habitat; possible breeder	AOD
HH319	BR4	17/05/2024	10:20	Hen Harrier	1	conifer plantation, soaring, male	suitable nesting habitat; possible breeder	AOD
HH320	BR4	17/05/2024	11:01	Hen Harrier	1	upland blanket bog, foraging, male	suitable nesting habitat; possible breeder	AOD
HH321	BR4	17/05/2024	11:12	Hen Harrier	1	conifer plantation, soaring, male	suitable nesting habitat; possible breeder	AOD

HH322	BR4	17/05/2024	11:28	Hen Harrier	1	conifer plantation and upland blanket bog, flying, foraging, male flying then forsging. likely different male to previous obs based on location/time	suitable nesting habitat; possible breeder	AOD
HH323	BR4	17/05/2024	12:07	Hen Harrier	1	conifer plantation and upland blanket bog, display, male sky dancing strated on site flew north then back to site began dancing again a flew south	courtship and display; probable breeding	AOD
HH324	BR4	17/05/2024	12:37	Hen Harrier	2	conifer plantation, foodpass, male in with prey met by female up from vegetation femaleback down male flew north circling	adult carrying food/faecal sac; confirmed breeding	AOD
HH325	BR4	17/05/2024	14:48	Hen Harrier	2	conifer plantation, display, sky dancing, male sky dancing, second male appeared from low met first male, first male continued dancing second male lost in forestry	courtship and display; probable breeding	AOD
HH326	BR4	17/05/2024	15:07	Hen Harrier	1	conifer plantation, soaring, male. likely 3rd male today.	suitable nesting habitat; possible breeder	AOD
HH327	BR1	21/05/2024	14:20	Hen Harrier	1	upland blanket bog and conifer plantation, soaring, female circling low near 2023 nest area	suitable nesting habitat; possible breeder	AOD
HH328	BR1	21/05/2024	18:03	Hen Harrier	1	upland blanket bog, flying, female in flight low at 2023 nest area	suitable nesting habitat; possible breeder	AOD
HH329	BR1	21/05/2024	18:24	Hen Harrier	2	upland blanket bog and conifer plantation, foodpass, male in with prey to female, female up from perch returned to perch with prey.male then flew over to 2023 nest area.behaviour indcates nest likely	courtship and display; probable breeding	AOD
HH330	BR1	21/05/2024	19:27	Hen Harrier	2	conifer plantation and upland blanket bog, flying, display, male and female flying low together circling.flight frantic back and forth possible courtship or agitated behaviour	courtship and display; probable breeding	AOD
SH070	BR1	21/05/2024	19:49	Sparrowhawk	1	wet grassland, flying	suitable nesting habitat; possible breeder	AOD
HH331	BR4	22/05/2024	13:58	Hen Harrier	1	conifer plantation and upland blanket bog, sky dancing, foraging, male soaring then dancing began foraging then	courtship and display; probable breeding	AOD
HH332	BR4	22/05/2024	14:03	Hen Harrier	1	conifer plantation and upland blanket bog, sky dancing, male sky dancing	courtship and display; probable breeding	AOD

BZ158	BR4	22/05/2024	14:08	Buzzard	1	conifer plantation and upland blanket bog, soaring	suitable nesting habitat; possible breeder	AOD
BZ159	BR4	22/05/2024	14:08	Buzzard	1	conifer plantation, soaring	suitable nesting habitat; possible breeder	AOD
CA001	BR4	17/05/2024	14:09	Cormorant	1	conifer plantation, travelling	flyover; non-breeding	AOD
HH333	BR4	22/05/2024	14:57	Hen Harrier	1	conifer plantation, soaring, foraging, male flying low circling near suitable nest habitat. Then flew out towards site foraging	suitable nesting habitat; possible breeder	AOD
HH334	BR8	22/05/2024	16:42	Hen Harrier	1	conifer plantation, mobbing, male mobbing bz	agitated behaviour; probable breeding	AOD
HH335	BR8	22/05/2024	17:44	Hen Harrier	1	conifer plantation, flying, male flying low briefly dropped to ground possible nest	suitable nesting habitat; possible breeder	AOD
HH336	BR6	23/05/2024	09:34	Hen Harrier	1	conifer plantation, flying, displaying, male flying low over trees sky dancing briefly	suitable nesting habitat; possible breeder	AOD
HH337	BR6	23/05/2024	09:37	Hen Harrier	1	conifer plantation, displaying, male back out same direction it came in dancing high eastwards	courtship and display; probable breeding	AOD
OP001	BR6	23/05/2024	11:19	Osprey	1	conifer plantation, wet grassland and upland blanket bog, soaring, osprey adult soaring high	flyover; non-breeding	AOD
BZ160	BR7	23/05/2024	14:30	Buzzard	2	conifer plantation and wet grassland, display, pair in display flight	courtship and display; probable breeding	AOD
HH338	BR7	23/05/2024	14:39	Hen Harrier	1	conifer plantation, flying, male flying low over trees	suitable nesting habitat; possible breeder	AOD
HH339	BR7	23/05/2024	15:27	Hen Harrier	1	conifer plantation, soaring, male back the way he came	suitable nesting habitat; possible breeder	AOD
K.025	BR6	23/05/2024	12:08	Kestrel	1	wet grassland and upland blanket bog, foraging	suitable nesting habitat; possible breeder	AOD
HH340	BR1	28/05/2024	13:08	Hen Harrier	1	conifer plantation and wet grassland, soaring, foraging, male soaring up from probable nest site then foraging	suitable nesting habitat; possible breeder	AOD
HH341	BR1	28/05/2024	13:38	Hen Harrier	1	conifer plantation, prey carry, male in with prey to possible nest site, dropped to ground	suitable nesting habitat; possible breeder	AOD

HH342	BR8	30/05/2024	14:33	Hen Harrier	1	conifer plantation, flying, male flying low near possible nest site	suitable nesting habitat; possible breeder	AOD
HH343	BR8	30/05/2024	14:57	Hen Harrier	1	conifer plantation, display, male sky dancing and calling	courtship and display; probable breeding	AOD
HH344	BR8	30/05/2024	15:59	Hen Harrier	1	conifer plantation, display, calling, male calling	courtship and display; probable breeding	AOD
HH345	BR8	30/05/2024	16:14	Hen Harrier	2	conifer plantation, flying, female and male flying low, likely nest nearby. Female circled back male lost	occupied nest; confirmed breeding	AOD
HH346	BR8	30/05/2024	16:26	Hen Harrier	1	conifer plantation, prey carrying, male in with prey dropped to ground came up without prey flew north foraging. Nest location confirmed in young forestry	adult carrying food/faecal sac; confirmed breeding	AOD
HH347	BR8	30/05/2024	16:51	Hen Harrier	1	conifer plantation, flying from nest, female flew up from nest	occupied nest; confirmed breeding	AOD
HH348	BR3	30/05/2024	17:39	Hen Harrier	1	conifer plantation and upland blanket bog, at nest, flying, female flew up from 2023 nest site circled breifly then dropped back	occupied nest; confirmed breeding	AOD
HH349	BR3	30/05/2024	17:55	Hen Harrier	2	conifer plantation and upland blanket bog, foodpass, prey carrying, male in with prey female up from nest foodpass female back down male perched in tree.nest confirmed.	adult carrying food/faecal sac; confirmed breeding	AOD
BZ161	BR7	16/05/2024	14:19	Buzzard	1	conifer plantation, soaring	suitable nesting habitat; possible breeder	AOD
HH350	BR3	30/05/2024	20:15	Hen Harrier	1	conifer plantation, flying, male dropped into nest area	suitable nesting habitat; possible breeder	AOD
HH351	BR1	27/06/2024	15:39	Hen Harrier	1	upland blanket bog, conifer plantation and wet grassland, foraging, female up from nest area foraging near nest then out west	occupied nest; confirmed breeding	AOD
SH071	BR1	27/06/2024	17:11	Sparrowhawk	1	conifer plantation, prey carrying, female with prey	adult carrying food/faecal sac; confirmed breeding	AOD
HH352	BR1	27/06/2024	17:56	Hen Harrier	1	conifer plantation and upland blanket bog, prey carrying, female into nest with prey from north	adult carrying food/faecal sac; confirmed breeding	AOD

HH353	BR2	27/06/2024	18:48	Hen Harrier	1	wet grassland, foraging, male	suitable nesting habitat; possible breeder	AOD
BZ162	BR4	18/06/2024	12:21	Buzzard	1	conifer plantation and upland blanket bog, soaring	suitable nesting habitat; possible breeder	AOD
HH354	BR2	18/06/2024	17:50	Hen Harrier	2	conifer plantation, foodpass, male in with prey to female	adult carrying food/faecal sac; confirmed breeding	AOD
SH072	BR6	26/06/2024	12:00	Sparrowhawk	1	conifer plantation and wet grassland, prey carrying, adult with prey into conifers	adult carrying food/faecal sac; confirmed breeding	AOD
BZ163	BR10	24/06/2024	14:39	Buzzard	1	highly modified/non-native woodland, bogs and improved agricultural grassland, soaring, circling, barrs east, 1.5km off site	suitable nesting habitat; possible breeder	NM
ML004	BR11	24/06/2024	21:24	Merlin	1	bogs and semi-natural grassland, hunting, travelling, br11. female, chasing passerines	suitable nesting habitat; possible breeder	NM
BZ164	BR5	25/06/2024	15:24	Buzzard	2	highly modified/non-native woodland, improved agricultural grassland and scrub/transitional woodland, soaring, circling, raheelin	pair; probable breeding	NM
BZ165	BR5	25/06/2024	17:26	Buzzard	1	highly modified/non-native woodland and scrub/transitional woodland, travelling, calling	suitable nesting habitat; possible breeder	NM
BZ166	BR12	25/06/2024	19:51	Buzzard	2	highly modified/non-native woodland and improved agricultural grassland, soaring, circling, off site, over br 6/7 area	pair; probable breeding	NM
K.026	BR12	25/06/2024	18:47	Kestrel	1	bogs and improved agricultural grassland, hunting, hovering, faughery windfarm	suitable nesting habitat; possible breeder	NM
K.027	BR12	25/06/2024	21:54	Kestrel	1	bogs and highly modified/non-native woodland, travelling, disappearing into woodland adjacent to br6	flyover; non-breeding	NM
K.028	BR12	25/06/2024	19:53	Kestrel	1	bogs, semi-natural grassland and improved agricultural grassland, hunting, hovering, dropping abruptly	suitable nesting habitat; possible breeder	NM
K.029	BR12	25/06/2024	20:11	Kestrel	1	bogs, improved agricultural grassland and scrub/transitional woodland, hunting, hovering, likely the same individual as was seen 15mins previous	suitable nesting habitat; possible breeder	NM
SH073	BR1	30/07/2024	12:57	Sparrowhawk	1	upland blanket bog and conifer plantation, soaring	suitable nesting habitat; possible breeder	AOD

K.030	VP2 / BR4 area	15/07/2024	13:33	Kestrel	1	bogs, hunting, hovering, travelling	suitable nesting habitat; possible breeder	NM
K.031	BRT1	15/07/2024	19:47	Kestrel	1	bogs, scrub and semi-natural grassland, hunting, hovering, and adjacent to vp3 area	suitable nesting habitat; possible breeder	NM
K.032	BRT1 (Lissinagroagh)	15/07/2024	16:29	Kestrel	1	bogs, improved agricultural grassland and scrub, travelling, perched very briefly before continuing	suitable nesting habitat; possible breeder	NM
BZ167	BRT1 (Moneenageer area)	15/07/2024	14:42	Buzzard	3	highly modified/non-native woodland, bogs and scrub, soaring, circling, three individuals - possibly a juvenile present but unable to see due to distance away	pair; probable breeding	NM
BZ168	BRT1 (Lissinagroagh area)	15/07/2024	19:57	Buzzard	2	improved agricultural grassland, highly modified/non-native woodland and scrub, calling, chasing, begging, swooping, adult with juveniles chasing and begging. descending and were lost behind woodland on s boundary (tawnylust)	fledged young; confirmed breeding	NM
BZ169	BRT1 (Glenkeel)	15/07/2024	19:27	Buzzard	1	highly modified/non-native woodland and improved agricultural grassland, soaring, calling, travelling	suitable nesting habitat; possible breeder	NM
BZ170	BRT1	15/07/2024	17:59	Buzzard	1	bogs and highly modified/non-native woodland, travelling low	flyover; non-breeding	NM
ML005	BRT1	15/07/2024	17:54	Merlin	1	bogs, semi-natural grassland and highly modified/non-native woodland, hunting, swooping, travelling, female	suitable nesting habitat; possible breeder	NM
ML006	BRT1	15/07/2024	19:28	Merlin	1	bogs and scrub, hunting, travelling, perching	suitable nesting habitat; possible breeder	NM
ML007	BRT1	15/07/2024	19:33	Merlin	1	scrub and bogs, perched, female, perched on fence post for 25mins before continuing	suitable nesting habitat; possible breeder	NM
ML008	BRT1 (Lissinagroagh area)	15/07/2024	20:04	Merlin	1	bogs, improved agricultural grassland and scrub/transitional woodland, departing, travelling, vanishing into scrubby farmland at bottom of hill	suitable nesting habitat; possible breeder	NM

BZ171	BR10	16/07/2024	16:50	Buzzard	1	highly modified/non-native woodland and improved agricultural grassland, soaring, calling	suitable nesting habitat; possible breeder	NM
BZ172	BR5	16/07/2024	18:31	Buzzard	1	highly modified/non-native woodland and scrub/transitional woodland, travelling, calling, low across forestry	suitable nesting habitat; possible breeder	NM
BZ173	BR5	16/07/2024	18:07	Buzzard	1	highly modified/non-native woodland, calling, not seen. possible juevnile within forestry	fledged young; confirmed breeding	NM
BZ174	BR5	16/07/2024	19:09	Buzzard	1	highly modified/non-native woodland, perched, calling, departing, departing southeast, low across forestry	suitable nesting habitat; possible breeder	NM
BZ175	BR5	16/07/2024	19:56	Buzzard	1	highly modified/non-native woodland, flying, calling, perching, juvenile	fledged young; confirmed breeding	NM
HH355	BR6	18/07/2024	18:21	Hen Harrier	1	bogs and scrub, foraging, travelling, male	suitable nesting habitat; possible breeder	NM
HH356	BR6	18/07/2024	19:45	Hen Harrier	1	bogs and highly modified/non-native woodland, foraging, travelling, male (possibly the same individual), continuing northwest over young forestry before being lost	suitable nesting habitat; possible breeder	NM
K.033	BR12	18/07/2024	10:17	Kestrel	1	bogs, highly modified/non-native woodland and improved agricultural grassland, travelling, disappearing into farmland	flyover; non-breeding	NM
K.034	BR12	18/07/2024	11:04	Kestrel	1	bogs, improved agricultural grassland and semi-natural grassland, hunting, hovering, largely within faughery windfarm. dropping abruptly into heather / scrub	suitable nesting habitat; possible breeder	NM
BZ176	Faughery	18/07/2024	11:43	Buzzard	1	semi-natural grassland, bogs and improved agricultural grassland, travelling low, calling	flyover; non-breeding	NM
BZ177	Tullyskeherny / Lisross	18/07/2024	22:13	Buzzard	1	improved agricultural grassland and linear woodland/scrub, travelling low, calling, travelling low across farmland within glen at dusk	suitable nesting habitat; possible breeder	NM
K.035	BR6	18/07/2024	21:27	Kestrel	1	bogs, semi-natural grassland and scrub, hunting, hovering, dropping abruptly on a few occasions but rising again almost immediately	suitable nesting habitat; possible breeder	NM
SH074	BR6	18/07/2024	18:53	Sparrowhawk	1	scrub, bogs and highly modified/non-native woodland, travelling low, vanishing into forestry	suitable nesting habitat; possible breeder	NM

K.036	BR3	14/08/2024	11:15	Kestrel	1	upland blanket bog, foraging	suitable nesting habitat; possible breeder	AOD
SH075	BR7	16/08/2024	11:55	Sparrowhawk	1	conifer plantation, flying	suitable nesting habitat; possible breeder	AOD
BZ178	BR4	16/08/2024	10:10	Buzzard	1	conifer plantation, soaring	suitable nesting habitat; possible breeder	AOD
K.037	BR4	29/08/2024	12:02	Kestrel	1	upland blanket bog and conifer plantation, foraging	suitable nesting habitat; possible breeder	AOD
SH076	Faughery	16/08/2024	06:12	Sparrowhawk	1	highly modified/non-native woodland, scrub and improved agricultural grassland, perched, flushed, flying, flying low within farmland	suitable nesting habitat; possible breeder	NM
BZ179	BR5	16/08/2024	08:04	Buzzard	1	highly modified/non-native woodland and scrub, flying, circling, dropping, dropping into forestry, met with flurry of begging calls	adult carrying food/faecal sac; confirmed breeding	NM
BZ180	BR5	16/08/2024	08:08	Buzzard	2	highly modified/non-native woodland and scrub, begging calls, at least two juveniles. begging calls when adult arrived with food	fledged young; confirmed breeding	NM
BZ181	BR5	16/08/2024	09:14	Buzzard	1	highly modified/non-native woodland and scrub, flying, calling, juvenile, fluttering within forestry before dropping into canopy	fledged young; confirmed breeding	NM
BZ182	BR5	16/08/2024	07:04	Buzzard	2	highly modified/non-native woodland and scrub, calling, juveniles calling, at least two individuals	fledged young; confirmed breeding	NM
BZ183	BR5	16/08/2024	06:27	Buzzard	1	highly modified/non-native woodland and scrub, gliding, calling, low over forestry	suitable nesting habitat; possible breeder	NM
K.038	Faughery	16/08/2024	09:56	Kestrel	1	bogs and semi-natural grassland, hunting, hovering, travelling, female	suitable nesting habitat; possible breeder	NM
BZ184	BR10	16/08/2024	12:28	Buzzard	1	improved agricultural grassland, scrub/transitional woodland and highly modified/non-native woodland, travelling, calling, circling	suitable nesting habitat; possible breeder	NM
K.039	Faughery	16/08/2024	14:09	Kestrel	1	improved agricultural grassland, bogs and scrub/transitional woodland, hunting, hovering	suitable nesting habitat; possible breeder	NM

K.040	VP2 area	22/08/2024	08:49	Kestrel	1	bogs and semi-natural grassland, hunting, hovering	suitable nesting habitat; possible breeder	NM
BZ185	Faughery	22/08/2024	08:58	Buzzard	1	highly modified/non-native woodland, bogs and improved agricultural grassland, travelling, gliding, travelling across site, moving towards vp4 area before being lost behind terrain	flyover; non-breeding	NM
BZ186	Killea	22/08/2024	09:09	Buzzard	1	highly modified/non-native woodland, improved agricultural grassland and scrub, soaring, hovering	suitable nesting habitat; possible breeder	NM
K.041	BRT1 - Tawnylust	22/08/2024	10:04	Kestrel	1	bogs, semi-natural grassland and scrub/transitional woodland, hunting, hovering	suitable nesting habitat; possible breeder	NM
K.042	BRT1 - Lissinagroagh	22/08/2024	10:19	Kestrel	1	bogs, scrub/transitional woodland and improved agricultural grassland, hunting, hovering, departing, travelling, vanishing into scrubby farmland and forestry edges	suitable nesting habitat; possible breeder	NM
K.043	BRT1 - Killea	22/08/2024	12:56	Kestrel	1	bogs, hunting, hovering	suitable nesting habitat; possible breeder	NM
BZ187	BRT1 - Lissinagroagh	22/08/2024	10:58	Buzzard	1	improved agricultural grassland, scrub and highly modified/non-native woodland, travelling, circling	suitable nesting habitat; possible breeder	NM
BZ188	BRT1 - Lissinagroagh	22/08/2024	11:17	Buzzard	2	scrub/transitional woodland, highly modified/non-native woodland and improved agricultural grassland, soaring, circling, moving southeast and off site	pair; probable breeding	NM
BZ189	BRT1 - Glenkeel	22/08/2024	09:55	Buzzard	1	improved agricultural grassland and highly modified/non-native woodland, travelling, off site	suitable nesting habitat; possible breeder	NM
BZ190	BRT1 - Boleyboy	22/08/2024	15:47	Buzzard	1	improved agricultural grassland, scrub/transitional woodland and highly modified/non-native woodland, travelling, soaring	suitable nesting habitat; possible breeder	NM

BZ191	BRT1 - Tullyskeherny / Lattone	22/08/2024	13:21	Buzzard	2	highly modified/non-native woodland, bogs and scrub/transitional woodland, soaring, circling, high, off site	pair; probable breeding	NM
BZ192	Cashelaveela	22/08/2024	16:03	Buzzard	1	improved agricultural grassland and scrub, travelling, gliding	suitable nesting habitat; possible breeder	NM
BZ193	BR12	23/08/2024	12:19	Buzzard	1	highly modified/non-native woodland, scrub/transitional woodland and improved agricultural grassland, soaring, circling, travelling, soaring over vp4 area and southwest of site, moving southeast	flyover; non-breeding	NM
BZ194	BR12	23/08/2024	11:39	Buzzard	1	highly modified/non-native woodland, bogs and improved agricultural grassland, soaring, circling, br7 area	suitable nesting habitat; possible breeder	NM
BZ195	BR12	23/08/2024	14:07	Buzzard	1	improved agricultural grassland and linear woodland/scrub, travelling, low within glen	flyover; non-breeding	NM
K.044	Faughery	23/08/2024	15:05	Kestrel	1	bogs and improved agricultural grassland, hunting, hovering	suitable nesting habitat; possible breeder	NM
BZ196	Tullyskeherny	23/08/2024	15:49	Buzzard	1	highly modified/non-native woodland and scrub, travelling, gliding	suitable nesting habitat; possible breeder	NM
K.045	BR6	23/08/2024	18:49	Kestrel	1	bogs and highly modified/non-native woodland, hunting, hovering, departing	suitable nesting habitat; possible breeder	NM
K.046	Lisdarush / Coolodonnell	23/08/2024	19:40	Kestrel	1	bogs, semi-natural grassland and improved agricultural grassland, hunting, hovering, travelling	suitable nesting habitat; possible breeder	NM

Table 4.0 Foraging VP Surveys

Ref.	BR	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
HH100	FVP1	20/06/2024	11:32	Hen Harrier	1	upland blanket bog, flying, female low at nest	suitable nesting habitat; possible breeder	AOD
HH101	FVP1	20/06/2024	11:52	Hen Harrier	2	conifer plantation, upland blanket bog and, food pass, male in with prey met female. Male then perched then flew off east	adult carrying food/faecal sac; confirmed breeding	AOD
HH102	FVP1	20/06/2024	12:53	Hen Harrier	1	upland blanket bog, conifer plantation and , foraging, female foraging near nest	suitable nesting habitat; possible breeder	AOD
HH103	FVP1	20/06/2024	13:10	Hen Harrier	2	conifer plantation, foodpass, male in from north with prey foodpass with female over nest.female dropped to nest male to perch		AOD
HH104	FVP2	20/06/2024	17:18	Hen Harrier	1	conifer plantation, flying, male near nest	suitable nesting habitat; possible breeder	AOD
HH105	FVP4	07/06/2024	12:05	Hen Harrier	1	upland blanket bog, conifer plantation and , foraging prey carry, male foraging then carrying prey to nest area	adult carrying food/faecal sac; confirmed breeding	AOD
HH106	FVP2	07/06/2024	15:32	Hen Harrier	1	conifer plantation, prey carrying, male in with prey dropped to nest area	adult carrying food/faecal sac; confirmed breeding	AOD
HH107	FVP2	07/06/2024	16:20	Hen Harrier	1	wet grassland, foraging, male foraging over farmland	suitable nesting habitat; possible breeder	AOD
HH108	FVP2	07/06/2024	17:01	Hen Harrier	1	conifer plantation, upland blanket bog and wet grassland, foraging, male foraging caught prey flew to nest area	adult carrying food/faecal sac; confirmed breeding	AOD
HH109	FVP4	12/06/2024	17:46	Hen Harrier	1	upland blanket bog, foraging, male	suitable nesting habitat; possible breeder	AOD
HH110	FVP2	12/07/2024	12:24	Hen Harrier	1	wet grassland, upland blanket bog and , foraging, male foraging	suitable nesting habitat; possible breeder	AOD

Table 5.0 Incidental Observations

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
BZ028	Vantage Point Survey; VP2 approach	02/04/2024	14:29	Buzzard	2	improved agricultural grassland, scrub and linear woodland/scrub; calling, travelling	NM
SN078	Vantage Point Survey; VP2	02/04/2024	21:16	Snipe	2	bogs; flushed	NM
SN079	Vantage Point Survey; VP1	04/04/2024	21:17	Snipe	3	bogs and semi-natural grassland; flushed, alarming	NM
LB055	Breeding Raptor Survey; Faughry	05/04/2024	12:52	Lesser Black-backed Gull	2	conifer plantation; flying over, adults	AOD
GP004	Breeding Raptor Survey; dough mtn	19/04/2024	15:41	Golden Plover	80	upland blanket bog; flying	AOD
SN080	Vantage Point Survey; VP4 approach	29/04/2024	15:14	Snipe	2	improved agricultural grassland and semi-natural grassland; flushed	NM
SN081	Vantage Point Survey; VP4	29/04/2024	22:06	Snipe	1	semi-natural grassland and highly modified/non-native woodland; flushed, alarming	NM
SN082	Vantage Point Survey; VP4 area, numbers were estimates	29/04/2024	22:09	Snipe	3	improved agricultural grassland and semi-natural grassland; drumming, chasing	NM
SN083	Vantage Point Survey; VP4 retreat	29/04/2024	22:19	Snipe	1	improved agricultural grassland and semi-natural grassland; drumming	NM
LB056	Breeding Raptor Survey; Faughry	01/05/2024	11:29	Lesser Black-backed Gull	6	wet grassland; fly	AOD
RG020	Breeding Raptor Survey; Dough mtn/ killea	01/05/2024	16:05	Red Grouse	1	upland blanket bog; call	AOD
HH020	Breeding Raptor Survey; Faughry	22/05/2024	15:17	Hen Harrier	1	#N/A	AOD
LB057	Breeding Raptor Survey; Raheelin	22/05/2024	18:46	Lesser Black-backed Gull	1	conifer plantation; fly, adult	AOD
LB058	Breeding Raptor Survey; Faughry	28/05/2024	13:50	Lesser Black-backed Gull	4	wet grassland and conifer plantation; flying, adults	AOD
SN084	Vantage Point Survey; VP3	15/05/2024	11:03	Snipe	2	bogs; flushed, alarming	NM
SN085	Vantage Point Survey; VP1	31/05/2024	04:02	Snipe	1	bogs and semi-natural grassland; flushed	NM
SN086	Vantage Point Survey; VP1	31/05/2024	04:04	Snipe	2	bogs and semi-natural grassland; flushed	NM
SN087	Vantage Point Survey; VP1	31/05/2024	10:39	Snipe	1	bogs and semi-natural grassland; flushed	NM
SN088	Vantage Point Survey; VP4 approach	07/05/2024	04:40	Snipe	1	improved agricultural grassland and semi-natural grassland; drumming	NM

LE003	Breeding Raptor Survey; Raheelin	20/06/2024	17:34	Long-eared Owl	1	conifer plantation; alarm call, parent alarm confirmed nest area.nest not visible	AOD
LB059	Breeding Raptor Survey; Raheelin	20/06/2024	15:37	Lesser Black-backed Gull	1	conifer plantation; flying, adult	AOD
RG021	Breeding Raptor Survey; Killea	20/06/2024	19:25	Red Grouse	1	upland blanket bog; call	AOD
LE004	Breeding Raptor Survey; Faughery	28/06/2024	14:00	Long-eared Owl	1	conifer plantation; begging call, young calling unseen, nest in area	AOD
SN089	Breeding Raptor Survey; Dough mtn	28/06/2024	15:17	Snipe	2	upland blanket bog; fly/displaying, both snipe displaying in flight	AOD
LB060	Breeding Raptor Survey; Tawnyfeacle	04/07/2024	09:54	Lesser Black-backed Gull	6	conifer plantation; flying, adults	AOD
SH021	Breeding Raptor Survey; Tawnyfeacle	04/07/2024	09:55	Sparrowhawk	1	conifer plantation; foraging	AOD
SH022	Breeding Raptor Survey; faughery	04/07/2024	10:55	Sparrowhawk	1	conifer plantation; soaring	AOD
SH023	Breeding Raptor Survey; Tawnyfeacle	04/07/2024	11:12	Sparrowhawk	3	conifer plantation; prey carrying, male and female carrying prey and then two birds flying together	AOD
LB061	Breeding Raptor Survey; Raheelin	04/07/2024	15:09	Lesser Black-backed Gull	4	conifer plantation; flying	AOD
SH024	Breeding Raptor Survey; Raheelin	04/07/2024	15:10	Sparrowhawk	1	conifer plantation; flying	AOD
SN090	Breeding Raptor Survey; Killea	05/07/2024	11:18	Snipe	1	upland blanket bog; flying	AOD
LB062	Breeding Raptor Survey; Saddle hill	07/06/2024	14:16	Lesser Black-backed Gull	2	conifer plantation; flying over, adults	AOD
RG022	Breeding Raptor Survey; Dough Mtn.	18/06/2024	11:50	Red Grouse	1	upland blanket bog; on ground, female slow to move on likely had chicks unseen	AOD
SN091	Breeding Raptor Survey; Killea	05/07/2024	09:35	Snipe	1	upland blanket bog; flying	AOD
RG023	Breeding Raptor Survey; Saddle Hill	05/07/2024	10:32	Red Grouse	1	upland blanket bog; call	AOD
SN092	Breeding Raptor Survey; BR11	24/06/2024	19:40	Snipe	3	bogs; chirping	NM
SN093	Breeding Raptor Survey; BR11	24/06/2024	19:58	Snipe	1	bogs and semi-natural grassland; drumming, swooping	NM
SN094	Breeding Raptor Survey; BR11	24/06/2024	20:02	Snipe	2	bogs; flushed, alarming	NM
RG024	Breeding Raptor Survey; BR11	24/06/2024	21:54	Red Grouse	2	bogs; flushed, calling, landing, flushed by fox	NM
H.007	Breeding Raptor Survey; BR5	25/06/2024	16:58	Grey Heron	1	highly modified/non-native woodland, improved agricultural grassland and bogs; travelling	NM

H.008	Breeding Raptor Survey; BR12	25/06/2024	18:54	Grey Heron	1	improved agricultural grassland and highly modified/non-native woodland; travelling, traversing south area of site	NM
H.009	Breeding Raptor Survey; BR12	25/06/2024	20:03	Grey Heron	2	improved agricultural grassland; travelling low, calling	NM
LB063	Breeding Raptor Survey; BR12	25/06/2024	19:17	Lesser Black-backed Gull	5	improved agricultural grassland, highly modified/non-native woodland and bogs; travelling, travelling along north buffer	NM
SN095	Breeding Raptor Survey; Faughery windfarm	25/06/2024	18:09	Snipe	2	bogs; flushed, alarming	NM
SH025	Vantage Point Survey; VP4 approach (Skreeny)	06/06/2024	13:23	Sparrowhawk	1	improved agricultural grassland and linear woodland/scrub; hunting, perching	NM
LB064	Breeding Raptor Survey; Tawnyfeacle	16/07/2024	09:23	Lesser Black-backed Gull	2	conifer plantation; flying, adults	AOD
K.005	Breeding Raptor Survey; Tawnyfeacle	16/07/2024	11:40	Kestrel	1	upland blanket bog; foraging	AOD
SH026	Breeding Raptor Survey; Tawnyfeacle	16/07/2024	11:47	Sparrowhawk	1	wet grassland; flying, female	AOD
LB065	Breeding Raptor Survey; Raheelin	16/07/2024	12:39	Lesser Black-backed Gull	2	conifer plantation; flying	AOD
LB066	Breeding Raptor Survey; Curraghfore	18/07/2024	16:22	Lesser Black-backed Gull	3	wet grassland and improved agricultural grassland; flying	AOD
H.010	Breeding Raptor Survey; Glenkeel (BRT1)	15/07/2024	19:24	Grey Heron	2	improved agricultural grassland and highly modified/non-native woodland; travelling, calling	NM
LB067	Breeding Raptor Survey; BR10	16/07/2024	14:36	Lesser Black-backed Gull	2	highly modified/non-native woodland, improved agricultural grassland and scrub; travelling	NM
SN096	Breeding Raptor Survey; BR12	18/07/2024	07:44	Snipe	2	bogs, semi-natural grassland and improved agricultural grassland; flushed, alarming	NM
LB068	Breeding Raptor Survey; BR12	18/07/2024	08:16	Lesser Black-backed Gull	2	highly modified/non-native woodland, improved agricultural grassland and bogs; travelling	NM
LB069	Breeding Raptor Survey; BR12	18/07/2024	08:21	Lesser Black-backed Gull	1	highly modified/non-native woodland, bogs and improved agricultural grassland; travelling	NM
LB070	Breeding Raptor Survey; BR12	18/07/2024	08:39	Lesser Black-backed Gull	7	highly modified/non-native woodland, improved agricultural grassland and bogs; travelling, swooping	NM
LB071	Breeding Raptor Survey; BR12	18/07/2024	10:57	Lesser Black-backed Gull	2	highly modified/non-native woodland and improved agricultural grassland; travelling	NM
LB072	Breeding Raptor Survey; BR6	18/07/2024	18:23	Lesser Black-backed Gull	1	highly modified/non-native woodland and scrub/transitional woodland; travelling	NM
SN097	Breeding Raptor Survey; BR6	18/07/2024	18:30	Snipe	5	bogs and semi-natural grassland; chirping, calling within br area frequently throughout, numbers were an estimate	NM
SN098	Breeding Raptor Survey; BR6	18/07/2024	19:47	Snipe	1	bogs, highly modified/non-native woodland and scrub; flying, calling	NM
SN099	Breeding Raptor Survey; BR6	18/07/2024	18:49	Snipe	2	bogs; travelling, swooping, landing, landing within moorland	NM

SN100	Breeding Raptor Survey; BR6	18/07/2024	21:31	Snipe	2	bogs, semi-natural grassland and scrub; flushed	NM
SN101	Vantage Point Survey; VP2 retreat	03/07/2024	19:13	Snipe	2	bogs; flushed, alarming	NM
SN102	Vantage Point Survey; VP3 approach	05/07/2024	15:07	Snipe	2	bogs; flushed	NM
SN103	Vantage Point Survey; VP3 retreat	05/07/2024	21:53	Snipe	3	bogs; flushed, alarming, dropping into moorland not far away	NM
SN104	Vantage Point Survey; VP3 retreat	05/07/2024	22:03	Snipe	1	bogs; flushed	NM
SN105	Vantage Point Survey; VP3 retreat	05/07/2024	21:52	Snipe	5	bogs; drumming, swirling, swooping, chasing, scattered within heather moorland, numbers were rough. separate territories	NM
SN106	Vantage Point Survey; VP4 approach	10/07/2024	09:45	Snipe	2	improved agricultural grassland; flushed	NM
SN107	Vantage Point Survey; VP4 approach	10/07/2024	09:48	Snipe	1	improved agricultural grassland and highly modified/non-native woodland; flushed	NM
SN108	Vantage Point Survey; Skreeny	10/07/2024	16:51	Snipe	2	improved agricultural grassland and linear woodland/scrub; travelling, alarming	NM
H.011	Vantage Point Survey; Skreeny	10/07/2024	16:44	Grey Heron	1	improved agricultural grassland and linear woodland/scrub; travelling	NM
LB073	Breeding Raptor Survey; Curraghfore	14/08/2024	10:29	Lesser Black-backed Gull	5	improved agricultural grassland; flying, adults and juveniles	AOD
LB074	Breeding Raptor Survey; Curraghfore	14/08/2024	10:31	Lesser Black-backed Gull	4	improved agricultural grassland; flying, juveniles	AOD
LB075	Breeding Raptor Survey; Raheelin	14/08/2024	15:46	Lesser Black-backed Gull	3	conifer plantation; flying	AOD
LB076	Breeding Raptor Survey; BR10 (Lissinagroagh / Tawnylust)	16/08/2024	11:18	Lesser Black-backed Gull	1	bogs and highly modified/non-native woodland; travelling	NM
K.006	Vantage Point Survey; Lissinagroagh	30/08/2024	16:51	Kestrel	1	bogs and highly modified/non-native woodland; hunting, hovering, departing	NM
RG025	Vantage Point Survey; Killea	30/08/2024	20:54	Red Grouse	1	bogs; calling, only heard, dusk	NM
SN109	Vantage Point Survey; VP4 approach	19/08/2024	12:51	Snipe	1	improved agricultural grassland and linear woodland/scrub; travelling, alarming	NM
SN110	Vantage Point Survey; VP4 retreat	19/08/2024	16:07	Snipe	2	improved agricultural grassland and semi-natural grassland; flushed, alarming, rushy pasture	NM
SN111	Breeding Raptor Survey; BRT1	22/08/2024	09:16	Snipe	1	bogs; flushed, alarming	NM

LB077	Breeding Raptor Survey; BRT1	22/08/2024	09:56	Lesser Black-backed Gull	7	bogs, highly modified/non-native woodland and improved agricultural grassland; travelling, swooping, across site	NM
LB078	Breeding Raptor Survey; Glenkeel	22/08/2024	11:06	Lesser Black-backed Gull	2	improved agricultural grassland and highly modified/non-native woodland; travelling, along valley	NM
LB079	Breeding Raptor Survey; Off site	22/08/2024	15:21	Lesser Black-backed Gull	1	improved agricultural grassland; travelling	NM
SN112	Breeding Raptor Survey; BRT1	22/08/2024	10:16	Snipe	2	bogs; flushed, alarming, dropping into heather moorland near vp3	NM
SN113	Breeding Raptor Survey; BRT1	22/08/2024	14:01	Snipe	1	bogs and highly modified/non-native woodland; flushed, alarming	NM
H.012	Breeding Raptor Survey; Faughery	23/08/2024	10:54	Grey Heron	1	improved agricultural grassland, highly modified/non-native woodland and scrub; travelling	NM
H.013	Breeding Raptor Survey; BR12	23/08/2024	12:39	Grey Heron	1	bogs and highly modified/non-native woodland; travelling, soaring high, soaring high over br6 / 9 area	NM
H.014	Breeding Raptor Survey; BR12	23/08/2024	14:04	Grey Heron	1	improved agricultural grassland; travelling, within glen	NM
SN114	Breeding Raptor Survey; Faughery wind farm	23/08/2024	14:50	Snipe	1	bogs and improved agricultural grassland; flushed, alarming	NM
LB080	Breeding Raptor Survey; BR6	23/08/2024	19:16	Lesser Black-backed Gull	5	highly modified/non-native woodland and bogs; travelling, high over killea / vp3 area	NM
LB081	Breeding Raptor Survey; BR6	23/08/2024	16:19	Lesser Black-backed Gull	1	bogs and highly modified/non-native woodland; travelling, lost behind terrain	NM
LB082	Breeding Raptor Survey; BR6	23/08/2024	16:26	Lesser Black-backed Gull	7	bogs and highly modified/non-native woodland; travelling, swooping, moving north across br 8 / 9 areas	NM
BZ029	Vantage Point Survey; Skreeny	20/09/2024	12:47	Buzzard	1	improved agricultural grassland, linear woodland/scrub and scrub/transitional woodland; travelling, low within farmland	NM

APPENDIX 3

CONFIDENTIAL APPENDIX

Appendix 6-9

Bird Survey Report Breeding 2025

Planning and Environmental Consultants

Breeding Bird Survey Report 2025

Lissinagroagh Wind Farm, Co. Leitrim

DOCUMENT DETAILS

Client:	**FuturEnergy Ireland**
Project Title:	**Lissinagroagh Wind Farm, Co. Leitrim**
Project Number:	**200217-j**
Document Title:	**Breeding Bird Survey Report 2025**
Document File Name:	**Lissinagroagh Breeding Bird Surveys 2025 – F1 - 2025.12.11 - 200217-j**
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Planning and Environmental Consultants

Rev	Status	Date	Author	Approved By
01	Final	11/12/25	AO'D	SD

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1. SUMMARY

Ornithological surveys have been undertaken at the site of Lissinagroagh Wind Farm, Manorhamilton, Co. Leitrim, since 2018. This report outlines the findings from surveys completed during the 2025 breeding season. The following surveys were undertaken:

- Vantage Point Surveys (VPs)
- Breeding Raptor Surveys

The key observations during surveys relate to breeding hen harrier. Hen harrier was recorded frequently, with multiple birds present on site. While a pair were present in an historically utilised territory, breeding was not confirmed in any areas.

2. INTRODUCTION

MKO was appointed to carry out ornithological surveys at Lissinagroagh Wind Farm, Manorhamilton, Co. Leitrim (hereafter 'the site'), for the 2025 breeding season. This report describes the survey methods and findings for the period April 2025 to September 2025 inclusive.

2.1 Site Description

The site is located north of Manorhamilton (Grid Ref: X 591484.00 Y 842226.00). The dominant habitat on site is forestry, upland blanket bog and rough grassland. The wider surroundings are predominantly upland blanket bog, rough grassland, forestry, and improved agricultural grassland.

2.2 Details of Proposed Development

Appendix 1 Figure 1.0 shows the wind farm site boundary, based on the most up to date 16 turbine layout at the time of preparing this report.

2.3 Purpose of this Report

This report describes the ornithological survey methods employed, and survey data collected at Lissinagroagh Wind Farm for the period April 2025 to September 2025 inclusive. It does not include an assessment or discussion of the potential impacts of the proposed development on birds. Instead, this report aims to provide robust baseline ornithological survey data for the breeding period. This data will be used to inform a separate ecological impact assessment and appropriate assessment for the proposed wind farm.

2.4 Relevant Legislation

The following key legislative provisions are applicable to wild birds in Ireland: Irish Wildlife Acts 1976 to 2022.; the European Union Birds Directive (EU Directive 2009/147/EC on the conservation of wild birds); the European Communities (Birds and Natural Habitats) Regulations 2011, as amended (S.I. no. 477 of 2011) and the International Convention on Wetlands of International Importance (the Ramsar Convention), 1971.

3. METHODS

3.1 Scope

3.1.1 Description of Study Area

The ornithology study area was defined as a 500m radius of the viable area for turbines (see Figure 1.0). This boundary accounts for both detecting birds that use the wind farm site occasionally and spatial inaccuracies in observational data, as well as ancillary structures. The ornithology study area was used for vantage point surveys, following Scottish Natural Heritage (SNH; now NatureScot) 2017 guidance (SNH, 2017) that flight activity surveys encompass an area extending 500m beyond the potential outermost proposed turbines. A 5km radius of the ornithology study area boundary was used for breeding raptor surveys, based on the core foraging range of hen harrier, which this area is known to support.

3.1.2 Ecological Features Considered

Ecological features considered in the scope of the surveys were the habitats present on the site and hinterland, as reviewed by aerial photography and reconnaissance visits, and the Special Protection Areas (SPA) designated under the Birds and Habitats (92/43/EEC) Directives Natura 2000 network within foraging range for Special Conservation Interest (SCI) species and/or 15km of the site. Bird species of conservation interest were also considered, including those listed on Annex I of the Birds Directive that occur in Ireland, species that are a SCI of SPAs within foraging range for SCI species and/or 15km of the site, species on the Red List of Birds of Conservation Concern in Ireland (Gilbert *et al.*, 2021) and all raptor species that occur in Ireland, because these species are particularly sensitive to wind farm developments.

3.1.3 Consultation

MKO undertook a consultation exercise to inform the scope of the surveys. Table 3-1 provides a list of the organisations consulted and notes where responses have been received.

Table 3-1 Consultation Response Summary

No.	Consultee	Response to Consultation
1	Birdwatch Ireland	No response at the time of writing
2	National Parks and Wildlife Service (NPWS)	Initial response received 18/06/2018. Confirmation received 30/12/2019 from NPWS that no more recent information was available.

3.2 Desk Study

A comprehensive desk study was undertaken in 2019, and updated during the preparation of this report, to search for any relevant information on species of conservation concern which potentially use the site. The assessment included a thorough review of the available ornithological data including:

- Review of sites designated for birds.
- Review of breeding bird atlases (Balmer *et al.*, 2013).
- Review of Birds of Conservation Concern (BoCCI) in Ireland 2020-2026 (Gilbert *et al.* 2021).
- Review of specially requested records from the NPWS Rare and Protected Species Database. An information request was sent to the NPWS requesting records from the Rare and Protected Species Database.
- Review of the 2022 National Survey of Breeding Hen Harrier in Ireland Report (Ruddock *et al.*, 2025).

3.3 Field Surveys

The approach to breeding bird surveys for the proposed wind farm is based on recommendations outlined in SNH (2017). This guidance is recognised as standard good practice guidance throughout the UK and Ireland for surveying birds to inform impact assessment for onshore wind farms. Field surveys were undertaken from April 2025 to September 2025 inclusive. Individual survey types are described below.

3.3.1 Flight Activity Surveys

Vantage point surveys were undertaken following the guidance of SNH (2017) from four vantage point locations during the 2025 breeding season. Vantage point surveys aim to quantify the flight activity of primary and secondary 'target species' within the study area. The main purpose of vantage point surveys is to collect data on primary target species that will enable estimates to be made of:

- The time spent flying over the site.
- The relative use by birds of different parts of the site.
- The proportion of flying time spent within the provisional upper and lower risk height limits as determined by the potential rotor diameter and rotor hub height.
- The analysis of the potential risk of collision of birds with rotating turbines.

Vantage Point Locations and Viewshed Analysis

Viewshed analysis was carried out to confirm the sufficiency of the chosen vantage point locations (VP1 at ITM X592930 Y842236, VP2 at ITM X592615 Y842428, VP3 at ITM X593496 Y843692 and VP4 at ITM X 590407 Y 840997). The initial viewshed analysis was conducted in 2018 and reviewed in 2020. Viewsheds were calculated using Resoft Wind Farm ZTV (Zone of Theoretical Visibility) software in combination with MapInfo Professional (Version 10.0) using a notional layer suspended at 25m, which is representative of the minimum height considered for the Potential Collision Risk Area based on the turbine model at the time the vantage point locations were selected. Note that while the relevance of being able to view as much of the site to ground level is acknowledged, the SNH guidance emphasises the importance of visibility of the 'collision risk volume' when the data is to be used to estimate the risk of collision with turbines by birds. Therefore, the viewshed analysis aims to identify the most suitable locations to site vantage points such that the airspace of the turbine rotor swept area is in view using the fewest possible number of vantage points. The vantage point locations were tested for visibility coverage by creating a viewshed point 1.75m in height (to represent the height of observer) on a map using 10m contours terrain data. The relative height of any surrounding trees and its effects on visibility is also accounted for in the analysis. Using the ZTV software, a viewshed of 360° was produced calculating an area 25m from ground level up to a 2km radius. The resulting viewshed image was then cropped to 180° to give the viewshed.

Survey Effort

A total of 36 hours of watches was undertaken at each of the four vantage point locations from April to September 2025 inclusive. This equates to a total of six hours per vantage point per month. Survey effort undertaken during the 2025 breeding season is summarised in Table 3-2 and full details are presented in Appendix 2 of this report, including dates, times, duration, and weather conditions. A map of the vantage point locations is provided in Appendix 1 Figure 1.1.

Table 3.2 Summary of vantage point survey effort undertaken at the proposed Lissinagroagh Wind Farm from April 2025 to September 2025.

	VP1 ITM [1] X 592930 Y 842236	VP2 ITM X 592615 Y 842428	VP3 ITM X 593496 Y 843692	VP4 ITM X 590407 Y 840997
Month	**Hours**			
April	11/4/25 6 hours	10/4/25 6 hours	8/4/25 6 hours	9/4/25 6 hours
May	26/5/25 6 hours	28/5/25 6 hours	9/5/25 6 hours	8/5/25 6 hours
June	25/6/25 6 hours	20/6/25 6 hours	19/6/25 6 hours	28/6/25 6 hours
July	15/7/25 6 hours	23/7/25 6 hours	22/7/25 6 hours	27/7/25 6 hours
August	8/8/25 6 hours	9/8/25 6 hours	10/8/25 6 hours	11/8/25 6 hours
September	29/9/25 6 hours	16/9/25 3 hours 17/9/25 3 hours	26/9/25 6 hours	25/9/25 4 hours 29/9/25 2 hours
Total Hours	**36**	**36**	**36**	**36**

Primary Target Species

The target species for vantage point surveys were defined by legal and/or conservation status, following SNH (2017) guidance, which states that "*in most circumstances the target species will be limited to those species which are afforded a higher level of legislative protection.*" A list of primary target species was draw from the following sources:

- Species that are SCIs of the SPAs within 15km of the site.
- Species listed on Annex I of the Birds Directive that occur in Ireland.
- Species listed on the Red List of Birds of Conservation Concern in Ireland (Gilbert *et al.*, 2021) with the exception of Red List passerines, as these are generally not significantly impacted by wind energy developments.

Secondary Target Species

SNH (2017) also states that "*local circumstances may indicate that survey information should also be acquired on other species, especially those of regional conservation concern*". A list of secondary target species comprised:

- All raptors that occur in Ireland that are not included as primary target species.

Data Collection

Data on bird observations and flight activity was collected by the surveyor by scanning the arc of 180° and a 2km radius from the fixed location. Surveys were scheduled to provide a spread over the full daylight period including at dawn and dusk (starting or ending an hour before dawn or an hour after dusk on alternate months for April, May, August, and September) to coincide with the highest peaks of bird activity and to record any wildfowl migration or crepuscular species. Breaks of at least 30 minutes were taken every 3 hours to minimise observer fatigue. A 10-minute settling in period was allowed for at the start of each vantage point to allow the surveyor to get into place, and to minimise the impact of surveyor disturbance on flight activity. For each primary target species observation, the following details were recorded:

- Date, time, and location of observation.
- Number of species recorded.
- Total duration of flightline observation.

[1] Irish Transverse Mercator Co-Ordinates

- Duration at each of flightline at each height band.
- Species age and sex (where determinable).
- Habitat(s).
- Behaviour.

Recording height bands were determined based on the likely turbine specifications under consideration at the time of survey (upper tip height 175m and lower tip height 25m). Flight heights were attributed to four distinct height bands as follows:

- Band 1 = 0 - 15m (below the likely rotor swept area).
- Band 2 = 15 - 25m (potentially within the likely rotor swept area, at least in part).
- Band 3 = 25 - 175m (within the likely rotor swept area, potential collision height, PCH).
- Band 4 = >175m (above the likely rotor swept area).

Although recording of secondary species is subsidiary to recording of primary target species, secondary target species were also recorded to provide an index of flight activity for secondary target species within the site.

3.3.2 Breeding Raptor Surveys

Breeding raptor (i.e. birds of prey) surveys were undertaken to identify occupied raptor territories and ascertain whether breeding was successful. Surveys were carried out during the breeding season period from April to September 2025, with a particular focus on breeding hen harrier.

Methodology followed Hardey *et al.* (2013). Surveys involved a combination of raptor vantage point watches of 3 hours and transects in areas deemed most likely to hold breeding raptors based on habitat and observed movements of raptor species in the study area. There were 13 breeding raptor survey locations. If breeding activity was observed, vantage point and transect locations were adjusted with the aim of pinpointing breeding locations. Each breeding raptor survey location was visited four times to complete a full round of breeding season surveys. The purpose of the four visits is (1) to establish occupancy, (2) to establish active nests, (2) to check for chicks and (4) to check for fledglings. Timings of these visits vary by species as set out in Hardey *et al.* (2013). Survey effort is provided in Appendix 2 of this report, including dates, times, duration and weather conditions. A map of the breeding raptor survey locations is presented in Appendix 1 Figure 2.0.

3.4 Project Team

This report has been prepared by Andrew O'Donoghue (B.Sc.), Project Ornithologist and reviewed by Susan Doyle (PhD), Senior Ornithologist with MKO. Both are suitably qualified ornithologists with experience in completing avifaunal assessments and competent experts for the purposes of the preparation of this report, following SNH (2017) and CIEEM (2017) ecological reporting guidelines.

3.4.1 Field Survey Team

The field surveys were undertaken in the 2025 breeding season by Andrew O'Donoghue, Niall McHugh (B.Sc.), Cillian Murphy (Pg.D), Niamh Scanlon (B.Sc.), Kate Bismilla (B.Sc.) and Robert Vaughan (HND). Surveyors are all suitably qualified competent experts in field ornithology. All have experience in bird survey methods including vantage point, breeding raptor and breeding walkover surveys.

3.5 Survey Limitations

A suite of bird surveys was undertaken at the site between April and September 2025, as detailed in this report. There were no significant gaps in viewsheds during vantage point surveys. It was possible to schedule surveys to avoid potential human disturbances (e.g., forestry operations, agriculture, peat extraction, recreational activity). Surveys were not carried out in unsuitable weather conditions where visibility or bird

activity would be impacted. On occasions where weather turned unsuitable or dangerous after the survey had begun, surveys were postponed. Results from the 2025 breeding season are derived from a continuous six months of surveying undertaken following best practice guidance (NatureScot, 2017). The survey duration and scope are considered entirely satisfactory.

4. RESULTS

4.1 Desk Study

4.1.1 Sites Designated for Nature Conservation

Using GIS software, sites designated for nature conservation within the potential zone of influence of the proposed wind farm development were identified. In the absence of any specific European or Irish guidance, SNH (2017) was consulted. This document provides guidance in relation to the identification of connectivity between proposed development proposals and SPAs. It takes into consideration the distances some species may travel beyond the boundary of their SPAs and outlines information on dispersal and foraging ranges of certain bird species. In addition, taking a precautionary approach, sites within a 15km radius of the proposed wind farm were identified. Sites designated for birds are listed below in Table 4-1.

Table 4-1 Designated sites within 15km of the site

Designated site and code	Distance from proposed works (km)
Special Protection Areas (SPA)	
Sligo/Leitrim Uplands (002384)	9.2
Natural Heritage Areas (NHA)	
Dough/Thur Mountains (002384)	0.1
Aghavoghil Bog (002430)	4.2
Crockauns/Keelogyboy Bogs (002435)	9.0

4.1.2 Previous Survey Data

4.1.2.1 Breeding Bird Atlas Records

'Bird Atlas 2007-11: The breeding and wintering birds of Britain and Ireland' (Balmer *et al.*, 2013) is the most recent comprehensive work on breeding birds in Ireland. It provides information on species and their breeding status in 10km hectads. The site lies within hectad G94. Table 5-1 presents a list of nine species of conservation interest recorded within this hectad.

Table 5-1 Bird atlas 2007-11 records

Species Name	Hectad (G94)	Conservation Status
Golden plover	Non-Breeding	Annex I EU Birds Directive, BoCCI Red Listed
Peregrine	Probable Breeding	Annex I EU Birds Directive, SCI of SPA within 15km

Species Name	Hectad (G94)	Conservation Status
Hen harrier	Confirmed Breeding	Annex I EU Birds Directive
Merlin	Possible Breeding	Annex I EU Birds Directive
Red grouse	Probable Breeding	BoCCI Red Listed

4.1.2.2 Rare and Protected Species Dataset

An information request was sent to the NPWS requesting records from the Rare and Protected Species Database. The sections below provide records obtained from the NPWS (on 18th of June 2018) of the rare and protected breeding bird species hen harrier, peregrine and red grouse.

Hen Harrier

Table 5-2 below presents the NPWS records for hen harrier nest sites to defined radii of the development site.

Table 5-2 NPWS Hen Harrier Nest Site Records

Year	Within site boundary	0-1km from site boundary	1-3km from site boundary	3-5km from site boundary
2015	No Records	1 confirmed breeding site	No Records	1 confirmed breeding site
2010	No Records	3 confirmed breeding sites	1 sighting	1 confirmed breeding site, 1 additional sighting
2005	No Records	3 sightings	No records	No records
1998-2004	No Records	No Records	No Records	No records

Peregrine

The NPWS identified one confirmed peregrine nest site within 3-5km of the site. The observation was recorded during a survey in 2002.

Red Grouse

The NPWS hold records of red grouse in the area. Between 2000 and 2011 this species was recorded on nine occasions. One observation was recorded on site. There were two records located approximately 500m from the site - one just south of Dough Mountain and the other just north of Killea. The remainder of the observations were recorded over 3km from the site, three of which were in the vicinity of Thur Mountain.

4.2 Field Surveys

4.2.1 Flight Activity Surveys

During vantage point surveys, hen harrier were recorded regularly on site, including some time spent flying at potential collision height (PCH). White-tailed eagle, merlin, peregrine, snipe, kestrel, buzzard, and sparrowhawk were also recorded on site, including at PCH. Individual species accounts of primary and secondary target species are provided below.

4.2.1.1 Primary Target Species

Hen harrier

Hen harrier were observed eight times during vantage point surveys. A total of 158 seconds of flight were recorded at PCH. In April a male was observed sky dancing (display flight) on site to the north. In September, a male and female were recorded foraging separately on site to the north of site. Other observations involved adult male or female birds flying, hunting, or foraging. Maps are presented in Appendix 1 Figure 1.2

White-tailed eagle

White-tailed eagle was observed twice on one day during surveys. In August, a single bird was observed soaring and going to roost on site at Boleyboy. A total of 120 seconds were recorded at PCH. Maps are presented in Appendix 1 Figure 1.3.

Merlin

Merlin were recorded three times on one day during vantage point surveys. There were no observations at PCH. All observations involved a female birds in flight, hunting and perched around Killea on site and within 500m of site. Maps are presented in Appendix 1 Figure 1.4.

Peregrine

Peregrine were recorded on two occasions during surveys. Individual birds were recorded travelling and soaring on and off site. A total of 155s were recorded at PCH. Maps are presented in Appendix 1 Figure 1.5.

Snipe

Snipe were recorded 52 times during vantage point surveys, all on site or within 500m of the site. Observations involved single birds or small flocks in flight, calling and displaying. Displaying birds were observed near Killea, Tawnyfeacle, and Dough Mountain indicating probable breeding in these areas. Maps are presented in Appendix 1 Figure 1.7.

Kestrel

Kestrel were recorded 16 times during vantage point surveys. A total of 621s were spent at PCH. Observations involved single birds hunting, hovering or travelling. Juvenile birds were recorded to north of site in July suggesting breeding in the wider area. Maps are presented in Appendix 1 Figure 1.8.

4.2.1.2 Secondary Target Species

Sparrowhawk

Sparrowhawk was recorded on nine occasions during vantage point surveys. A male was recorded carrying prey off site to south of site in June indicating breeding in the wider area. Maps are presented in Appendix 1 Figure 1.9.

Buzzard

Buzzard were recorded 57 times during vantage point surveys, on site and within 500m of the site. A total of 5790s were recorded at PCH. A provisioning flight was observed off site to the south in August, indicating a breeding territory in this area. Other observations included birds soaring, travelling, foraging and calling in both the north and south of the site. Maps are presented in Appendix 1 Figure 1.10.

4.2.2 Breeding Raptor Surveys

Hen harrier

Hen harrier were observed 26 times during breeding raptor surveys. In early to mid-April two males were observed sky dancing (displaying) on both the north and south of site in the vicinity of historically occupied territories. In late April, a male and female were recorded flying close together in courtship and dropping into forestry on the south of the site near the traditionally occupied territory here. In May, a male was regularly recorded in this same area in flight or perched but no breeding behaviour was recorded. In late May, a ringtail (likely a female bird) was recorded in flight in the same area but again no signs of breeding were recorded. In July, a male was observed in a failed hunting attempt on site and flew to the east, off site. Later in the month a male was observed carrying prey off site to the east in the same direction, indicating a nest in this direction, likely off site. A ringtail was also observed flying in this direction in July. Maps are presented in Appendix 1 Figure 2.1.

White-tailed eagle

An immature white-tailed eagle was recorded in flight and perched on site in May at Boleyboy. Two more observations in August involved an immature bird (possibly the same bird) on site near Saddle Hill. Maps are presented in Appendix 1 Figure 2.2.

Osprey

Osprey were recorded on one occasion during breeding raptor surveys. On the 10th of June and adult was observed in agitated flight alarm calling and lingering near a flock of ravens at Faughery. The bird then flew off site to the northwest. Maps are presented in Appendix 1 Figure 2.3.

Peregrine

Peregrine were recorded on one occasion in July with a bird hunting within 500m of site. No breeding behaviour was observed. Maps are presented in Appendix 1 Figure 2.4.

Kestrel

Kestrel were recorded 58 times during breeding raptor surveys. A pair of juvenile birds were observed on site to the south in July and off site to the north in September confirming breeding in these locations. Observations involved birds flying, hunting, and foraging on and off site. Maps are presented in Appendix 1 Figure 2.5.

Buzzard

Buzzard were recorded 38 times during breeding raptor surveys. Single birds or pairs were recorded. Observations involved birds flying, soaring, hunting and calling. Maps are presented in Appendix 1 Figure 2.6.

Sparrowhawk

Sparrowhawk were recorded 18 times during breeding raptor surveys. Observations involved birds in flight, foraging, calling or carrying prey. Breeding was confirmed off site at Tawnyfeacle and Raheelin with adults carrying prey or calling young recorded. Maps are presented in Appendix 1 Figure 2.7.

4.2.3 Incidental Observations

Hen harrier

Hen harrier were observed once as incidental observations. In May, an adult male was recorded foraging and travelling at Faughery on site and within 500m of site. Maps are presented in Appendix 1 Figure 3.0.

White-tailed eagle

White-tailed eagle was recorded once as an incidental observation. An immature bird was observed in the same area as it was observed roosting in the previous day. Maps are presented in Appendix 1 Figure 3.1.

Golden plover

Golden plover were recorded twice as incidental observations. In April a flock of 113 birds were recorded in flight on Dough Mountain within 500m of site and, in August, a single bird was recorded in the same area. No breeding evidence was recorded. Maps are presented in Appendix 1 Figure 3.2.

Red grouse

Red grouse were recorded twice as incidental observations. Observations involved single birds calling at Dough Mountain and Lisdarush on site and within 500m of site, indicating probable breeding in these areas. Maps are presented in Appendix 1 Figure 3.3.

Snipe

Snipe were recorded 52 times as incidental observations. Behaviours included flying, flushed by the observer, chipping (display song), alarm calling and drumming (displaying). Probable breeding was indicated with the presence of displaying birds at Faughery, Dough Mountain, Saddle Hill, and Killea, all on site or within 500m of the site. Maps are presented in Appendix 1 Figure 3.4.

Kestrel

Kestrel were recorded once as an incidental observations. A single male was observed in flight on site in July. Maps are presented in Appendix 1 Figure 3.5.

Buzzard

Buzzard were recorded four times as incidental observations. Birds were recorded in flight and soaring across the site. Maps are presented in Appendix 1 Figure 3.6.

5. DISCUSSION

Ornithological surveys were conducted at the Lissinagroagh wind farm site from April to September 2025 inclusive. During these surveys, breeding territories were identified for hen harrier, red grouse, snipe, kestrel, buzzard, and sparrowhawk. Other raptors such as merlin, white-tailed eagle and osprey were observed at the site and surrounds. No breeding behaviour was recorded, however white-tailed eagle were observed roosting.

Hen harrier

In early to mid-April two male hen harrier were observed displaying and interacting to both the north and south of site on different dates in the vicinity of historically occupied territories. This indicated probable breeding in these areas early in the season.

To the north of site, observations near historic territories were infrequent beyond April. A male and female were recorded foraging separately on the north of the site in September, but no breeding activity was confirmed in this area.

To the south of the site, in late April, a male and female were recorded flying close together in courtship and dropping into forestry near the traditionally occupied territory here. In May a male was regularly recorded in this southern area in flight or perched but no breeding activity was recorded. In late May, a ringtail, likely a female bird was recorded in flight here but again no further signs of breeding were recorded. In June observations dropped off sharply here indicating potential nest failure in this location.

In July a male was observed in a failed hunting attempt on site and flew to the east, off site. Later in the month a male was observed carrying prey off site to the east. A ringtail was also observed flying in this direction in July. However, no further breeding activity was recorded, and any possible nest would likely be a distance off site to the southeast, based on observations.

Other species

Merlin were recorded within 500m of site at the northern side of Dough Mountain, however, no breeding behaviour was recorded. An osprey was recorded alarm calling on site in June, however the closest suitable breeding habitat and known pair was approximately 5km off site to the northwest. An immature white-tailed eagle was recorded on site at Boleyboy in May and going to roost in the same area in August. While no breeding activity was observed, this bird was using the site for roosting.

Kestrel was confirmed breeding in areas off site to the north and south with the presence of recently fledged juvenile birds. Sparrowhawk were confirmed breeding in two locations off site at Raheelin and Tawnyfeacle. Buzzard were also confirmed breeding off site at Tawnyfeacle.

Red grouse were classified as probable breeding (as evidenced by the presence of calling birds) on site and within 500m of the site at Lisadarush and Dough Mountain. Snipe were also considered to be probable breeders with displaying birds recorded within 500m of the site at Saddle Hill, Faughery, Killea, Dough Mountain, and off site at Tawnyfeacle. Golden plover were recorded within 500m of site, however no breeding behaviour was recorded.

REFERENCES

Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. & Fuller, R.J. (2013) *Bird Atlas 2007-11: The breeding and wintering birds of Britain and Ireland.* BTO Books, Thetford.

Council Directive 92/43/EEC 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31992L0043

Council Directive 2009/147/EC 30 November 2009 on the conservation of wild birds. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32009L0147

Gilbert, G., Stanbury, A. and Lewis, A. (2021). Birds of Conservation Concern in Ireland 4: 2020-2026. *Irish Birds,* 43:1-22. Available at: https://birdwatchireland.ie/birds-of-conservation-concern-in-ireland/

Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. and Thompson, D. (2013) *Raptors. A field Guide for Surveys and Monitoring.* The Stationary Office, Edinburgh.

SNH (2016). Assessing connectivity with Special Protection Areas (SPAs). Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2018-08/Assessing%20connectivity%20with%20special%20protection%20areas.pdf

SNH (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms. Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2018-06/Guidance%20Note%20-%20Recommended%20bird%20survey%20methods%20to%20inform%20impact%20assessment%20of%20onshore%20windfarms.pdf

APPENDIX 1

FIGURES



Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius

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Drawing Title	Site Map
Project Title	Lissinagroagh
Drawn By: AOD	Checked By: SD
Project No.: 200217-j	Drawing No.: Fig 1.0
Scale: 1:30,000	Date: 12.12.2025

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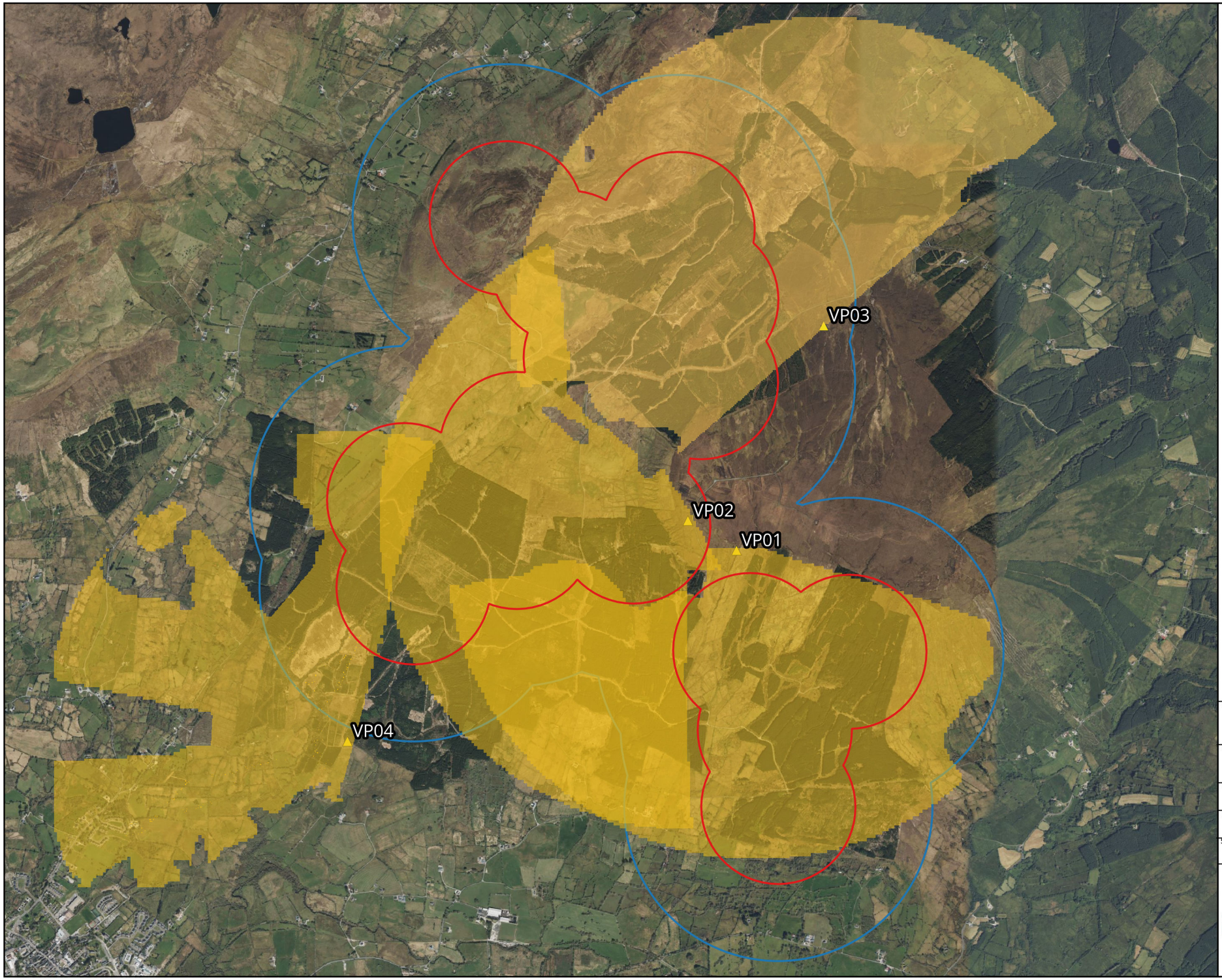

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- VP Locations

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Drawing Title

VP Locations and Viewsheds

Project Title

Lissinagroagh

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Project No.	Drawing No.
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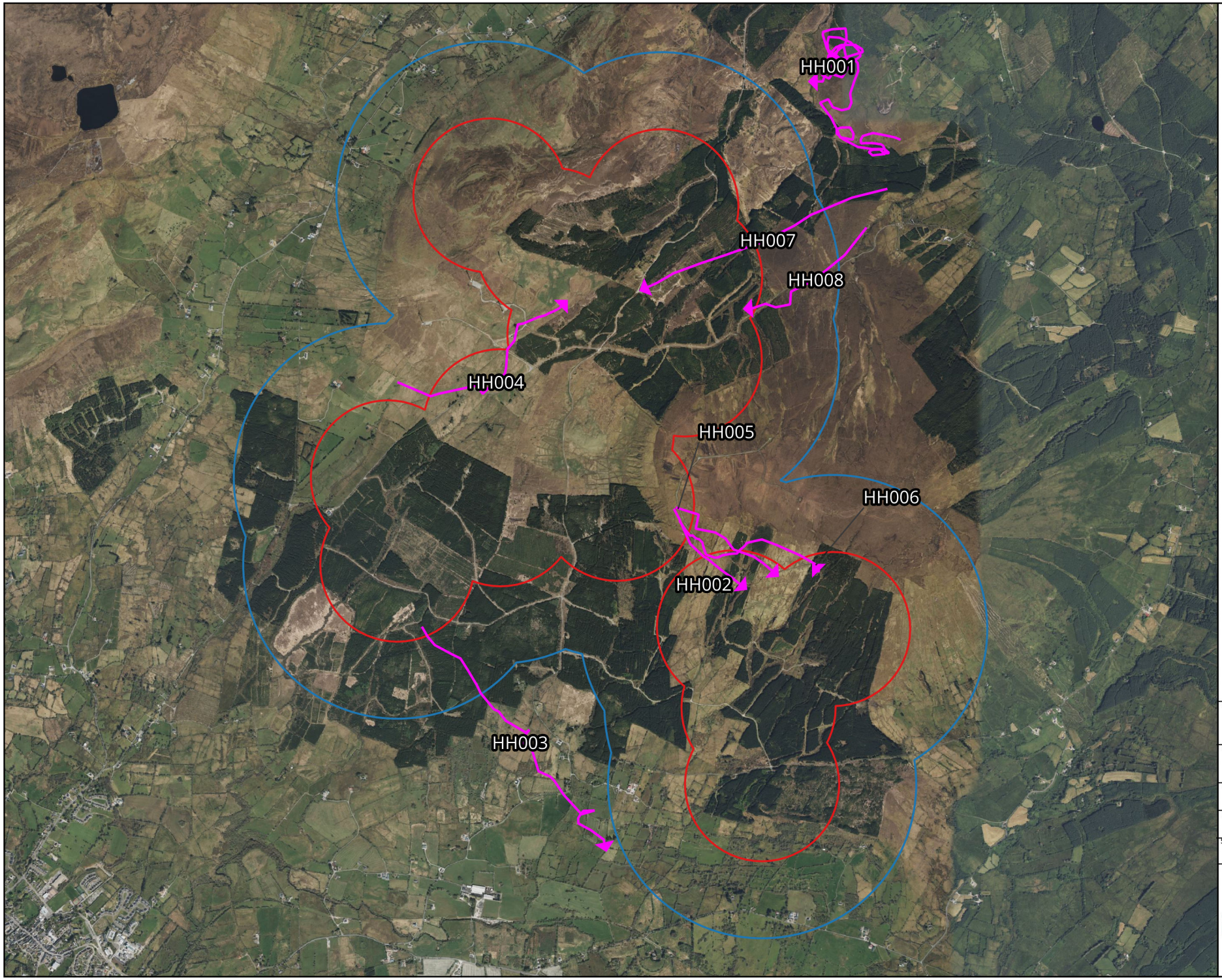

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title	Hen Harrier Vantage Point Observations
Project Title	Lissinagroagh
Drawn By: AOD	Checked By: SD
Project No.: 200217-j	Drawing No.: Fig 1.2
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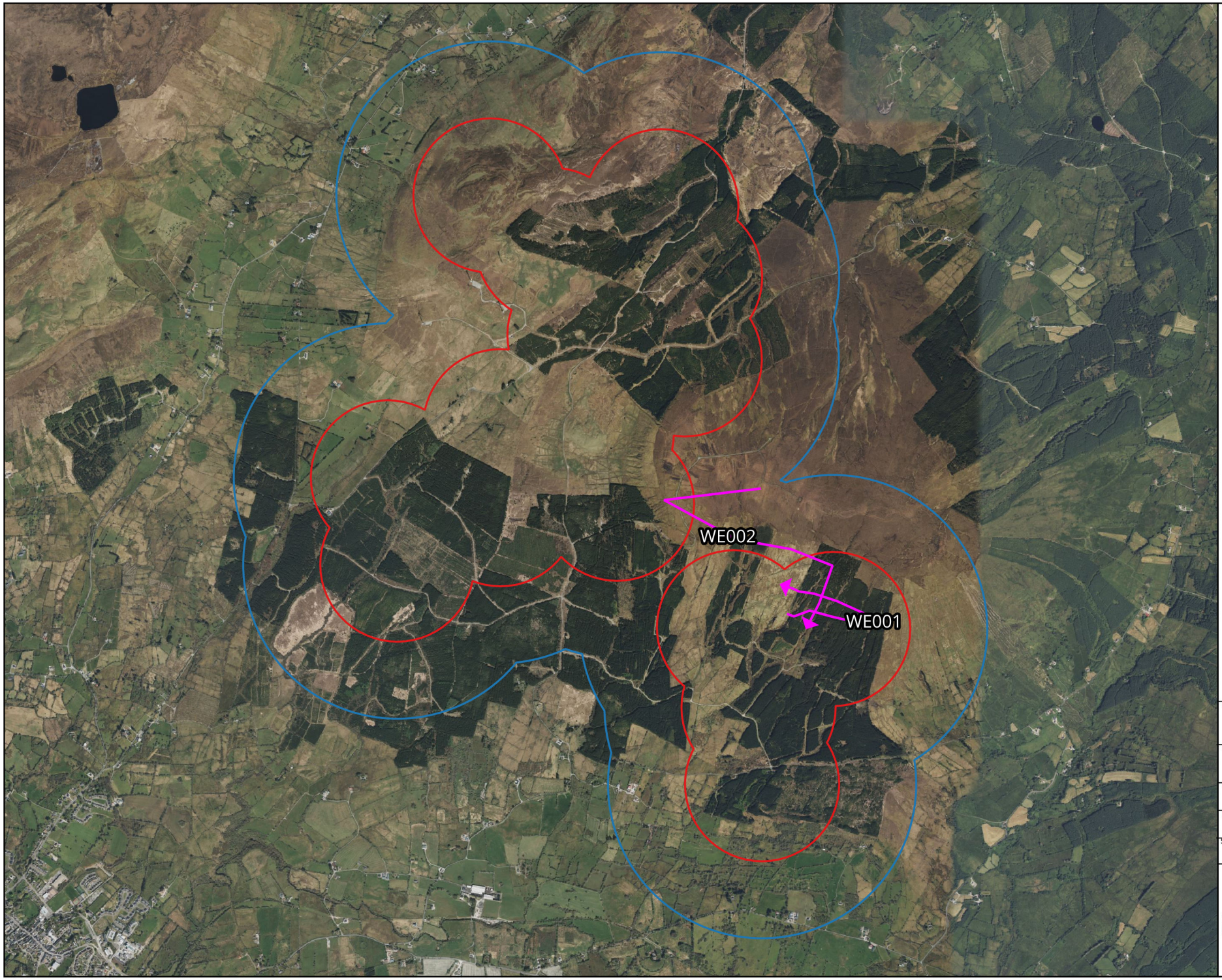

Map Legend

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- Lissinagroagh 500m radius
- Flightline

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Drawing Title	White-tailed Eagle Vantage Point Observations
Project Title	Lissinagroagh
Drawn By: AOD	Checked By: SD
Project No.: 200217-j	Drawing No.: Fig 1.3
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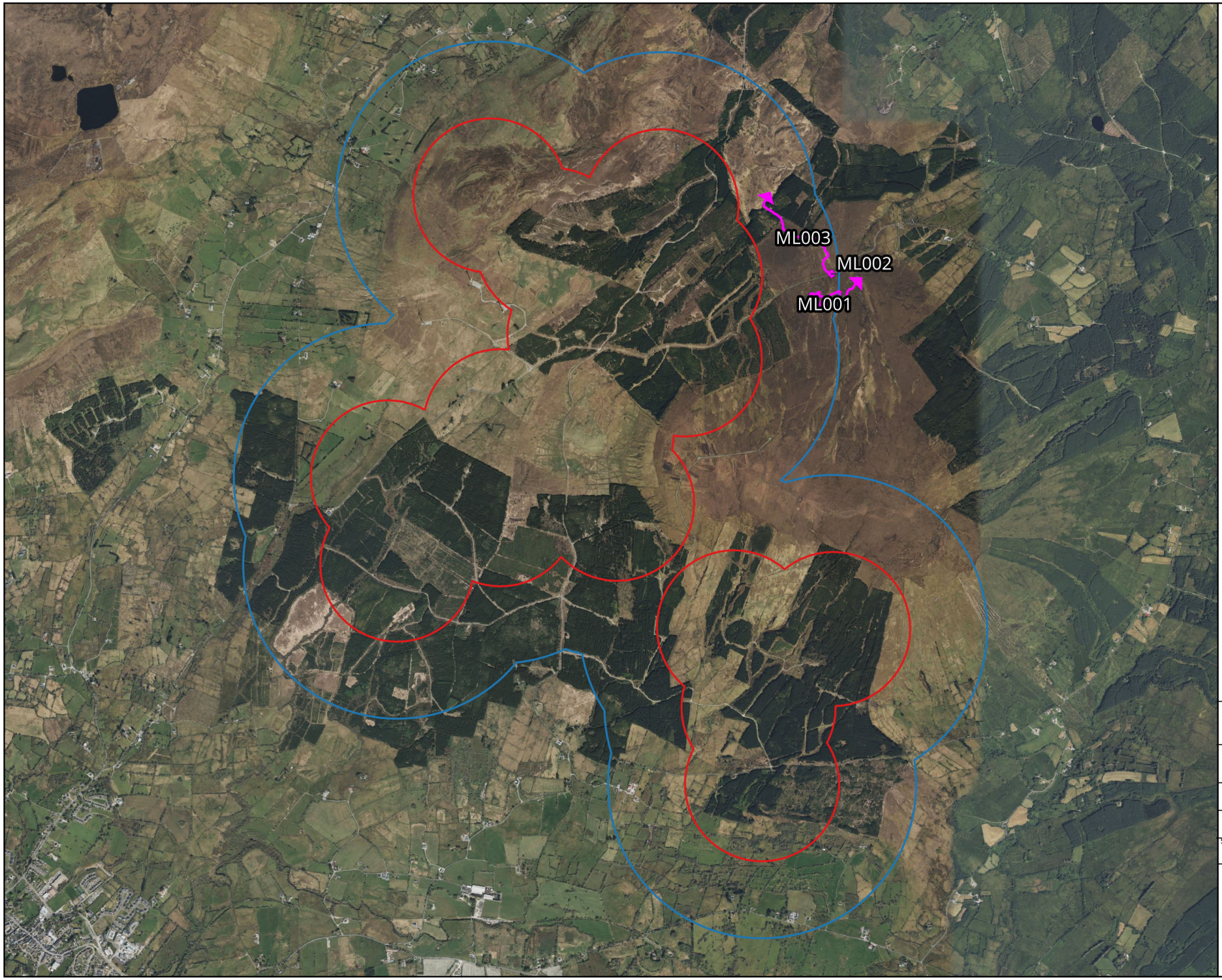

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- Flightline

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Drawing Title	Merlin Vantage Point Observations
Project Title	Lissinagroagh
Drawn By: AOD	Checked By: SD
Project No.: 200217-j	Drawing No.: Fig 1.4
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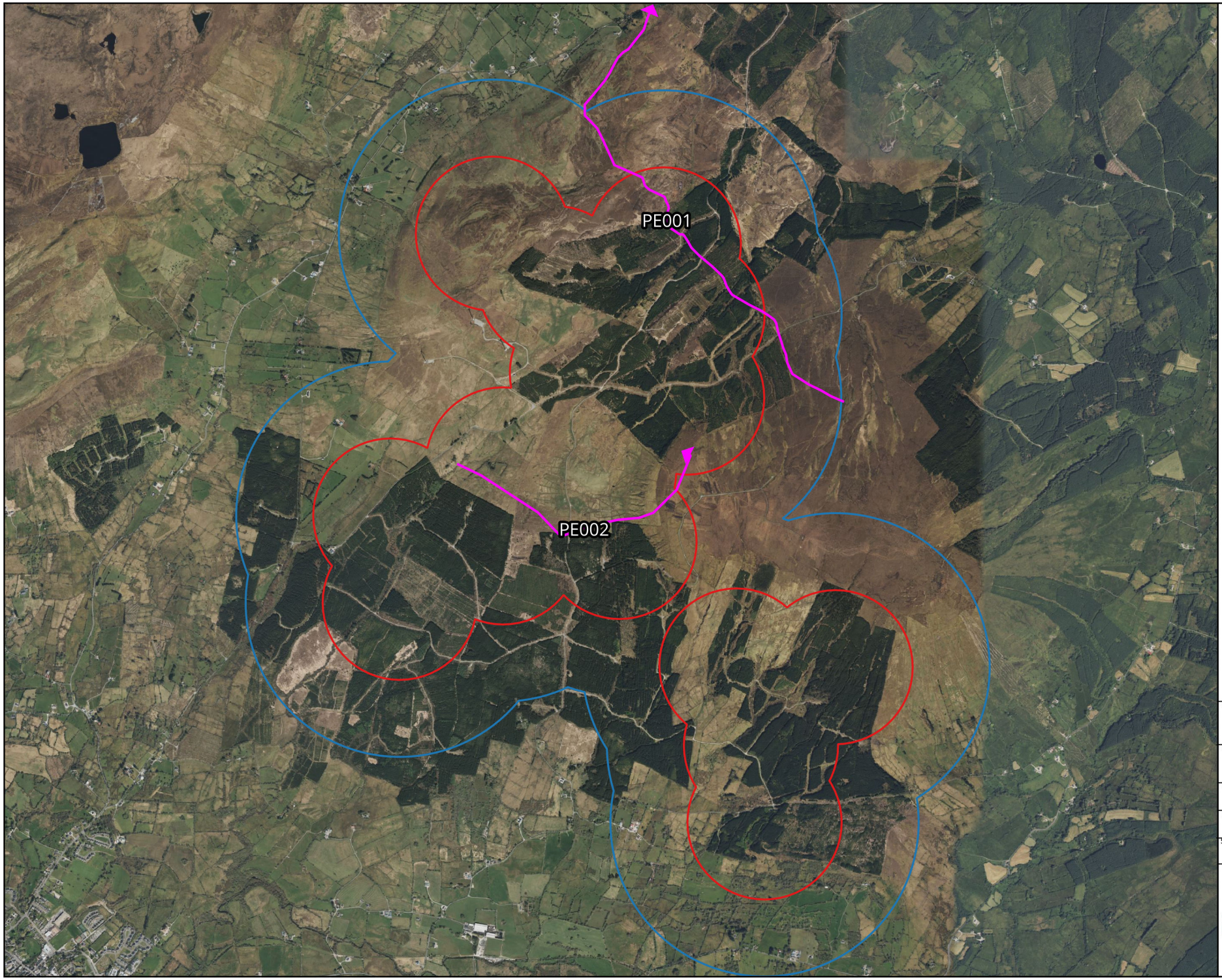

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title
Peregrine Vantage Point Observations

Project Title
Lissinagroagh

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Project No.	Drawing No.
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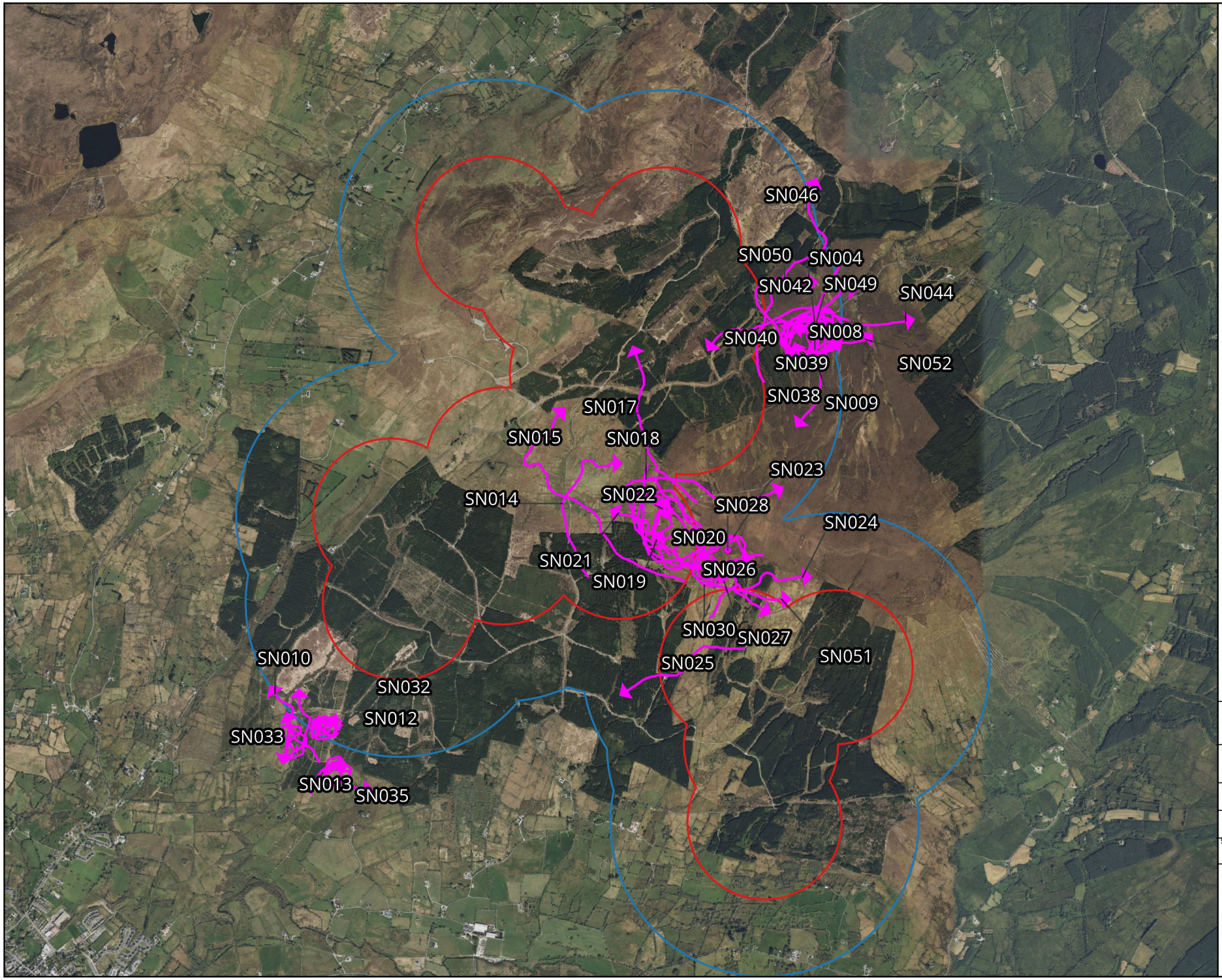

Map Legend

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- Lissinagroagh 500m radius
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Drawing Title
Snipe Vantage Point Observations

Project Title
Lissinagroagh

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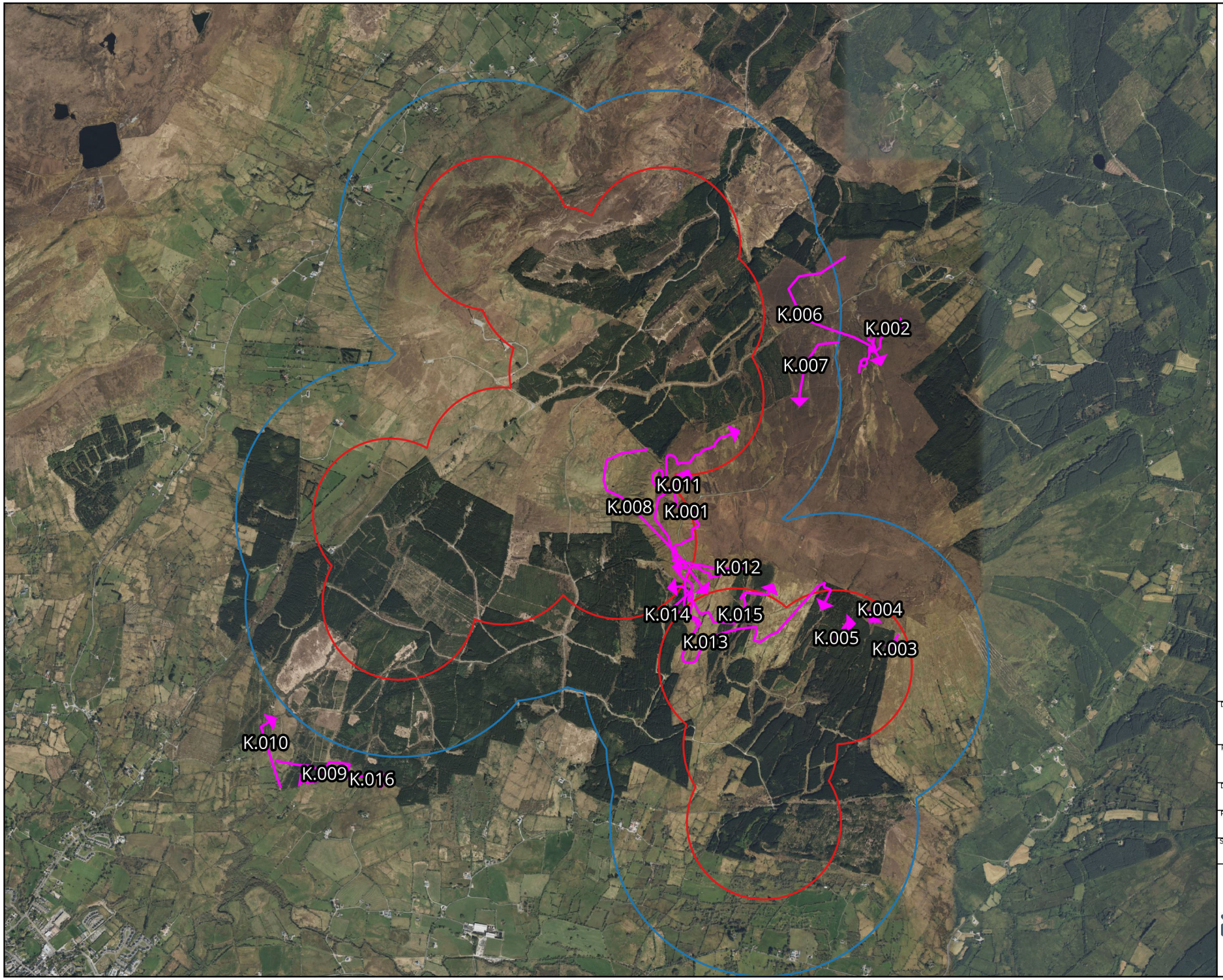

Map Legend

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- Lissinagroagh 500m radius
- Flightline

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Drawing Title
Kestrel Vantage Point Observations

Project Title
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Project No.	Drawing No.
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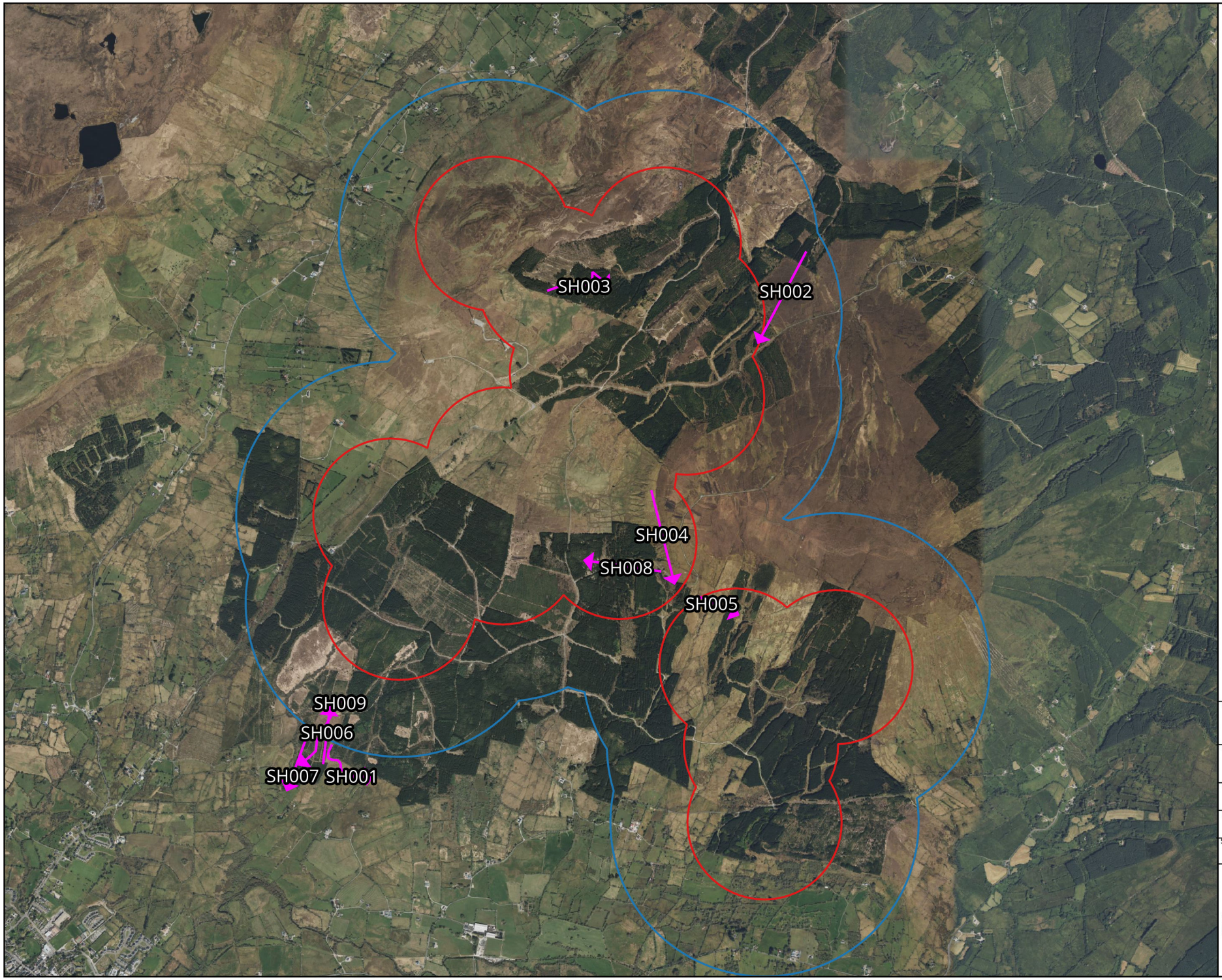

Map Legend

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- Flightline

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Drawing Title
Sparrowhawk Vantage Point Observations

Project Title
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Project No.	Drawing No.
200217-j	Fig 1.8
Scale	Date
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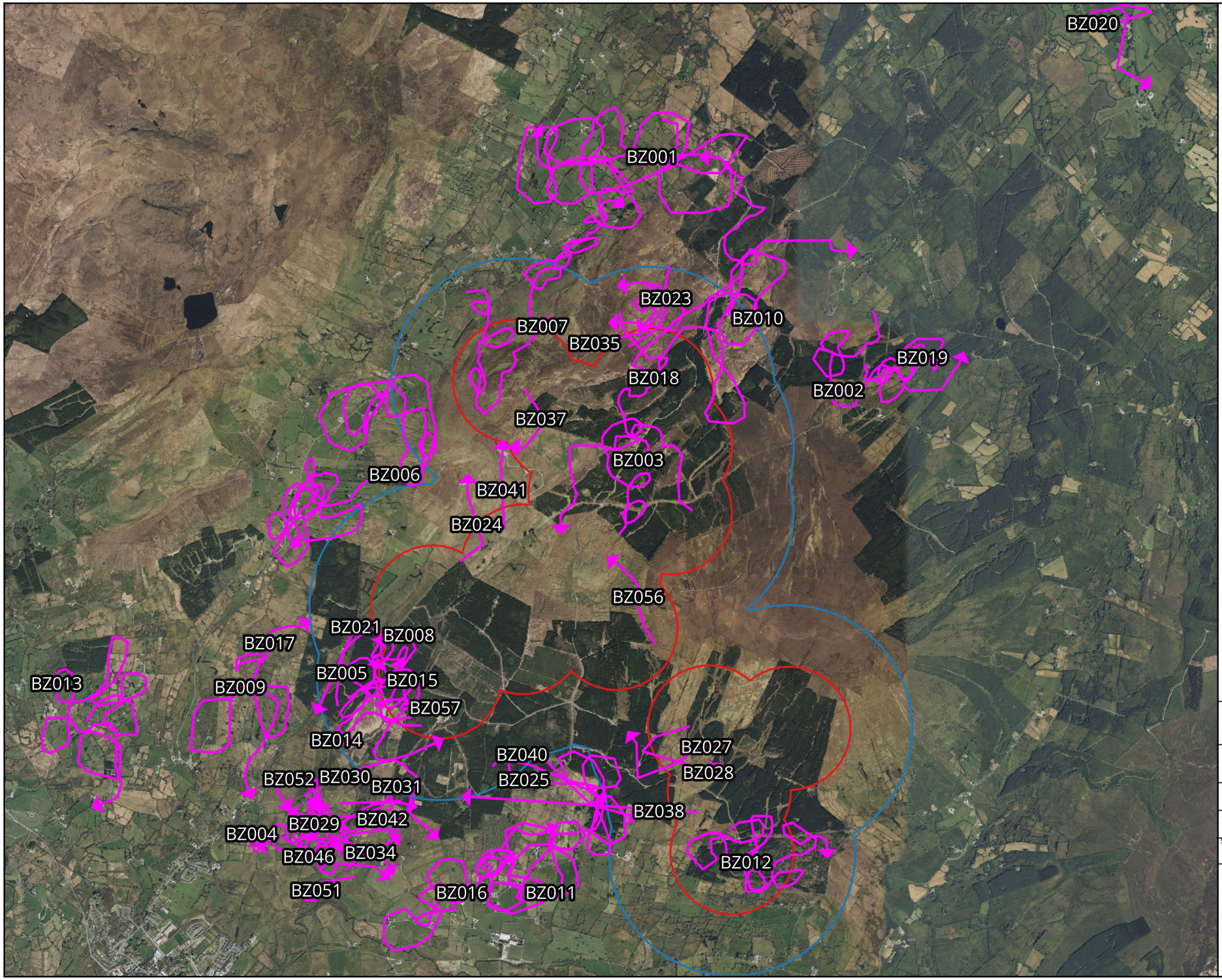

Map Legend

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Drawing Title: Buzzard Vantage Point Observations

Project Title: Lissinagroagh

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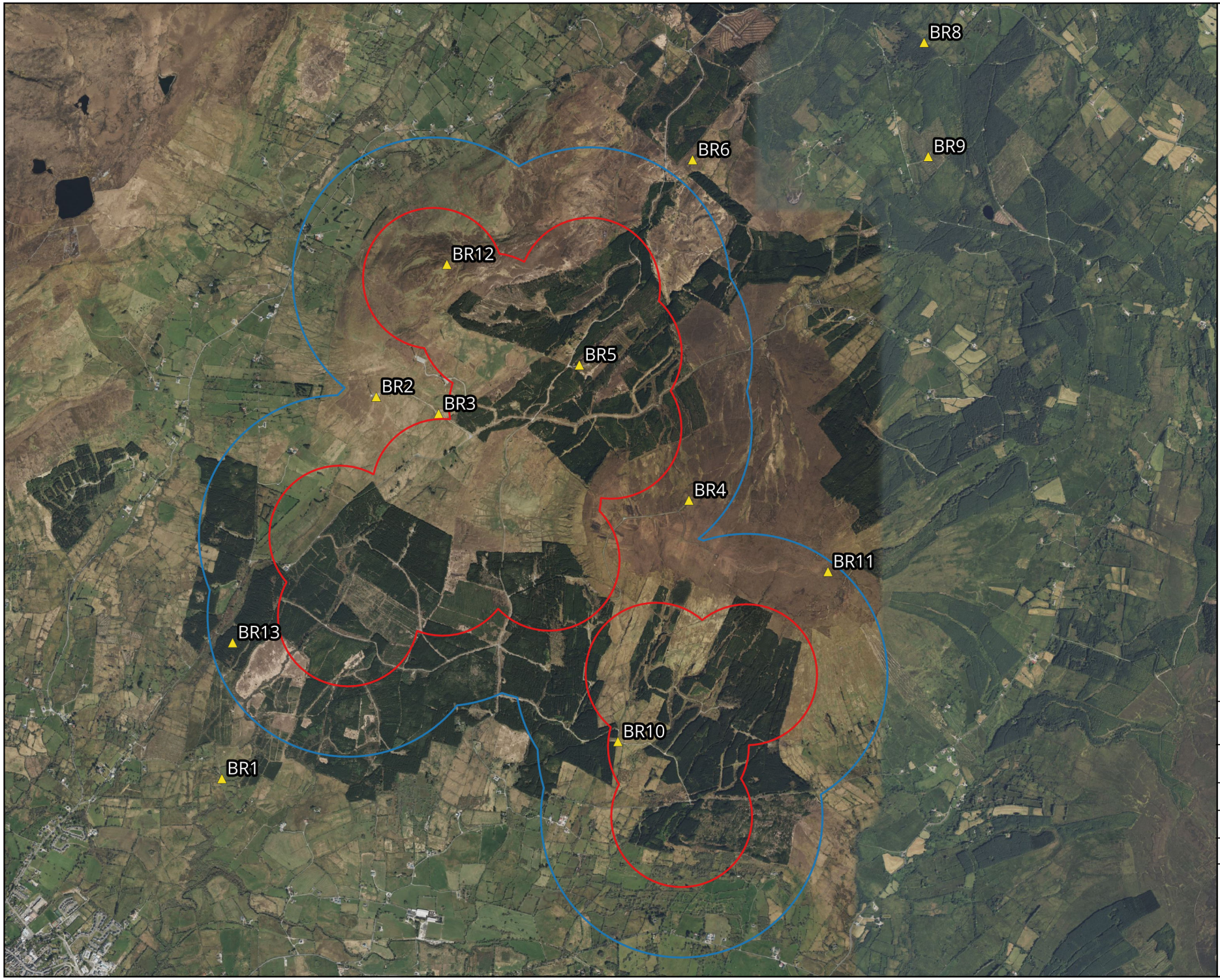

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Drawing Title

Breeding Raptor Survey Locations

Project Title

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Project No.	Drawing No.
200217-j	Fig 2.0
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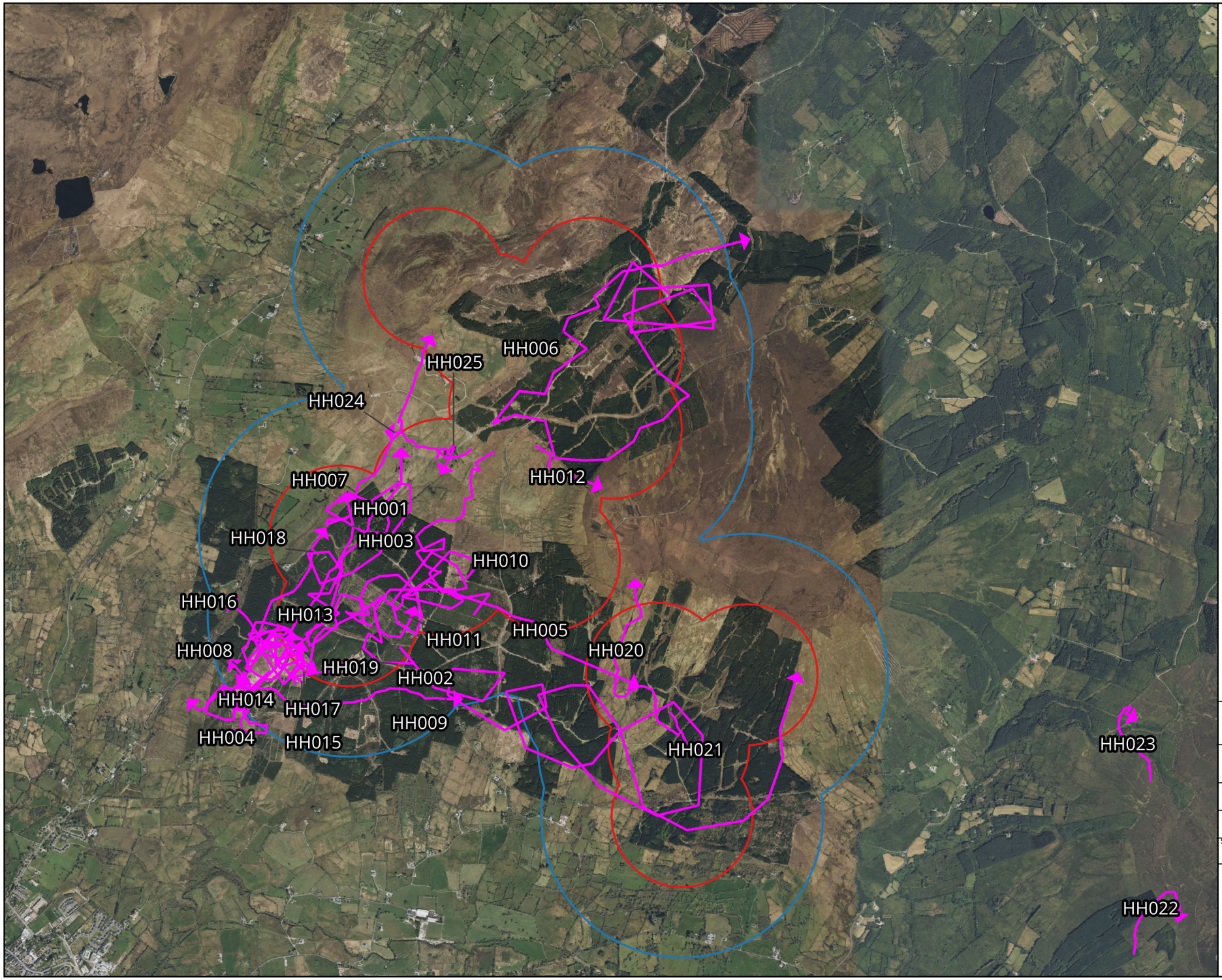

Map Legend

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- Lissinagroagh 500m radius
- Flightline

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Project Title	Lissinagroagh
Drawn By: AOD	Checked By: SD
Project No.: 200217-j	Drawing No.: Fig 2.1
Scale: 1:35,000	Date: 12.12.2025

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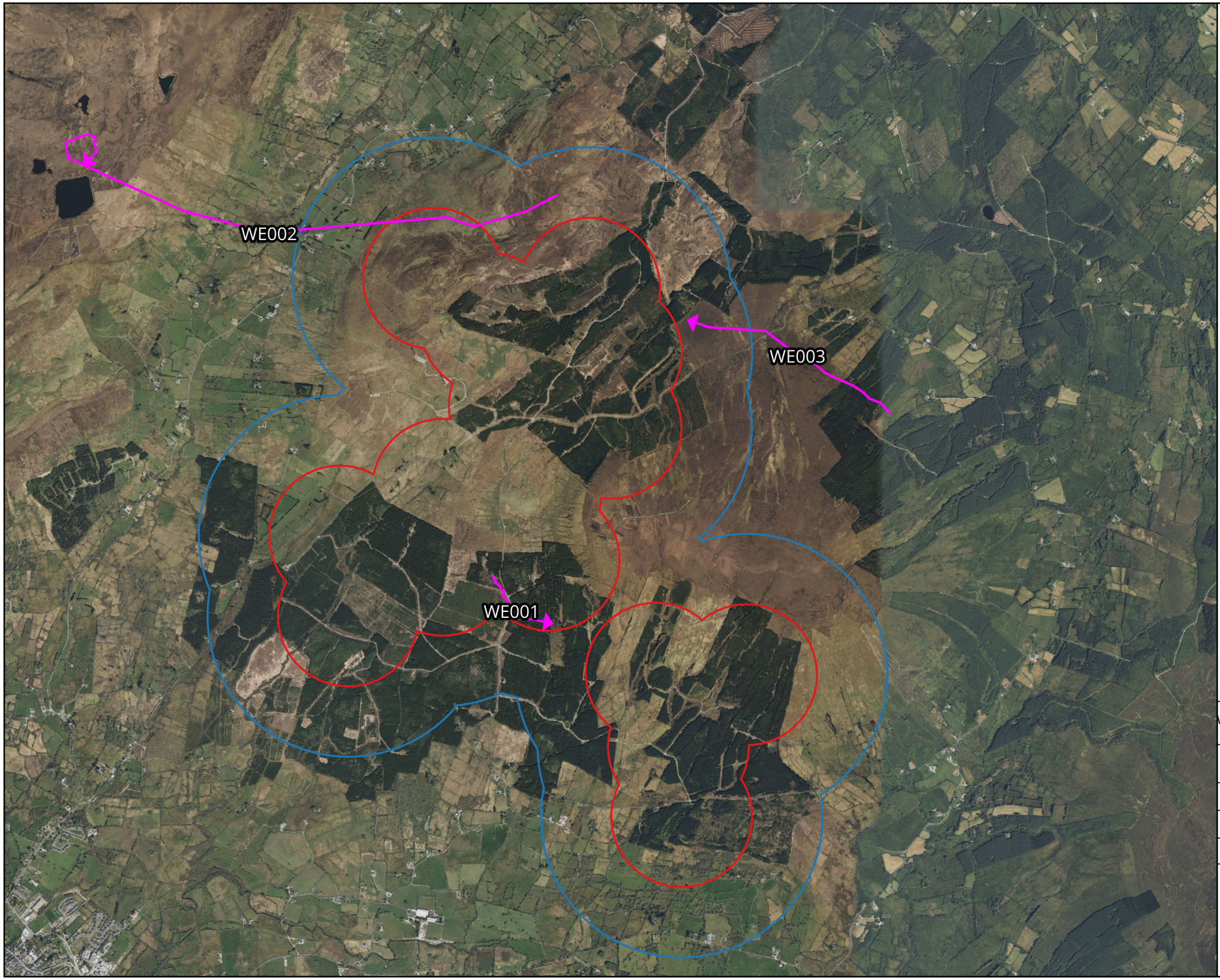

Map Legend

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- Flightline

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Drawing Title
White-tailed Eagle Breeding Raptor Observations

Project Title
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Drawn By	Checked By
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Project No.	Drawing No.
200217-j	Fig 2.2
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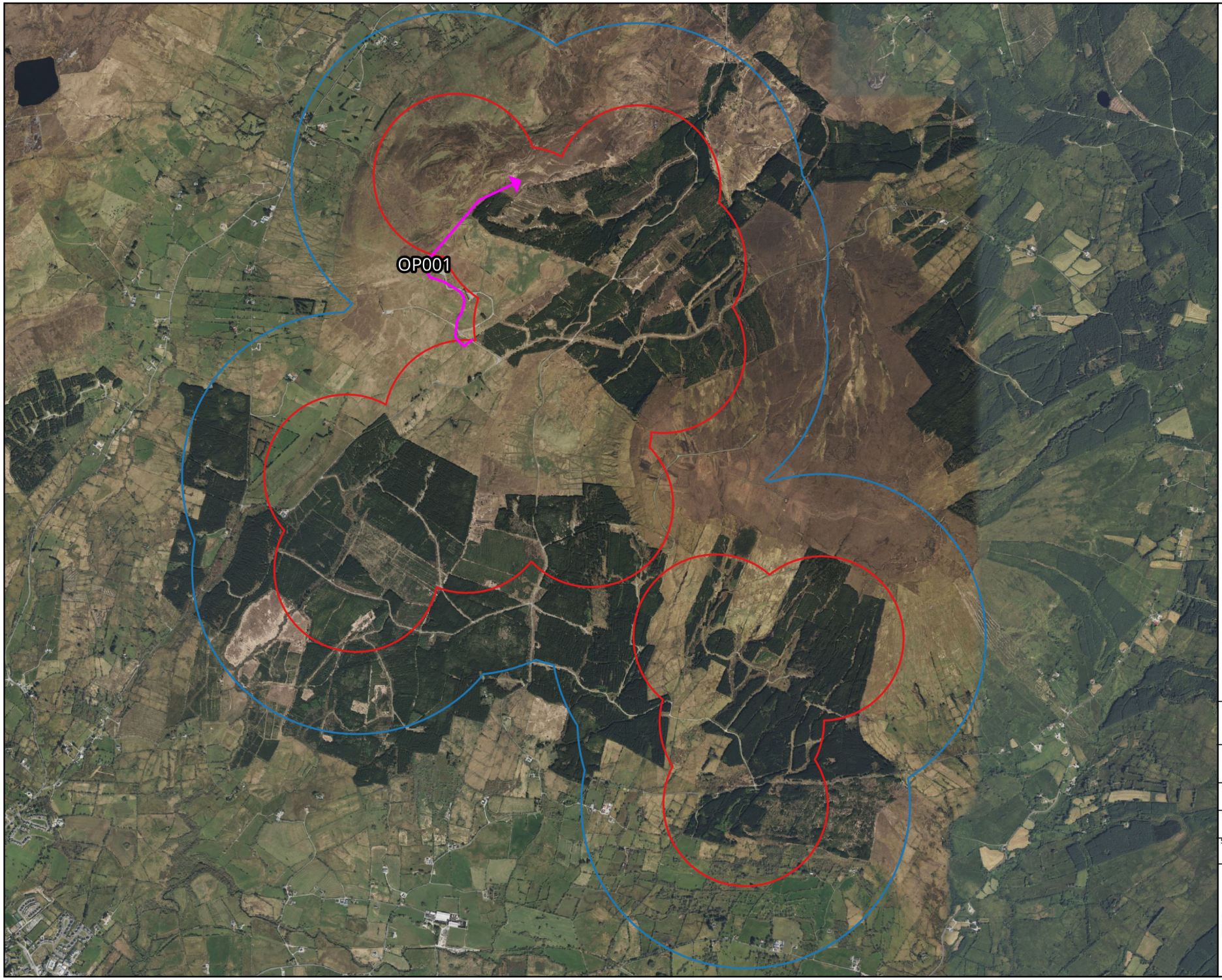

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title
Osprey Breeding Raptor Observations

Project Title
Lissinagroagh

Drawn By	Checked By
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Project No.	Drawing No.
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Scale	Date
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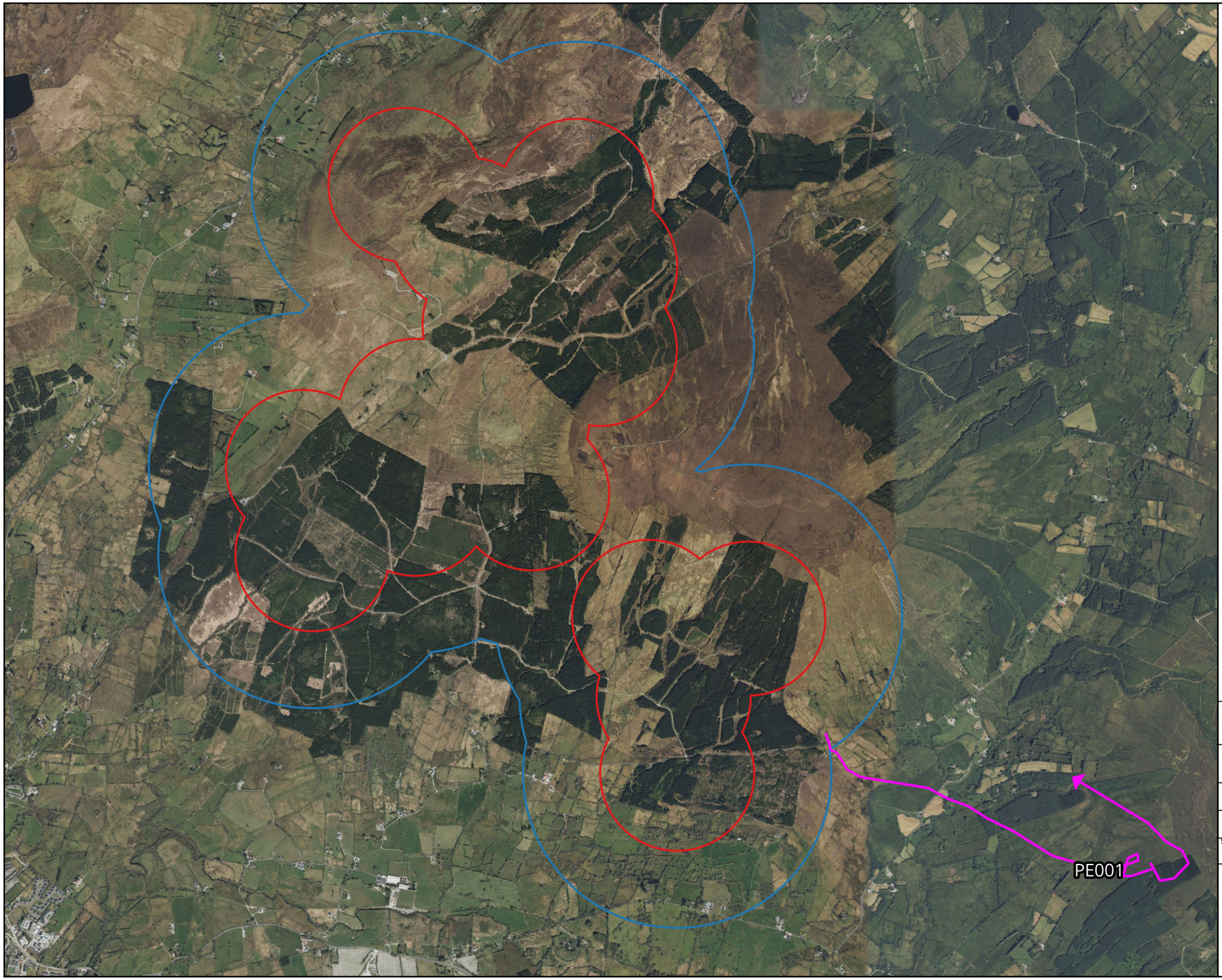

Map Legend

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- Flightline

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Drawing Title
Peregrine Breeding Raptor Observations

Project Title
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Project No.	Drawing No.
200217-j	Fig 2.4
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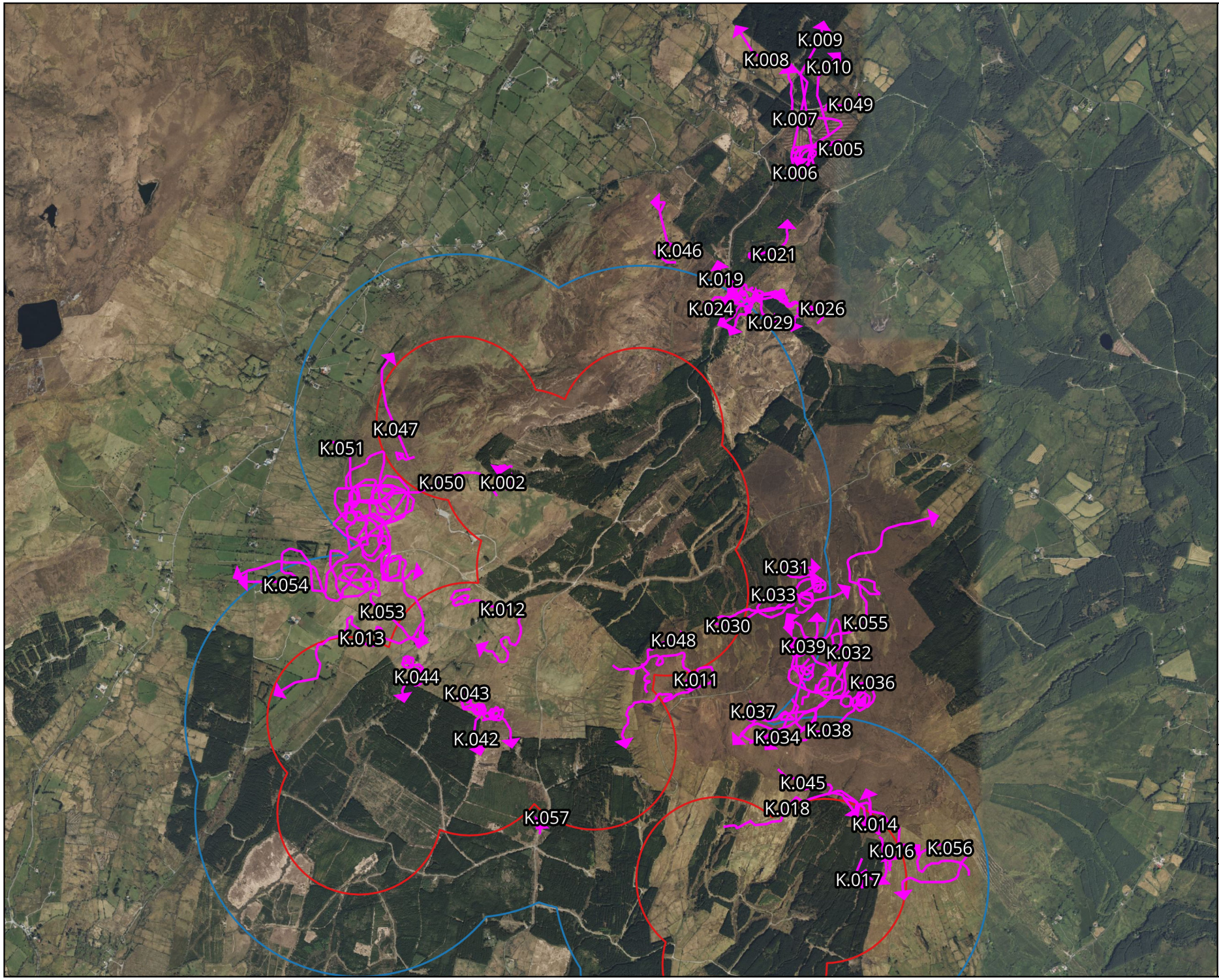

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- Flightline

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Drawing Title
Kestrel Breeding Raptor Observations

Project Title
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Project No.	Drawing No.
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Scale	Date
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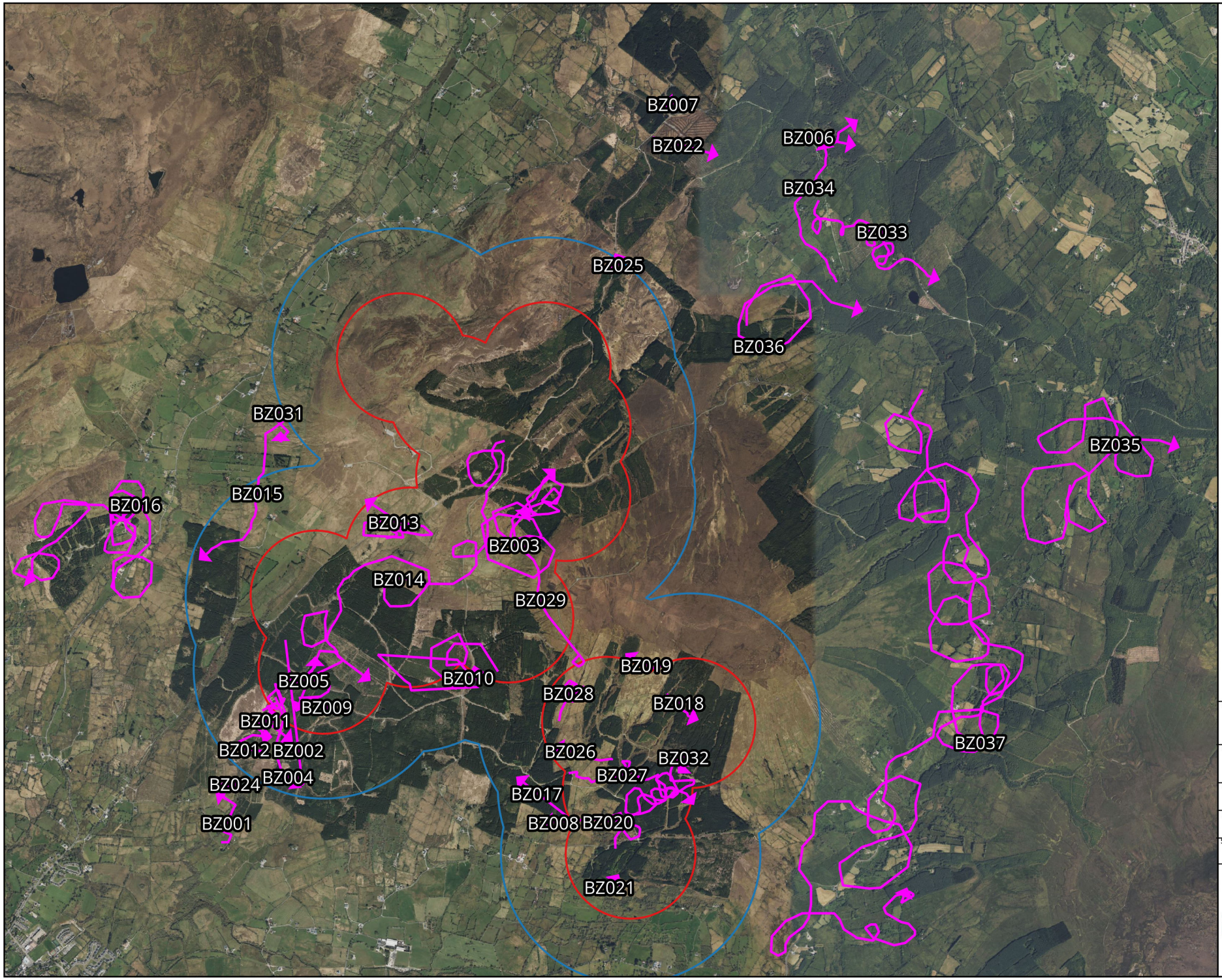

Map Legend

- Lissinagroagh site boundary
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- Flightline

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Drawing Title
Buzzard Breeding Raptor Observations

Project Title
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Project No.	Drawing No.
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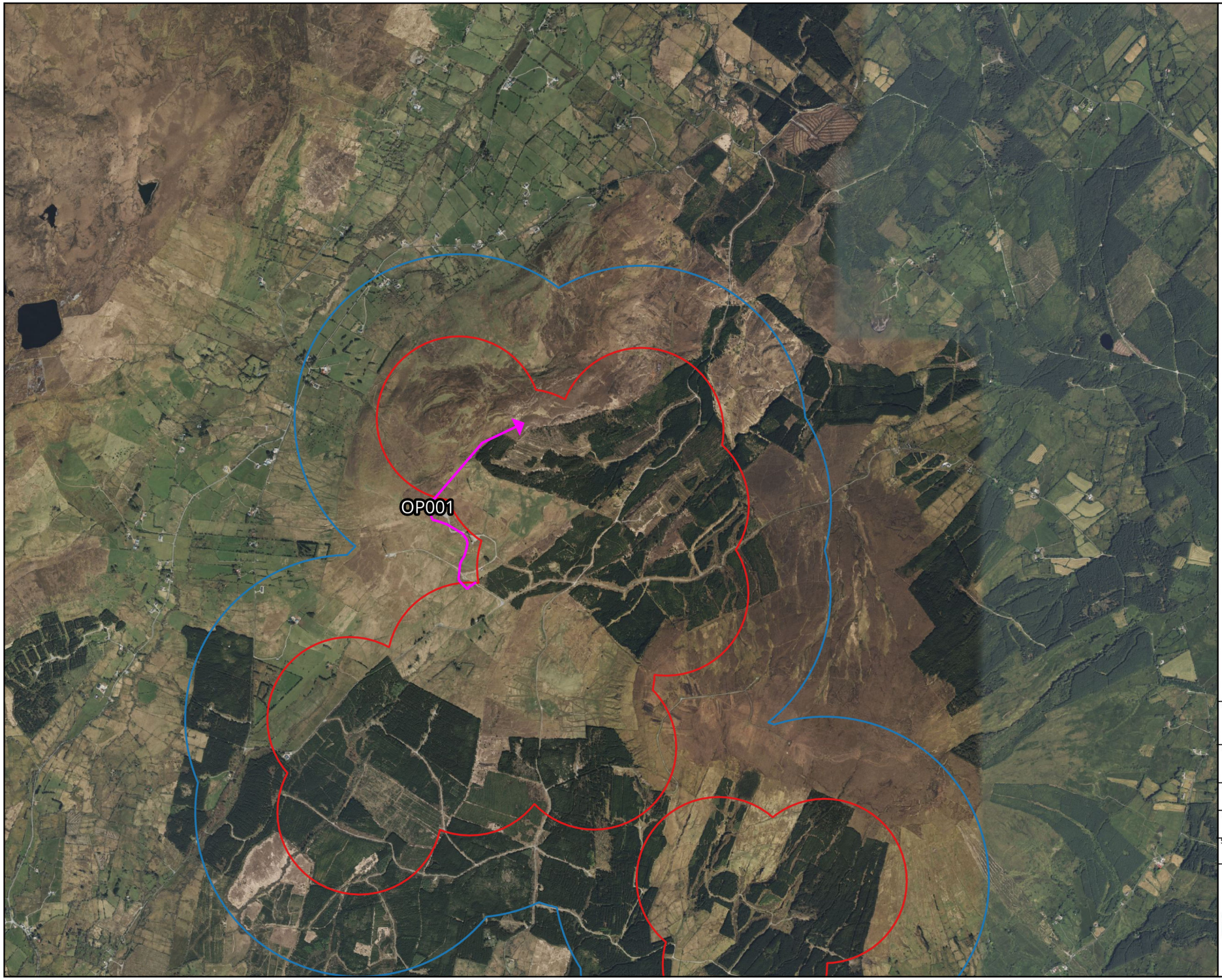

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title

Sparrowhawk Breeding Raptor Observations

Project Title

Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
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Scale	Date
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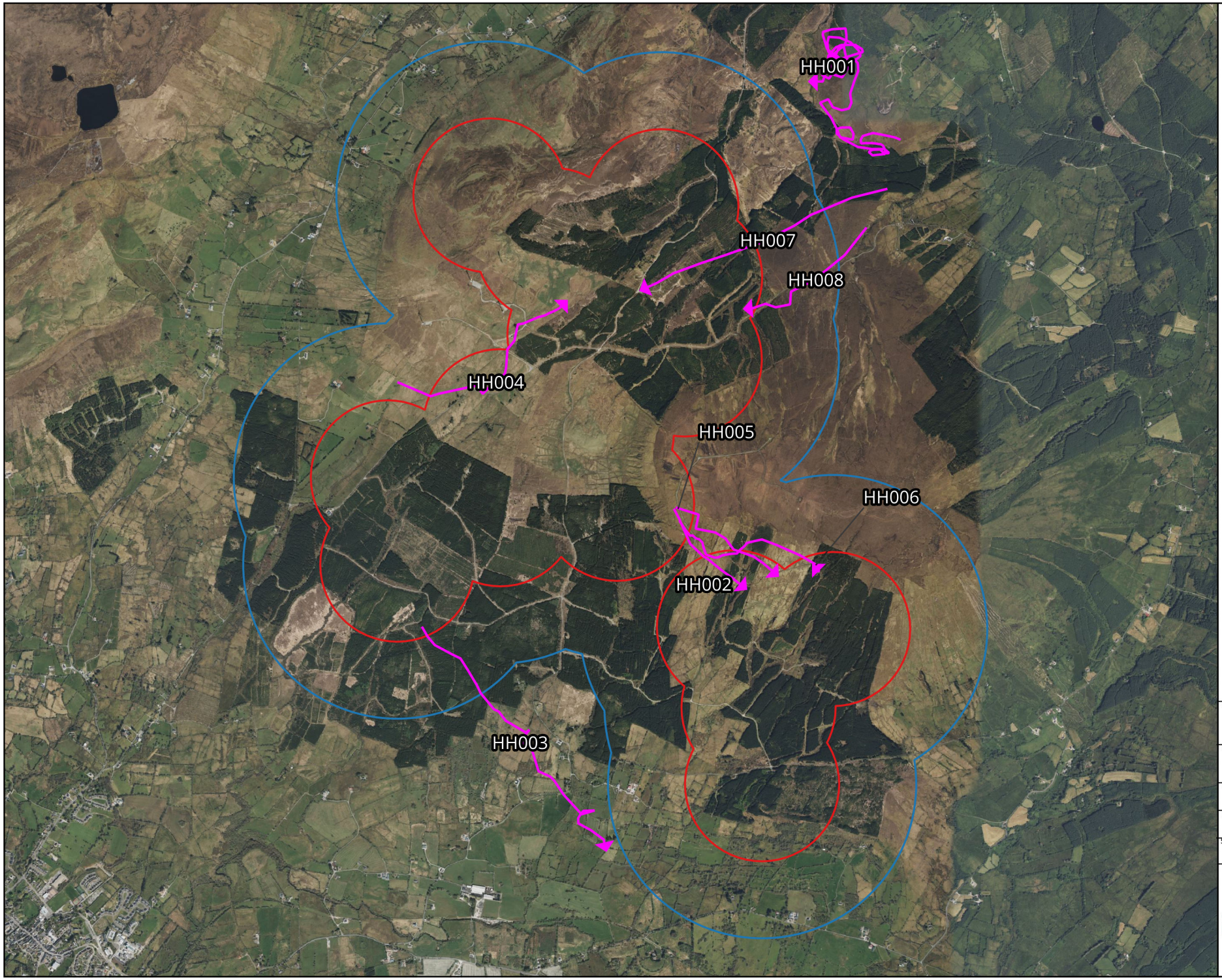

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title	Hen Harrier Incidental Observations
Project Title	Lissinagroagh
Drawn By: AOD	Checked By: SD
Project No.: 200217-j	Drawing No.: Fig 3.0
Scale: 1:32,000	Date: 12.12.2025

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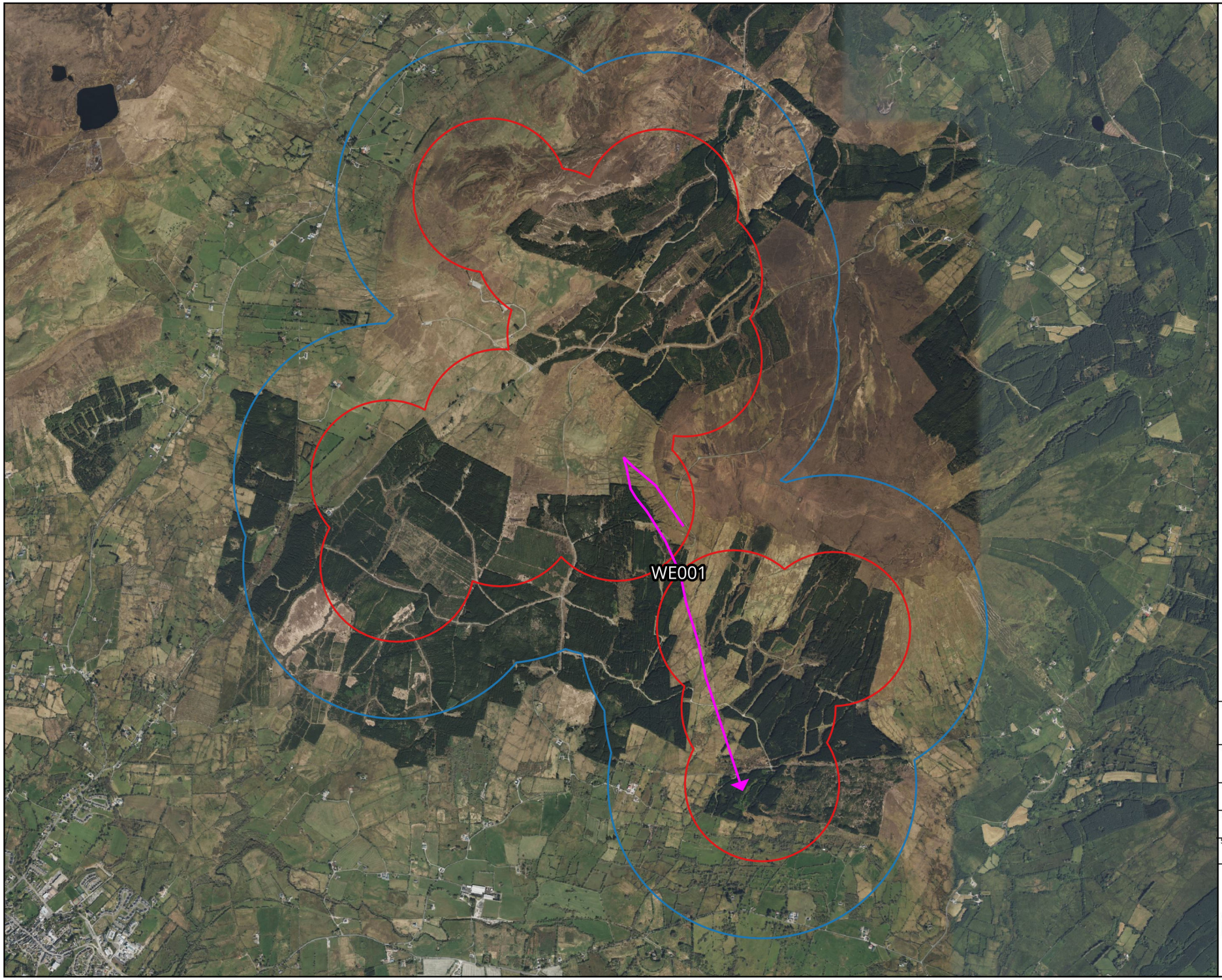

Map Legend

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- Lissinagroagh 500m radius
- Flightline

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Drawing Title
White-tailed Eagle Incidental Observations

Project Title
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Drawn By	Checked By
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Project No.	Drawing No.
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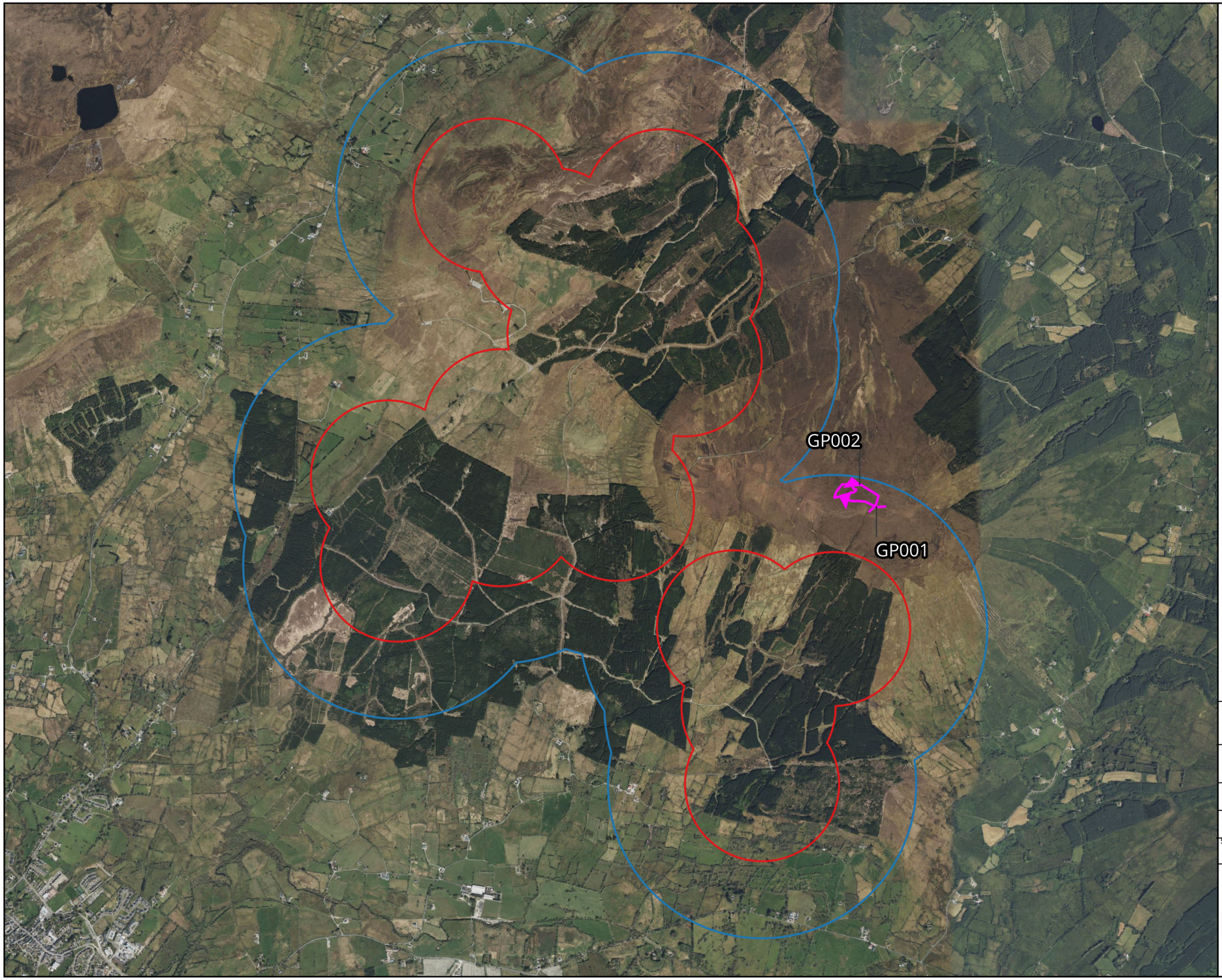

Map Legend

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- Lissinagroagh 500m radius
- Flightline

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Drawing Title
Golden Plover Incidental Observations

Project Title
Lissinagroagh

Drawn By	Checked By
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Project No.	Drawing No.
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Scale	Date
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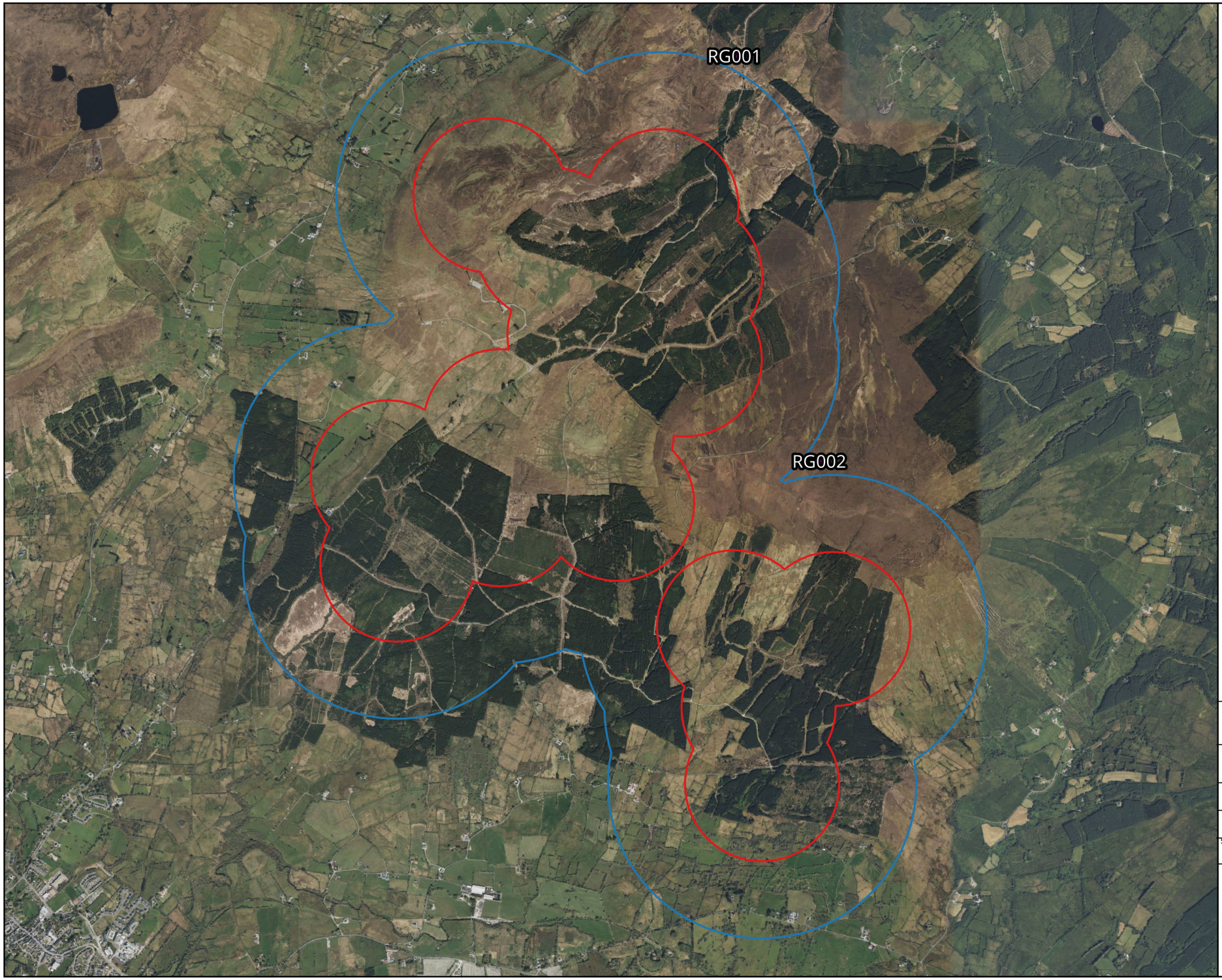

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title	Red Grouse Incidental Observations
Project Title	Lissinagroagh
Drawn By: AOD	Checked By: SD
Project No.: 200217-j	Drawing No.: Fig 3.3
Scale: 1:32,000	Date: 12.12.2025

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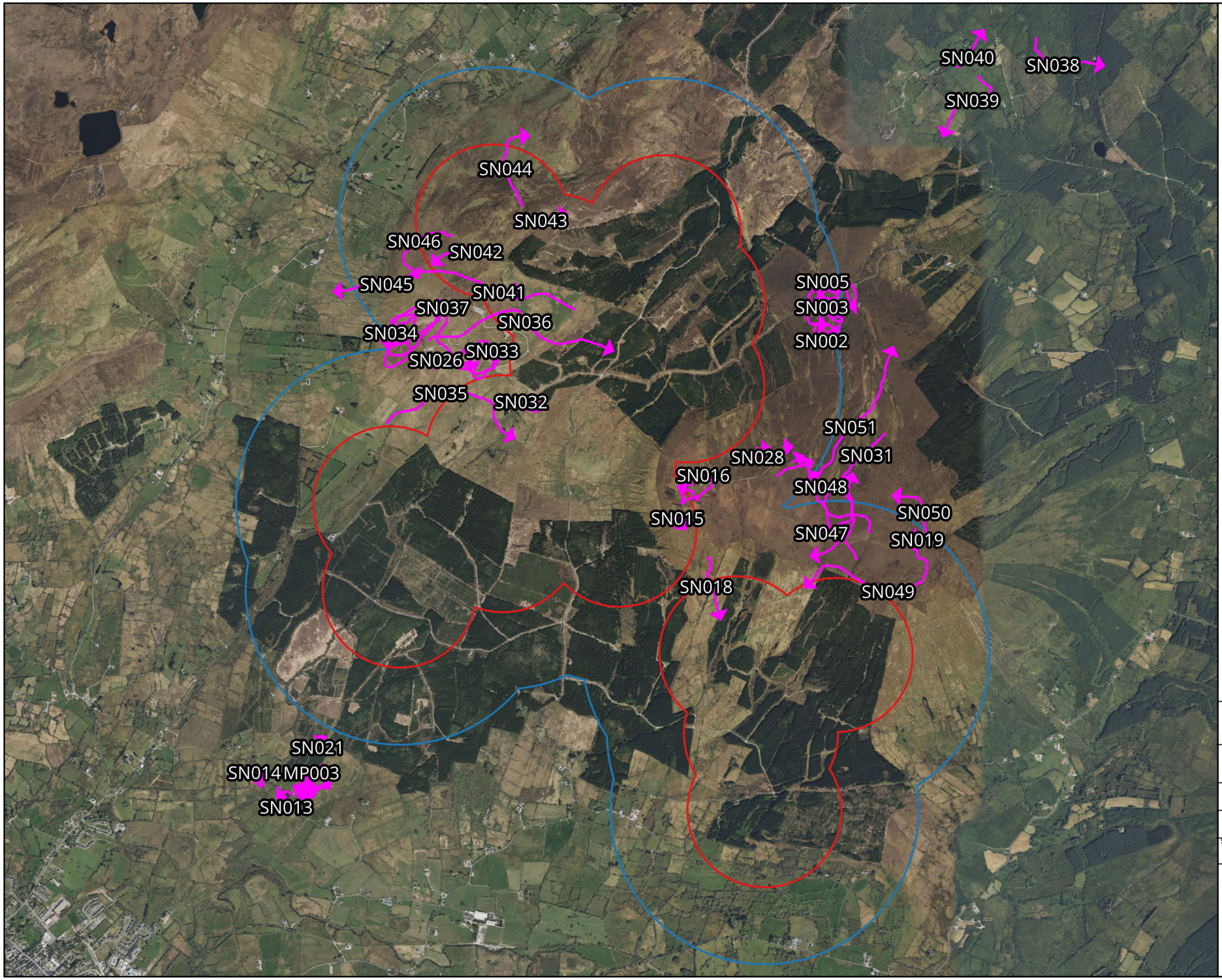

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title

Snipe Incidental Observations

Project Title

Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 3.4
Scale	Date
1:32,000	12.12.2025

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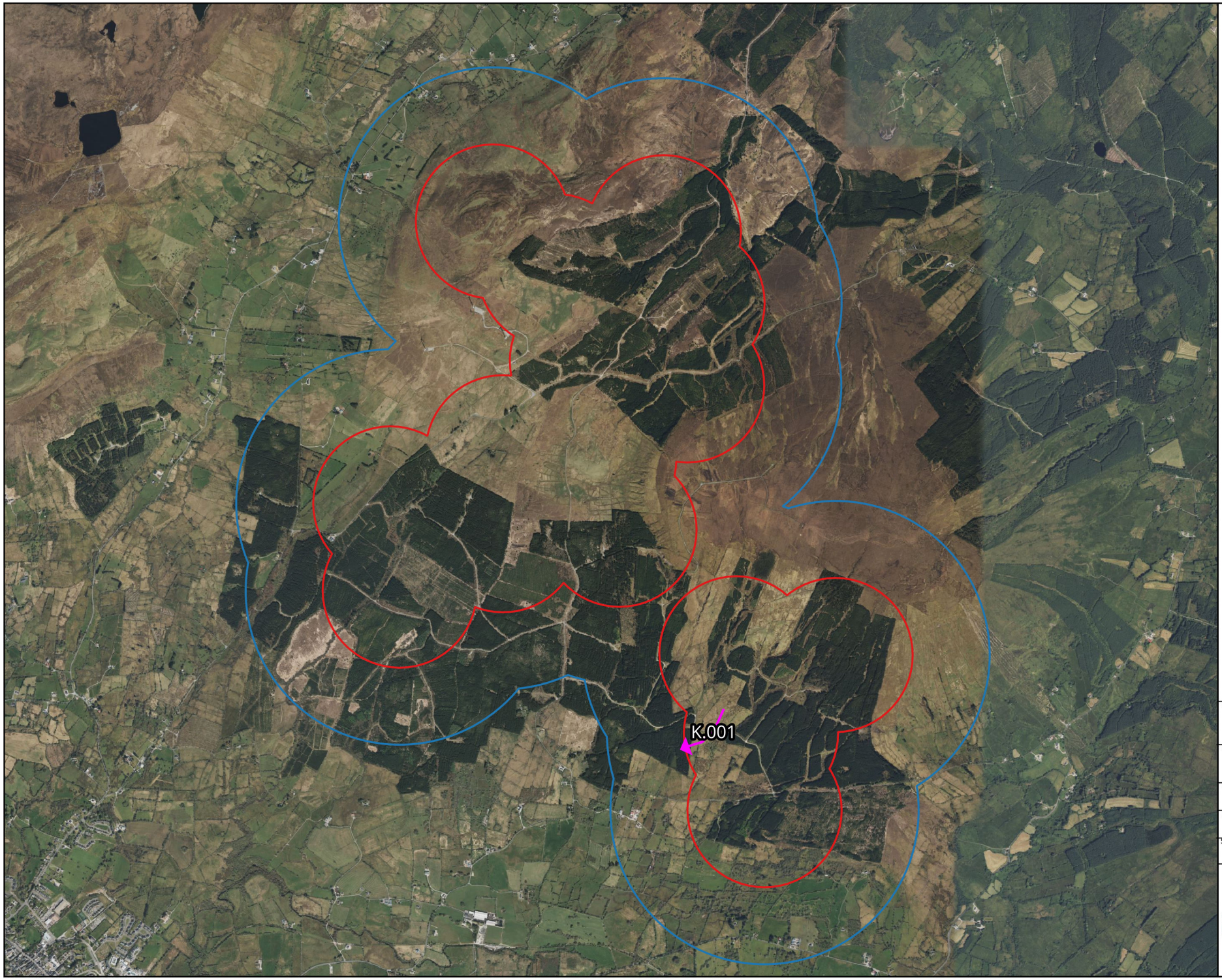

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title

Kestrel Incidental Observations

Project Title

Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 3.5
Scale	Date
1:32,000	12.12.2025

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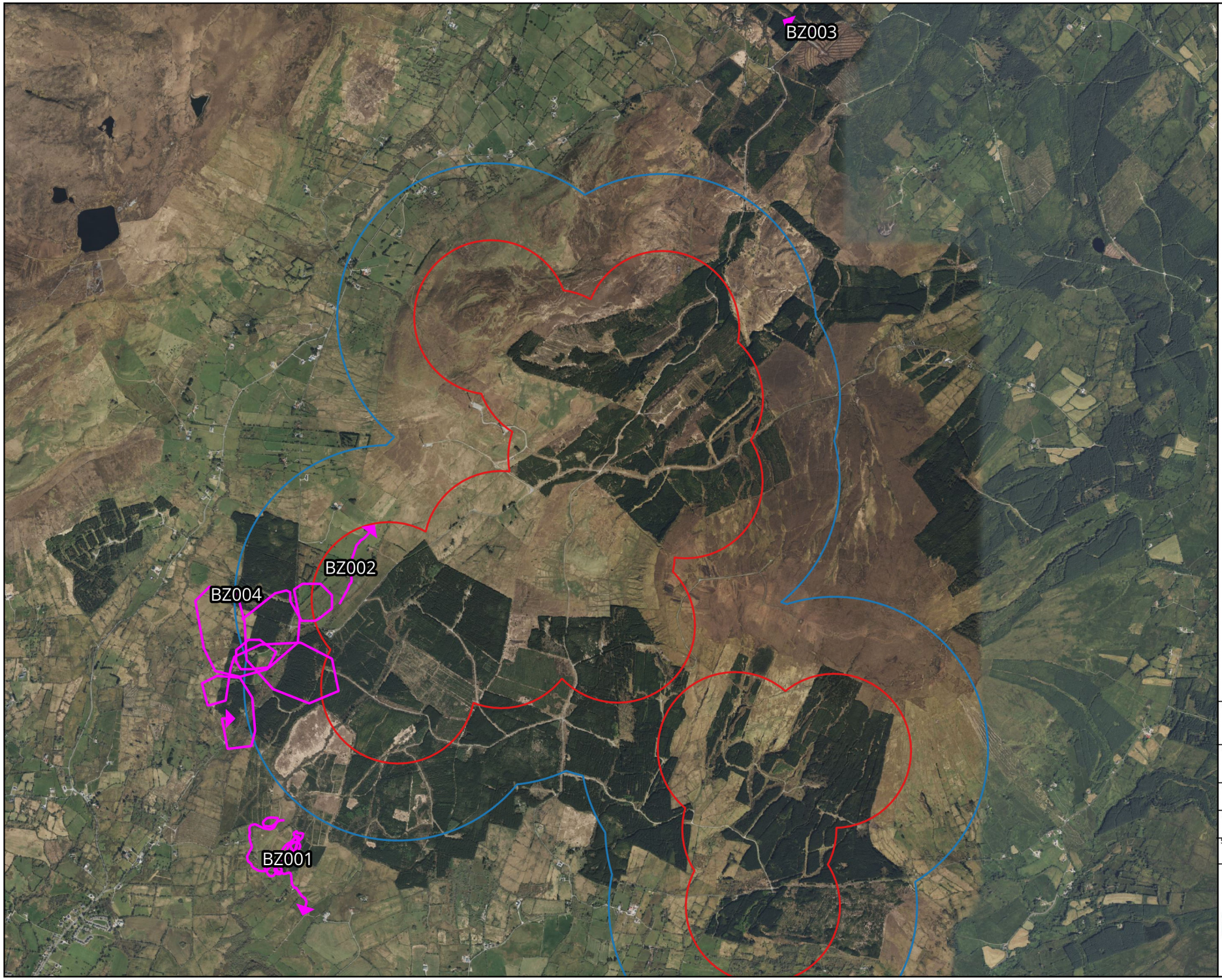

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title

Buzzard Incidental Observations

Project Title

Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 3.6
Scale	Date
1:32,000	12.12.2025

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Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius

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Drawing Title	Site Map
Project Title	Lissinagroagh
Drawn By: AOD	Checked By: SD
Project No.: 200217-j	Drawing No.: Fig 1.0
Scale: 1:30,000	Date: 12.12.2025

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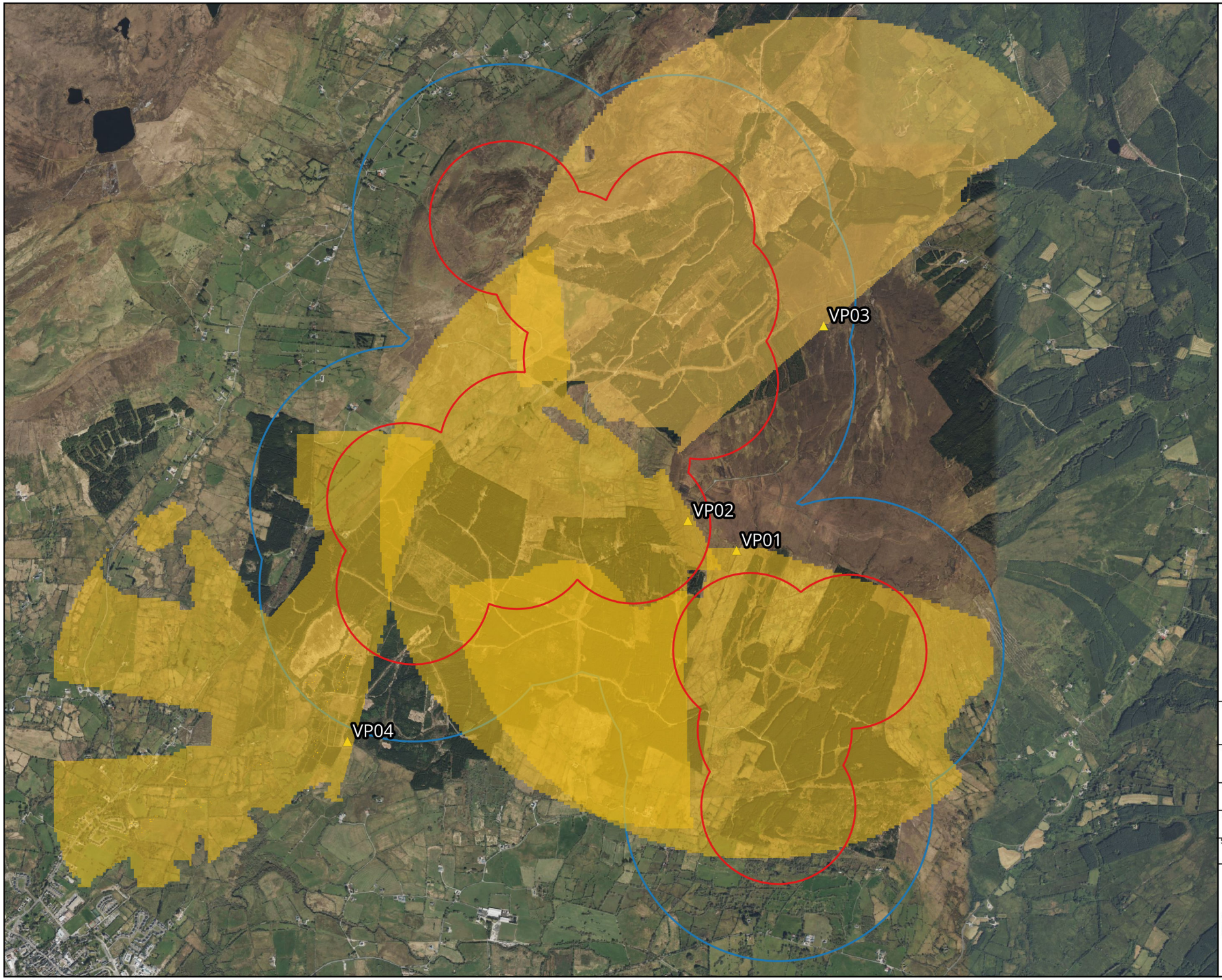

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- VP Locations

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Drawing Title

VP Locations and Viewsheds

Project Title

Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 1.1
Scale	Date
1:32,000	12.12.2025

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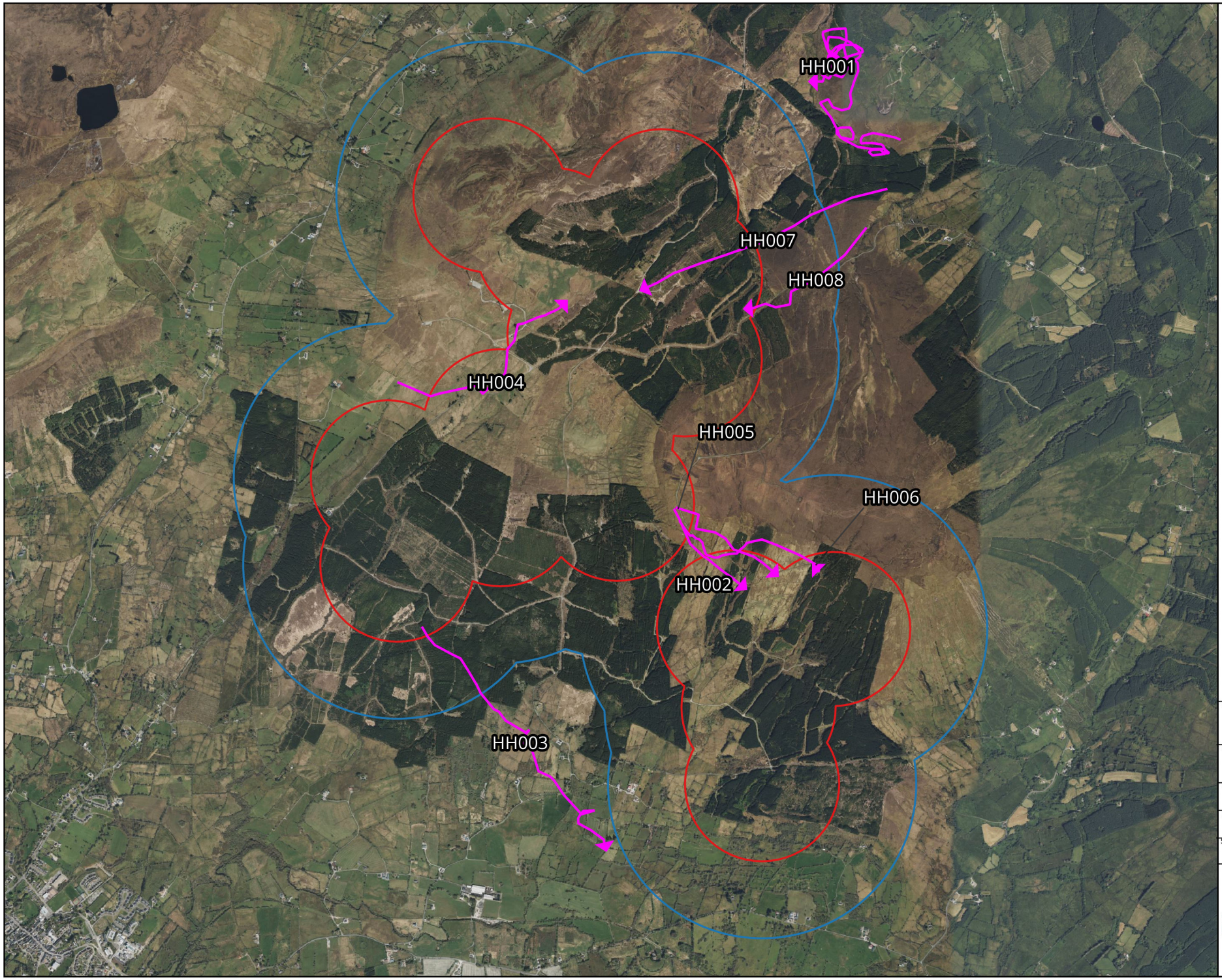

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title	Hen Harrier Vantage Point Observations
Project Title	Lissinagroagh
Drawn By: AOD	Checked By: SD
Project No.: 200217-j	Drawing No.: Fig 1.2
Scale: 1:32,000	Date: 12.12.2025

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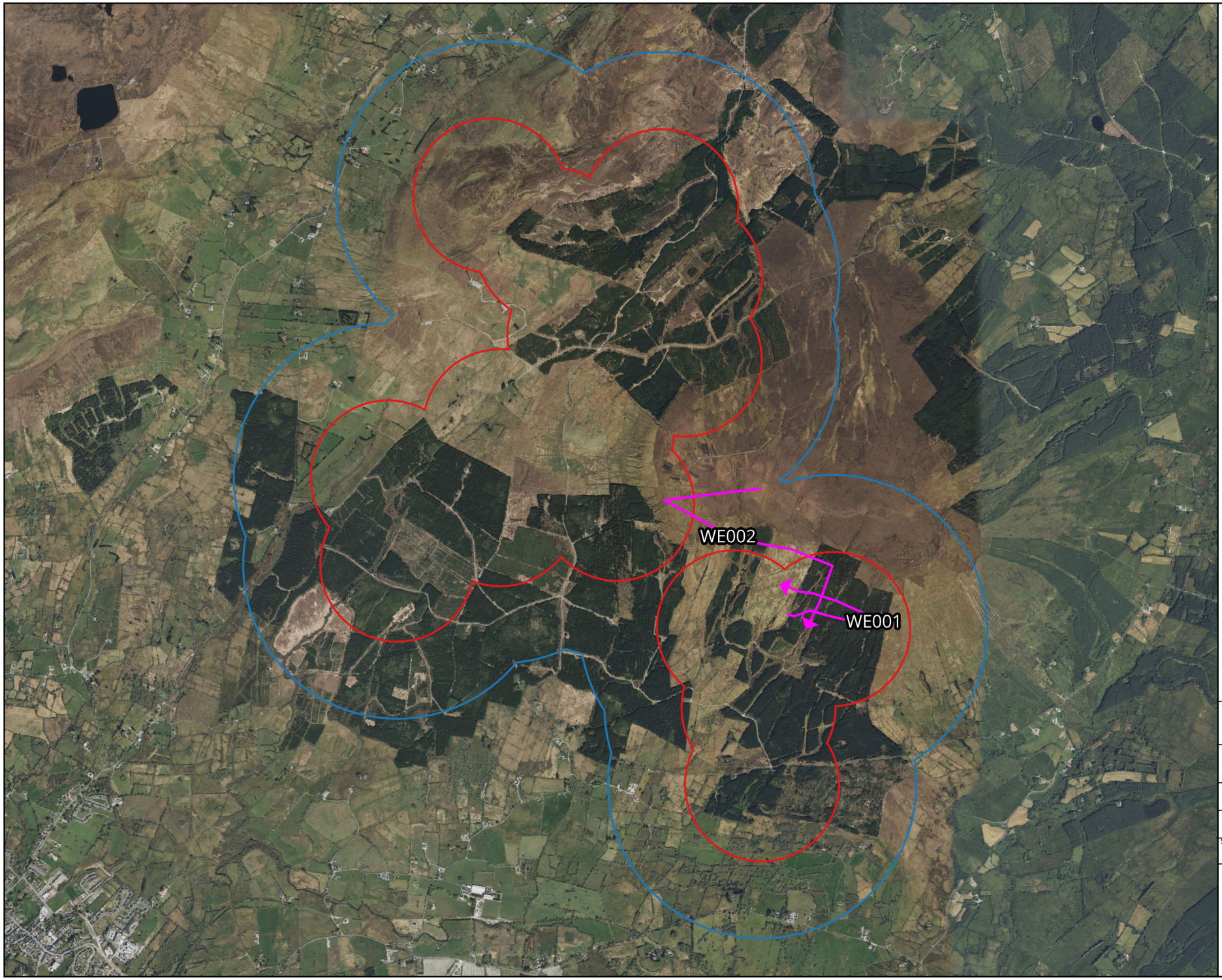

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title	White-tailed Eagle Vantage Point Observations
Project Title	Lissinagroagh
Drawn By: AOD	Checked By: SD
Project No.: 200217-j	Drawing No.: Fig 1.3
Scale: 1:32,000	Date: 12.12.2025

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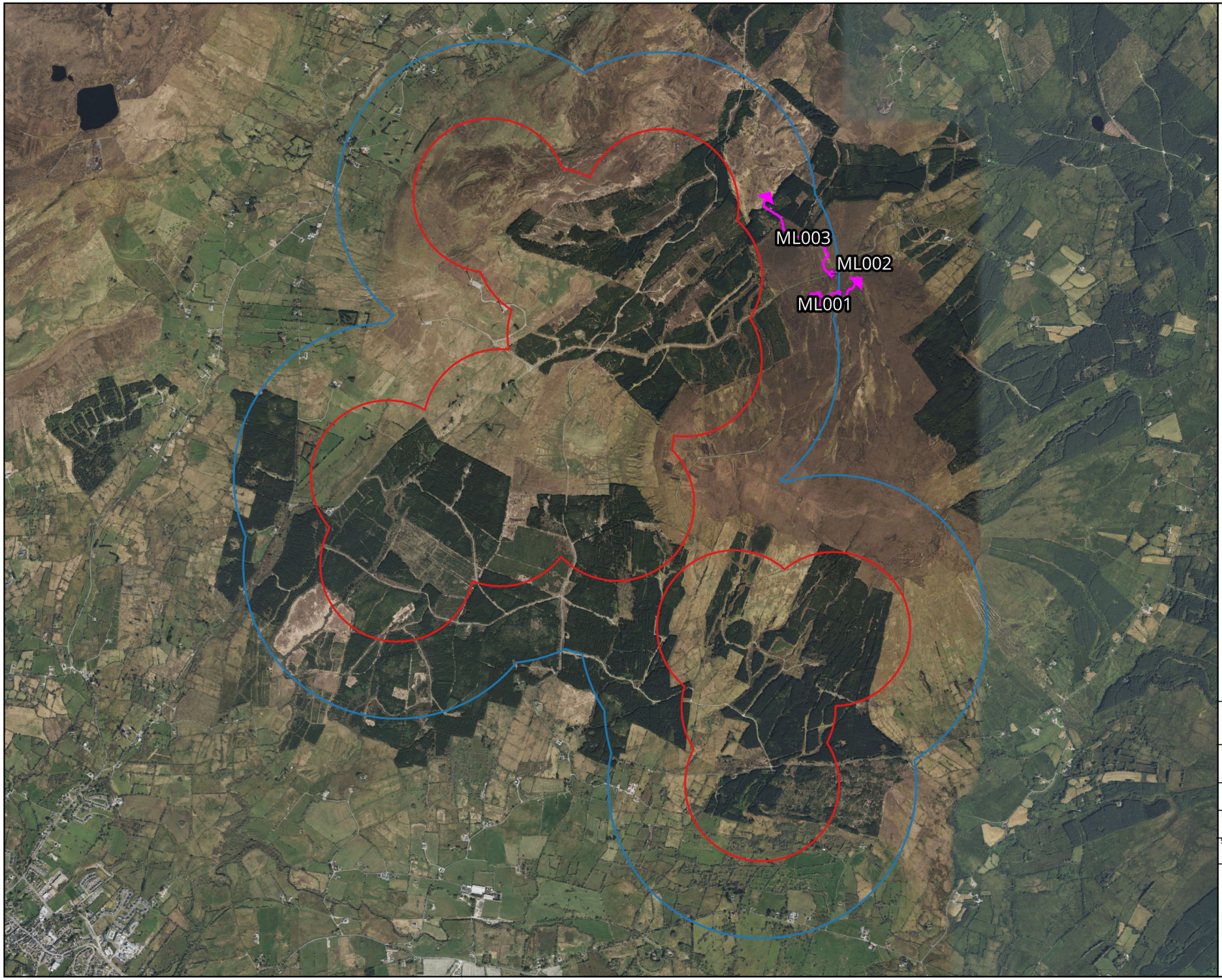

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title
Merlin Vantage Point Observations

Project Title
Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 1.4
Scale	Date
1:32,000	12.12.2025

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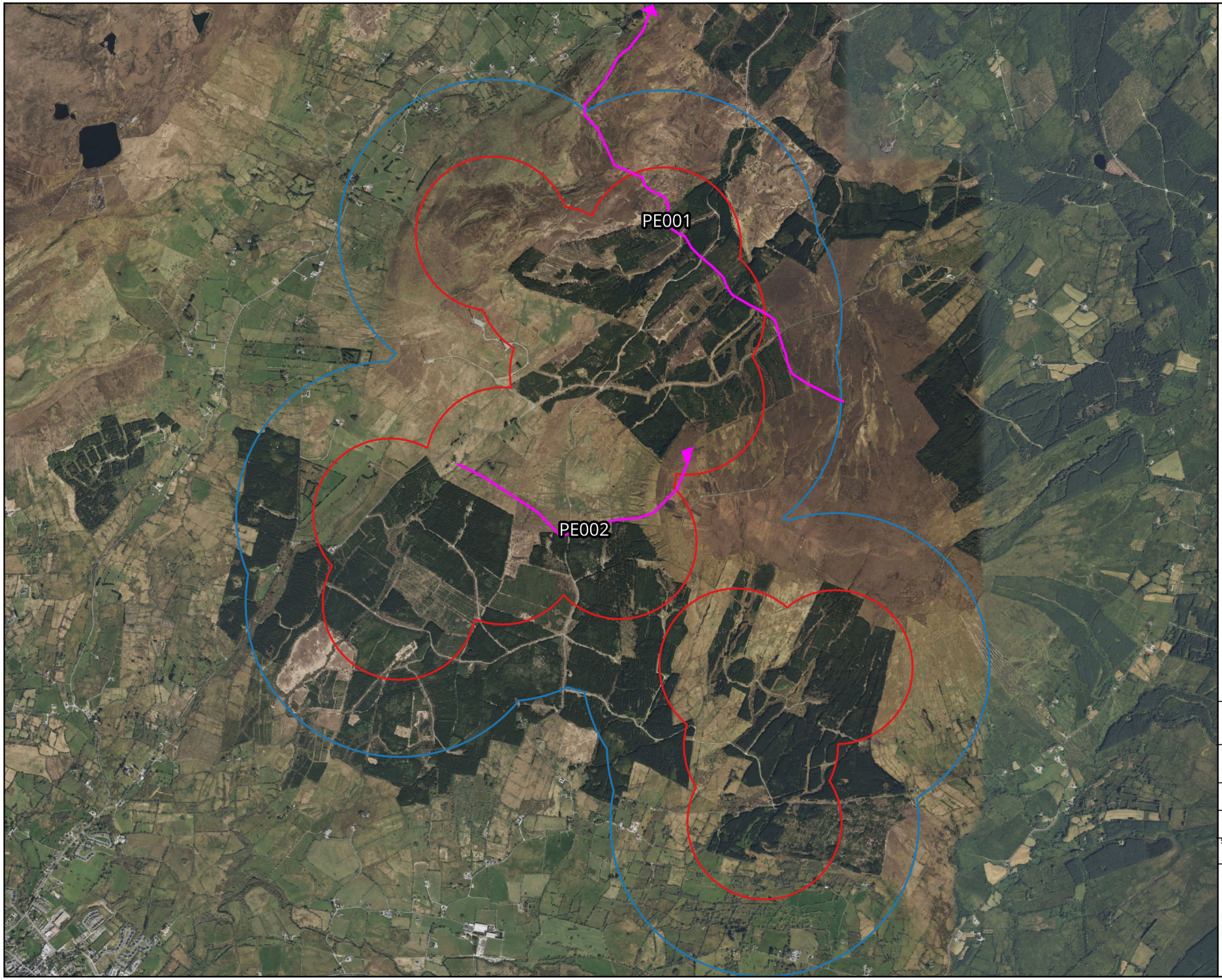

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title
Peregrine Vantage Point Observations

Project Title
Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 1.5
Scale	Date
1:32,000	12.12.2025

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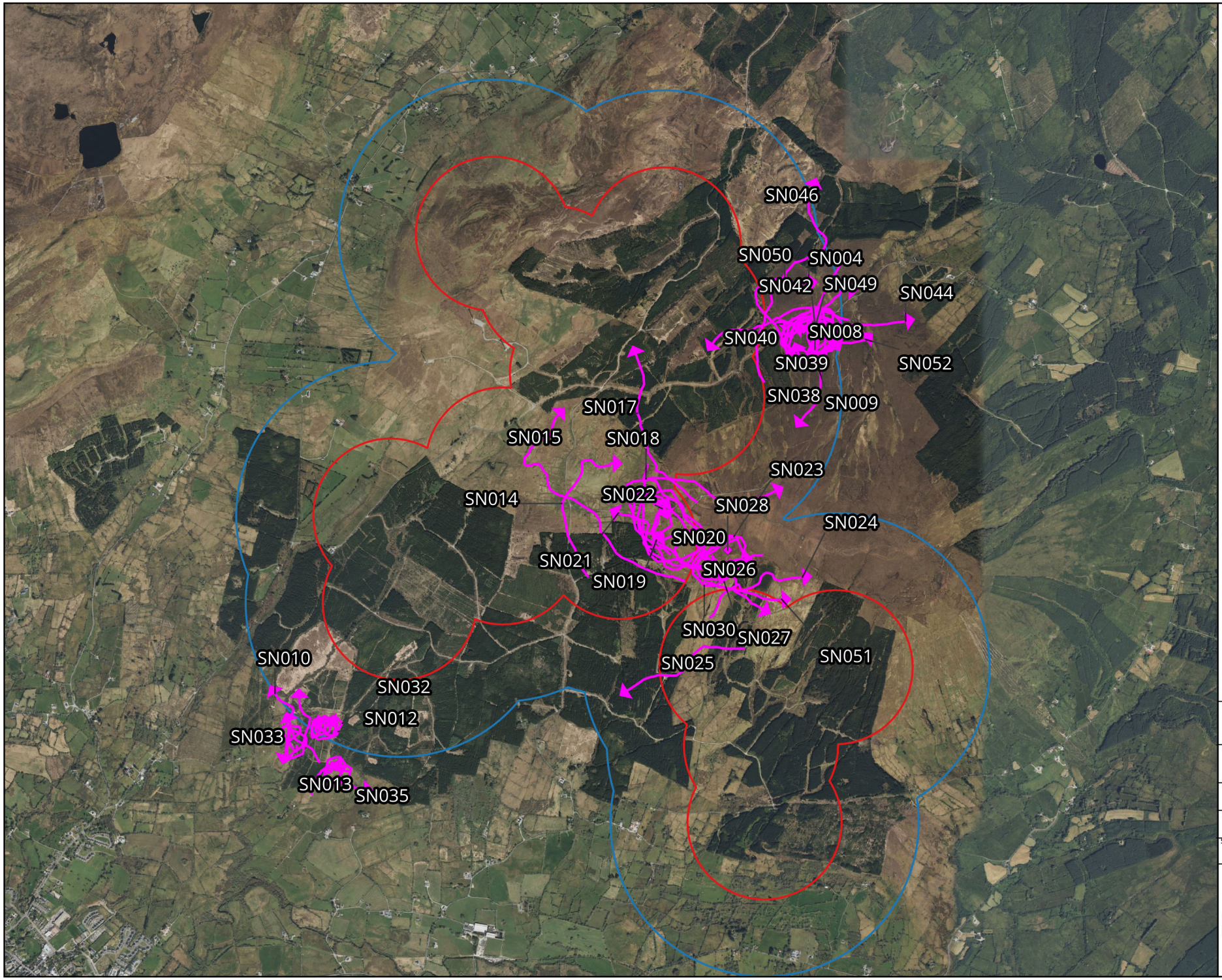

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title
Snipe Vantage Point Observations

Project Title
Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 1.6
Scale	Date
1:32,000	12.12.2025

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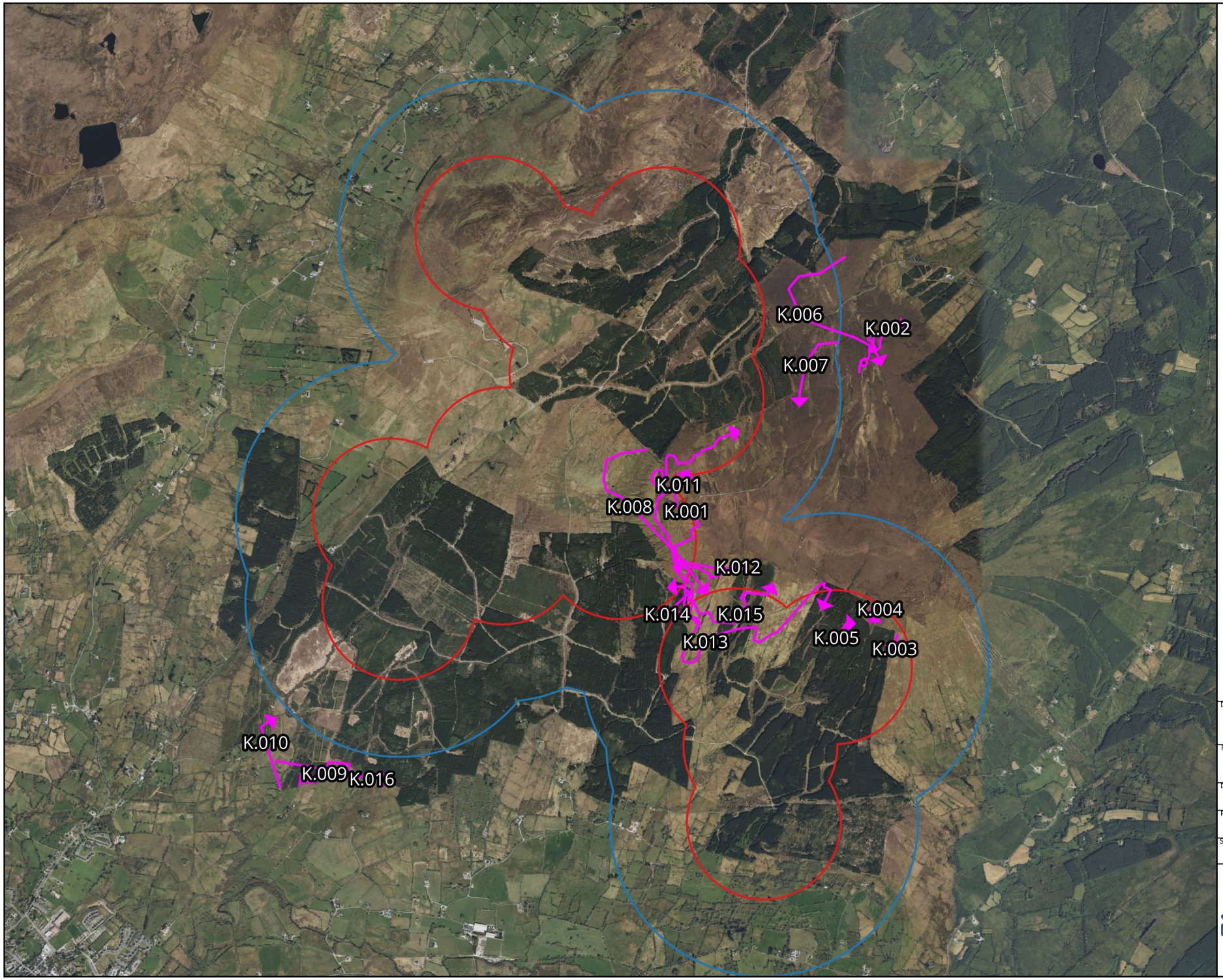

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title
Kestrel Vantage Point Observations

Project Title
Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 1.7
Scale	Date
1:32,000	12.12.2025

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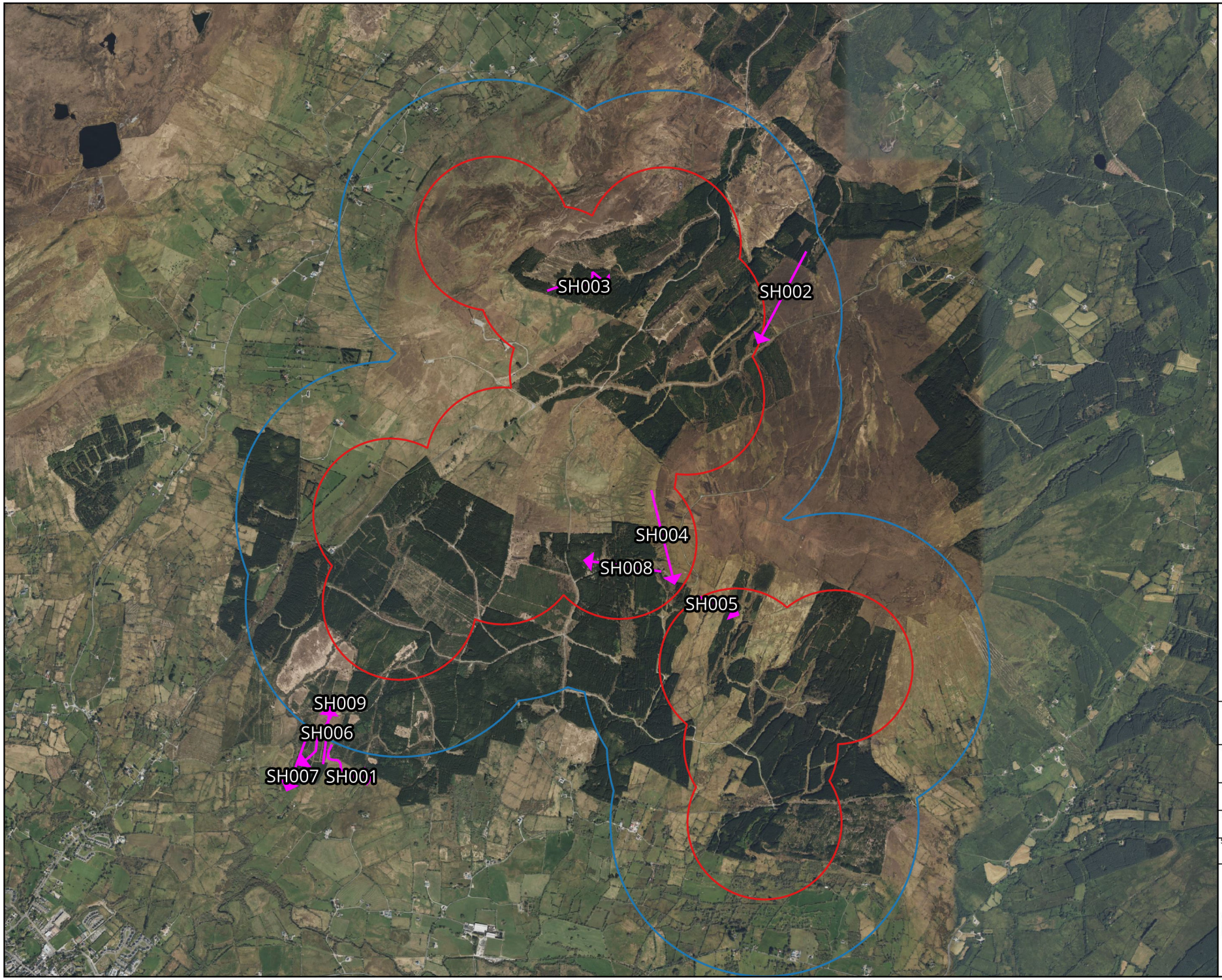

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title
Sparrowhawk Vantage Point Observations

Project Title
Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 1.8
Scale	Date
1:32,000	12.12.2025

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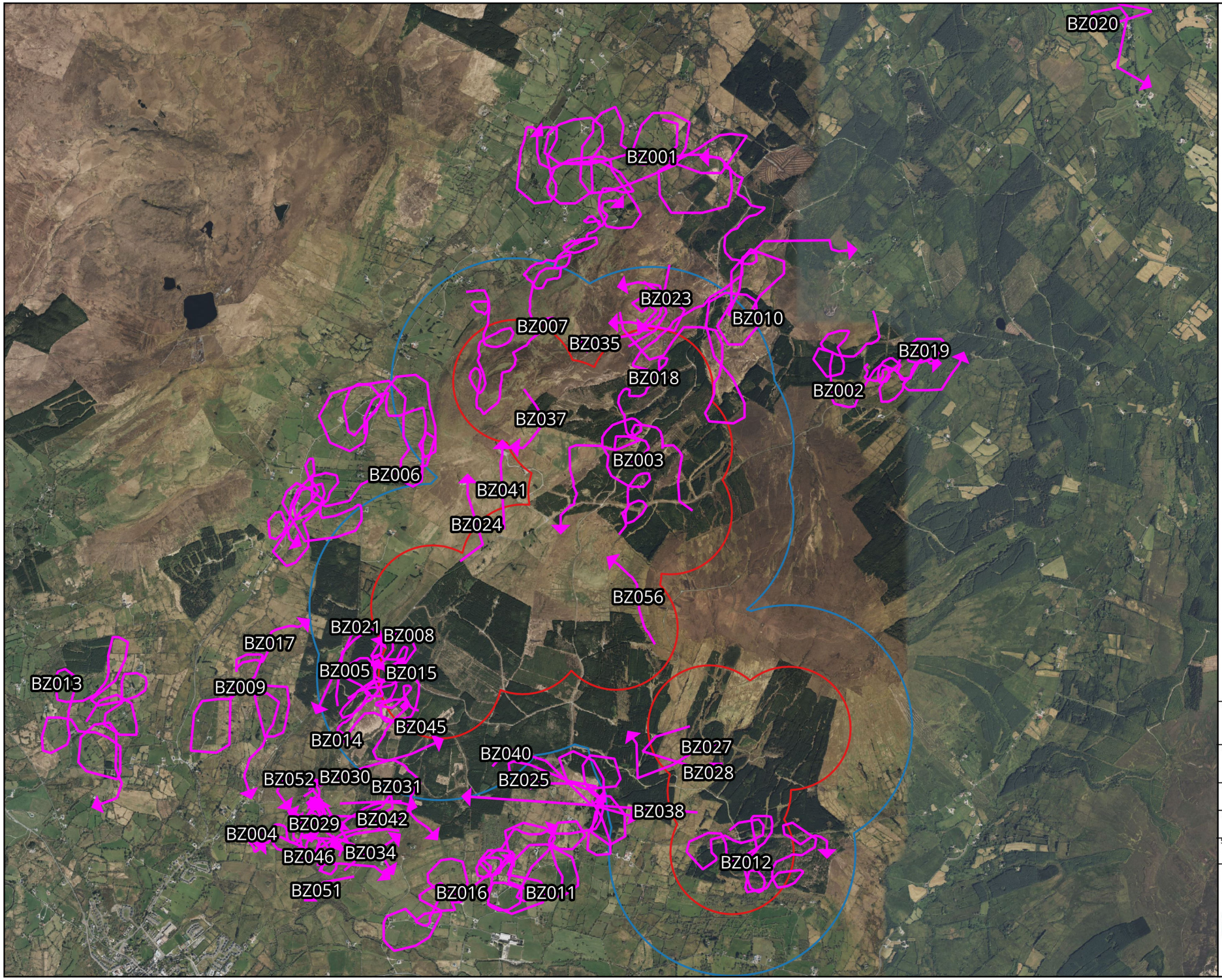

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title	Buzzard Vantage Point Observations
Project Title	Lissinagroagh
Drawn By: AOD	Checked By: SD
Project No.: 200217-j	Drawing No.: Fig 1.9
Scale: 1:40,000	Date: 12.12.2025

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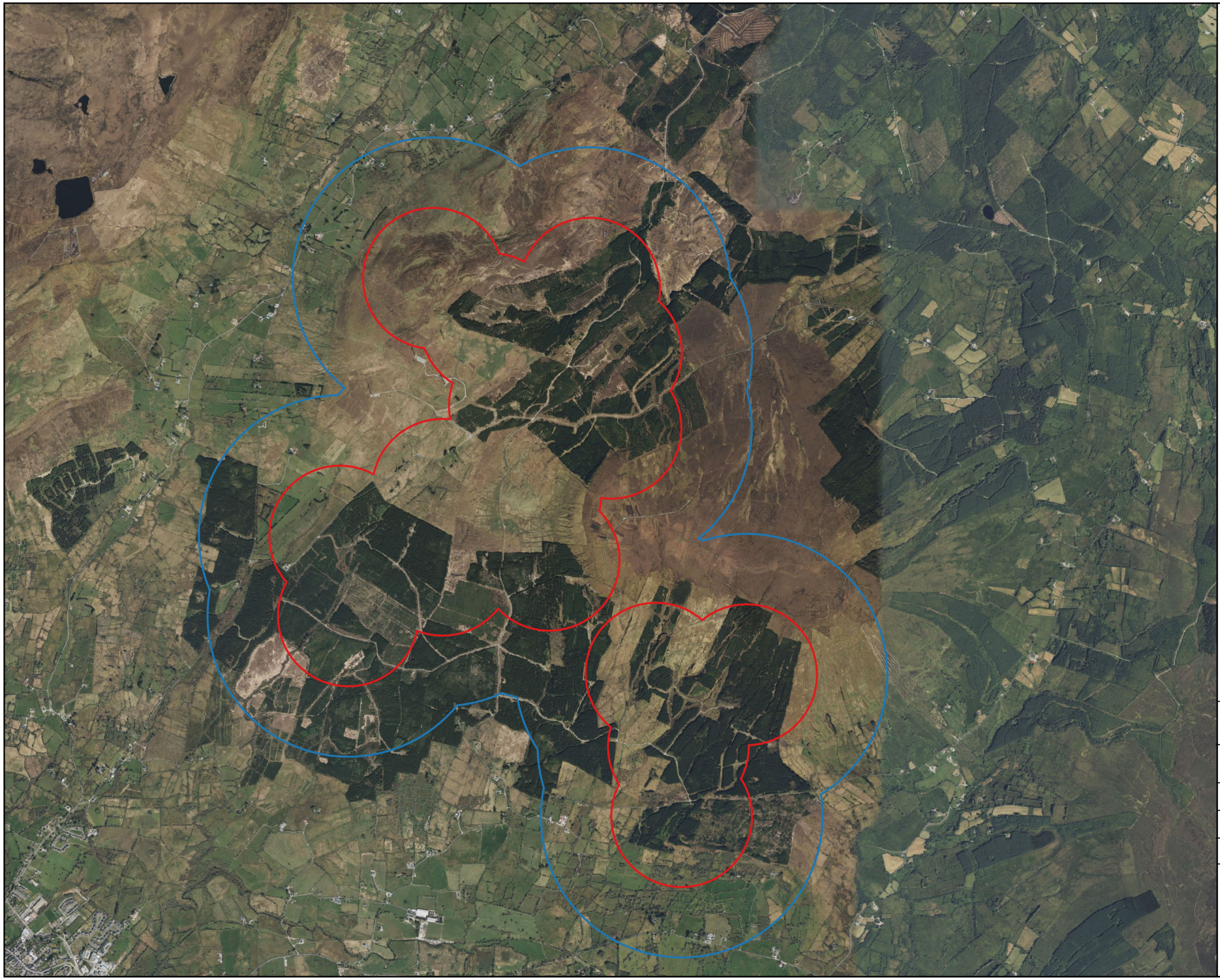

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Survey Location

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Drawing Title
Breeding Raptor Survey Locations

Project Title
Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 2.0
Scale	Date
1:35,000	12.12.2025

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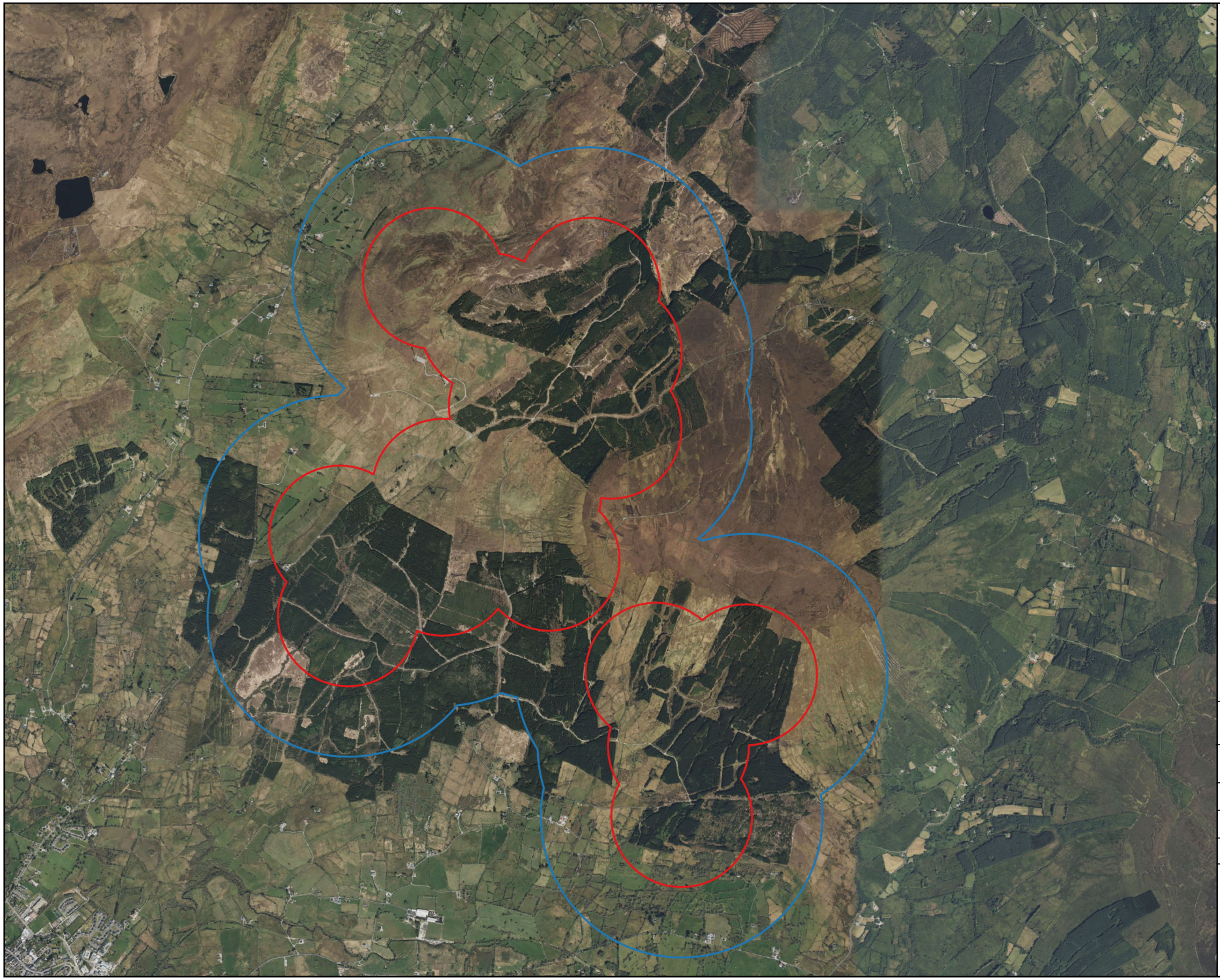

Drawing Title
Hen Harrier Breeding Raptor Observations

Project Title
Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 2.1
Scale	Date
1:35,000	12.12.2025

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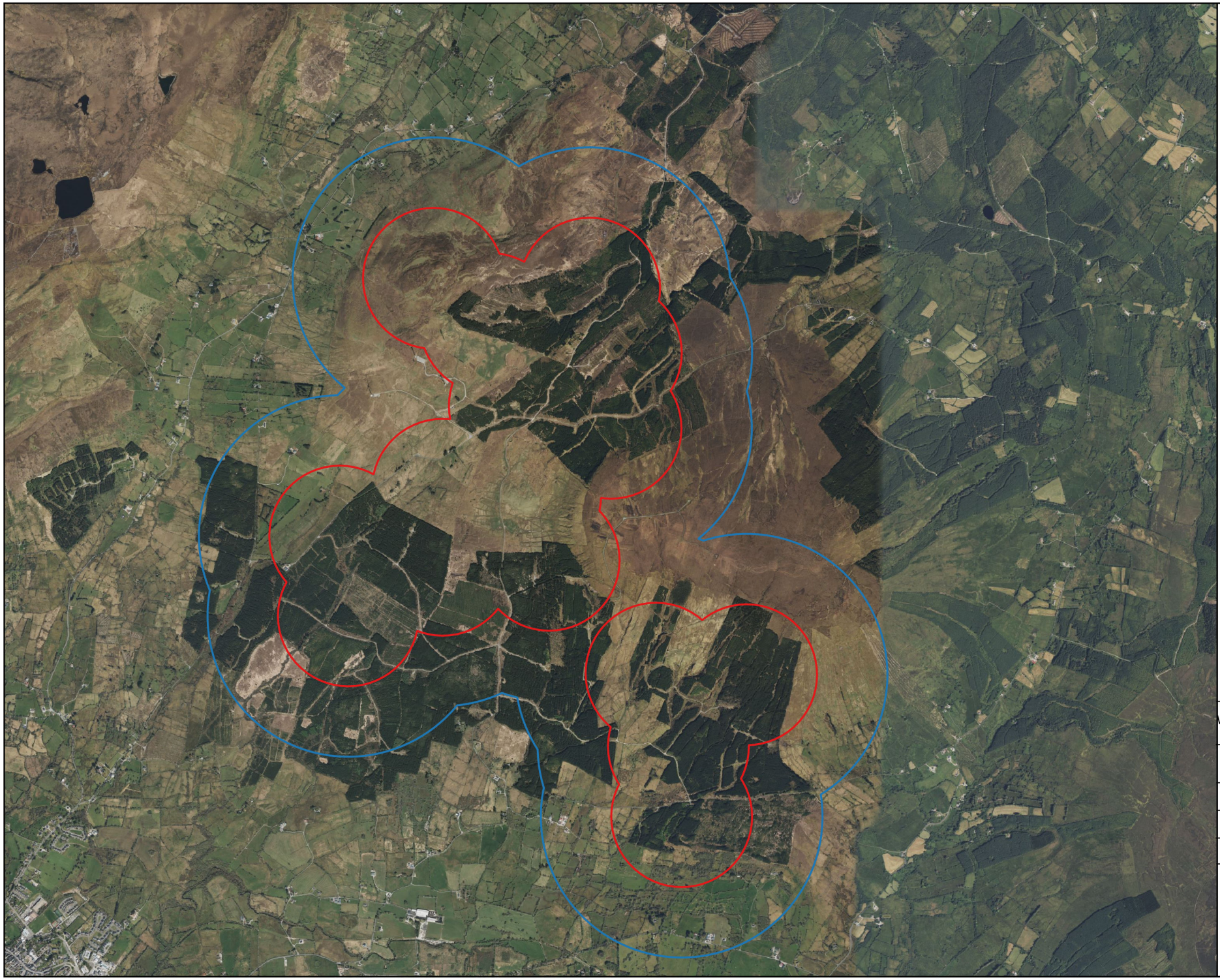

Drawing Title
White-tailed Eagle Breeding Raptor Observations

Project Title
Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 2.2
Scale	Date
1:35,000	12.12.2025

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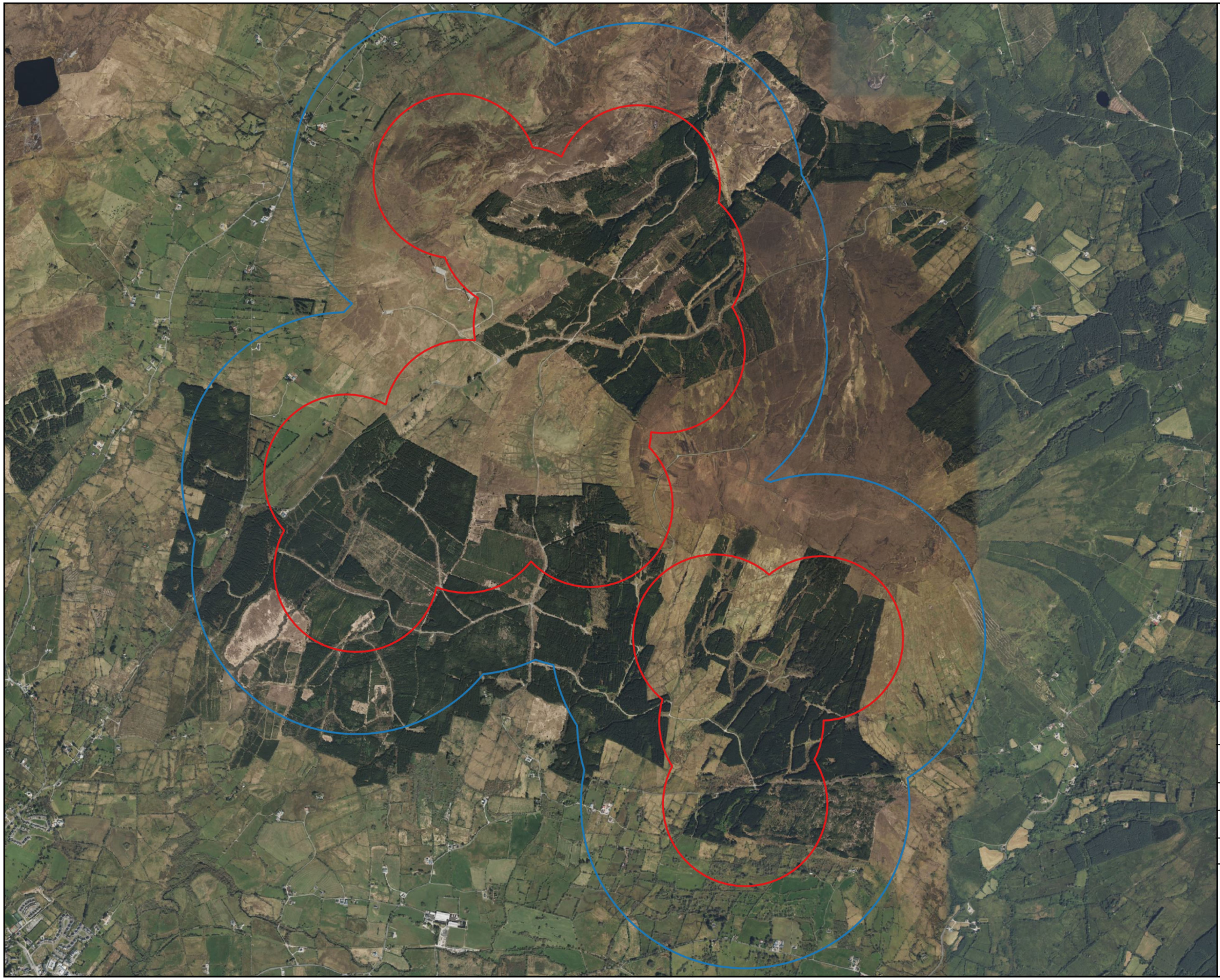

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title
Osprey Breeding Raptor Observations

Project Title
Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 2.3
Scale	Date
1:30,000	12.12.2025

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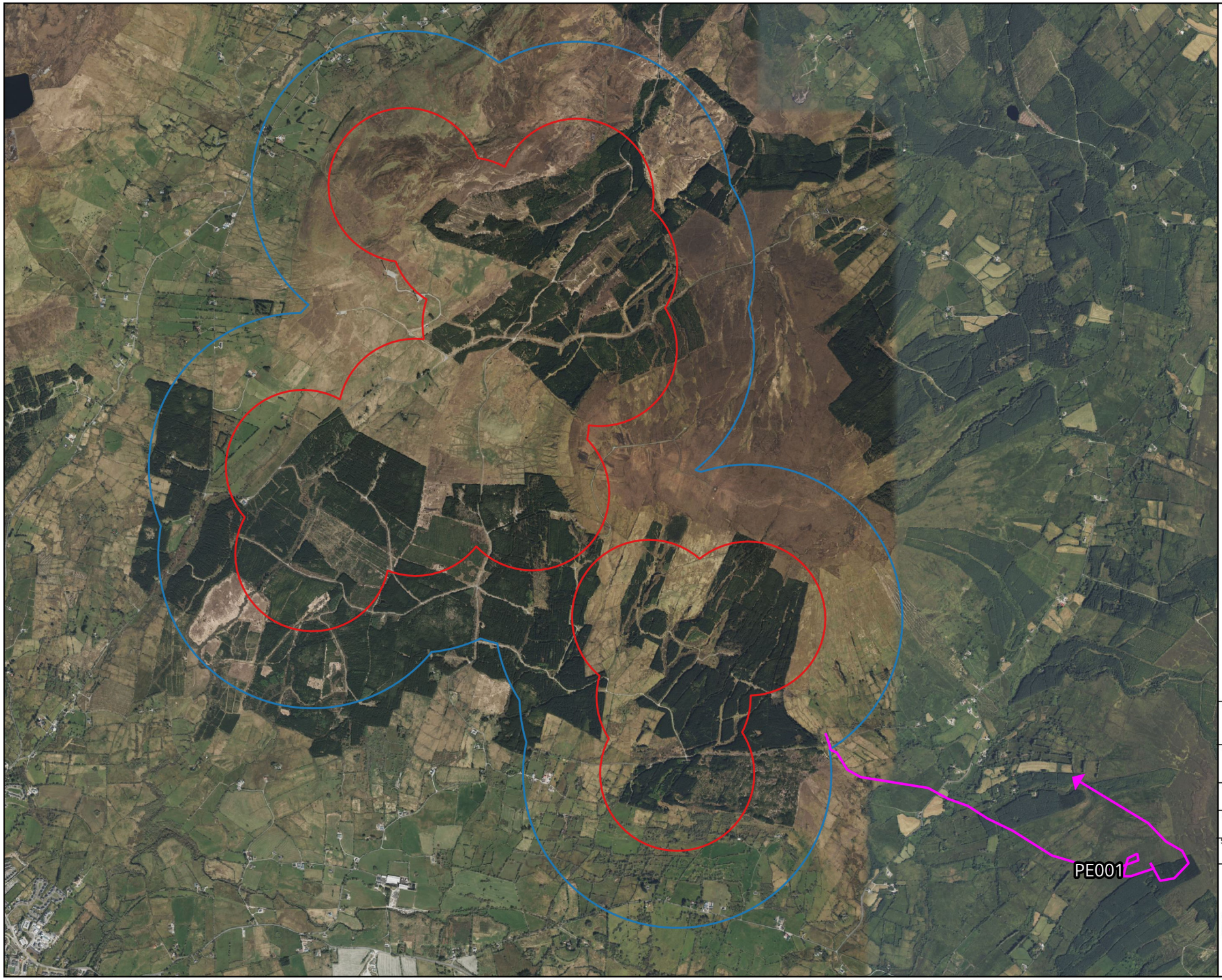

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title
Peregrine Breeding Raptor Observations

Project Title
Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 2.4
Scale	Date
1:32,000	12.12.2025

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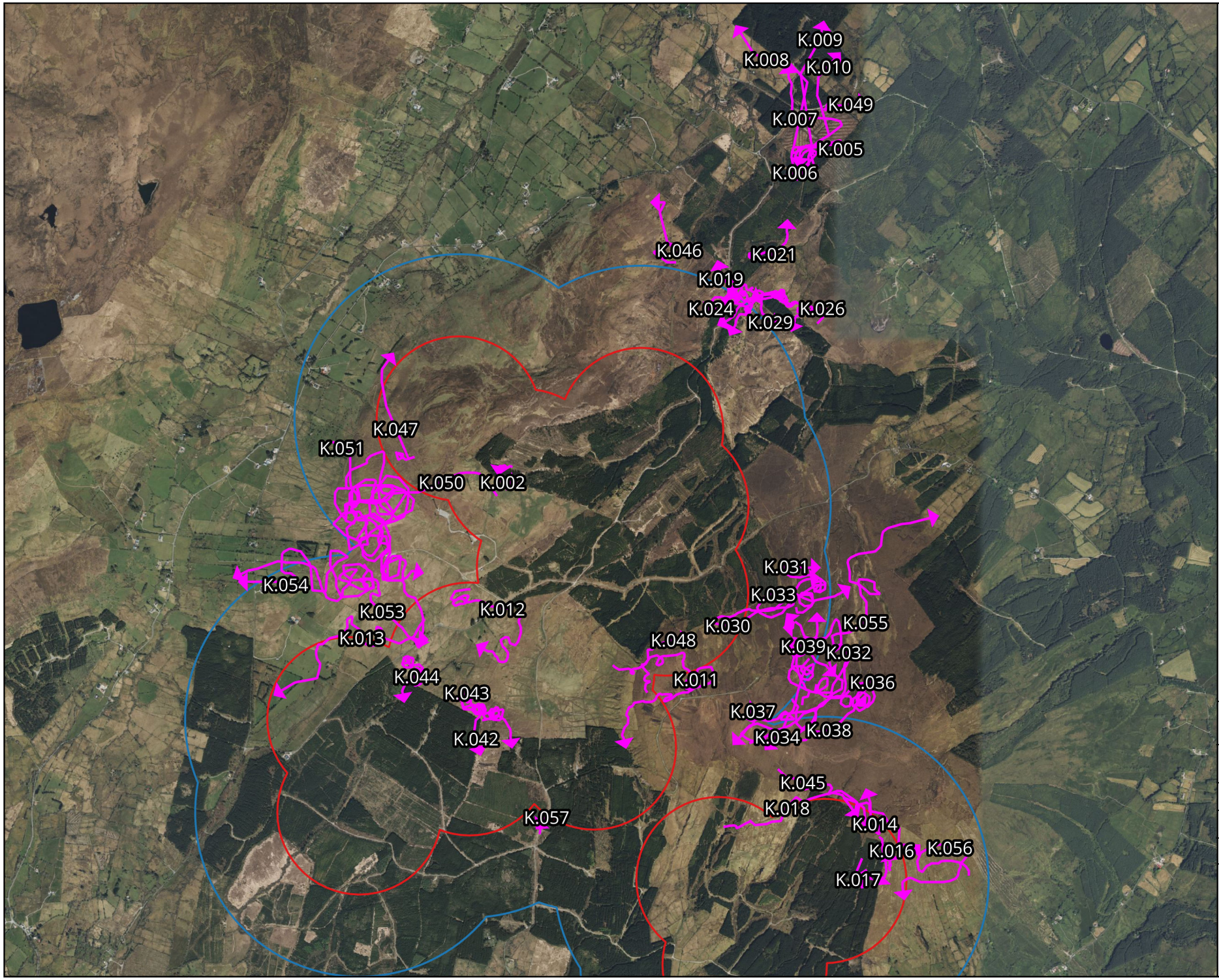

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title
Kestrel Breeding Raptor Observations

Project Title
Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 2.5
Scale	Date
1:30,000	12.12.2025

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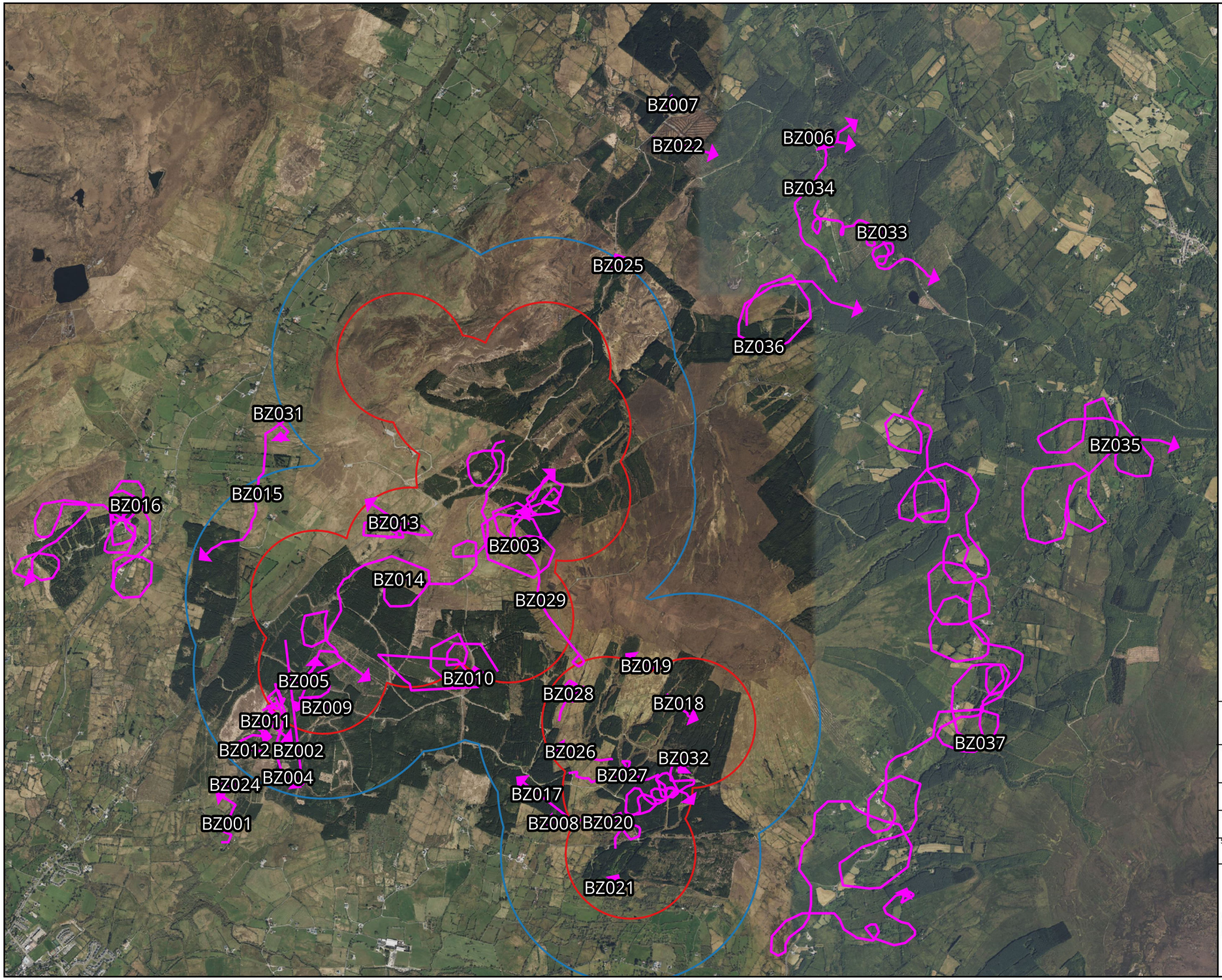

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title
Buzzard Breeding Raptor Observations

Project Title
Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 2.6
Scale	Date
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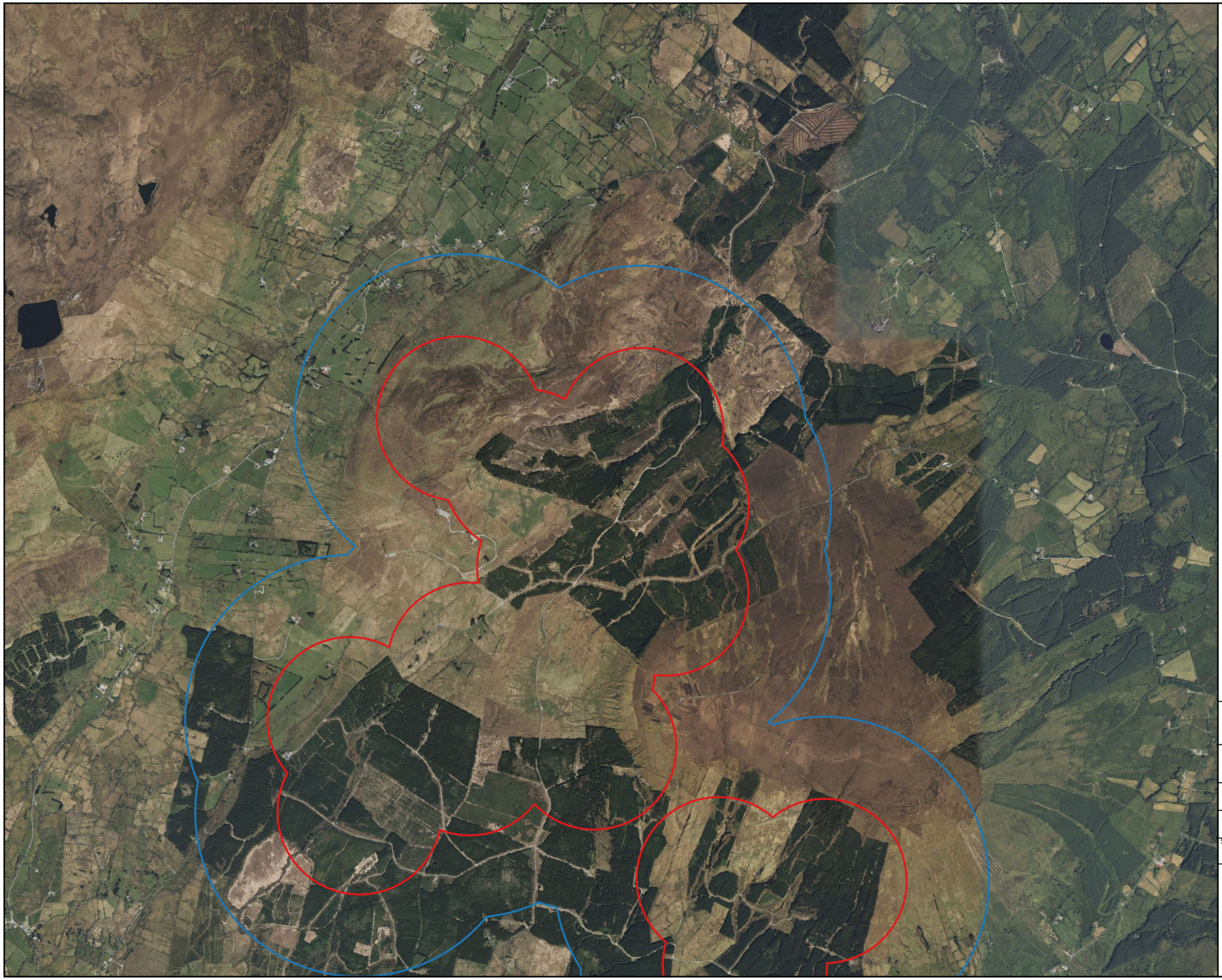

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title
Sparrowhawk Breeding Raptor Observations

Project Title
Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 2.7
Scale	Date
1:30,000	12.12.2025

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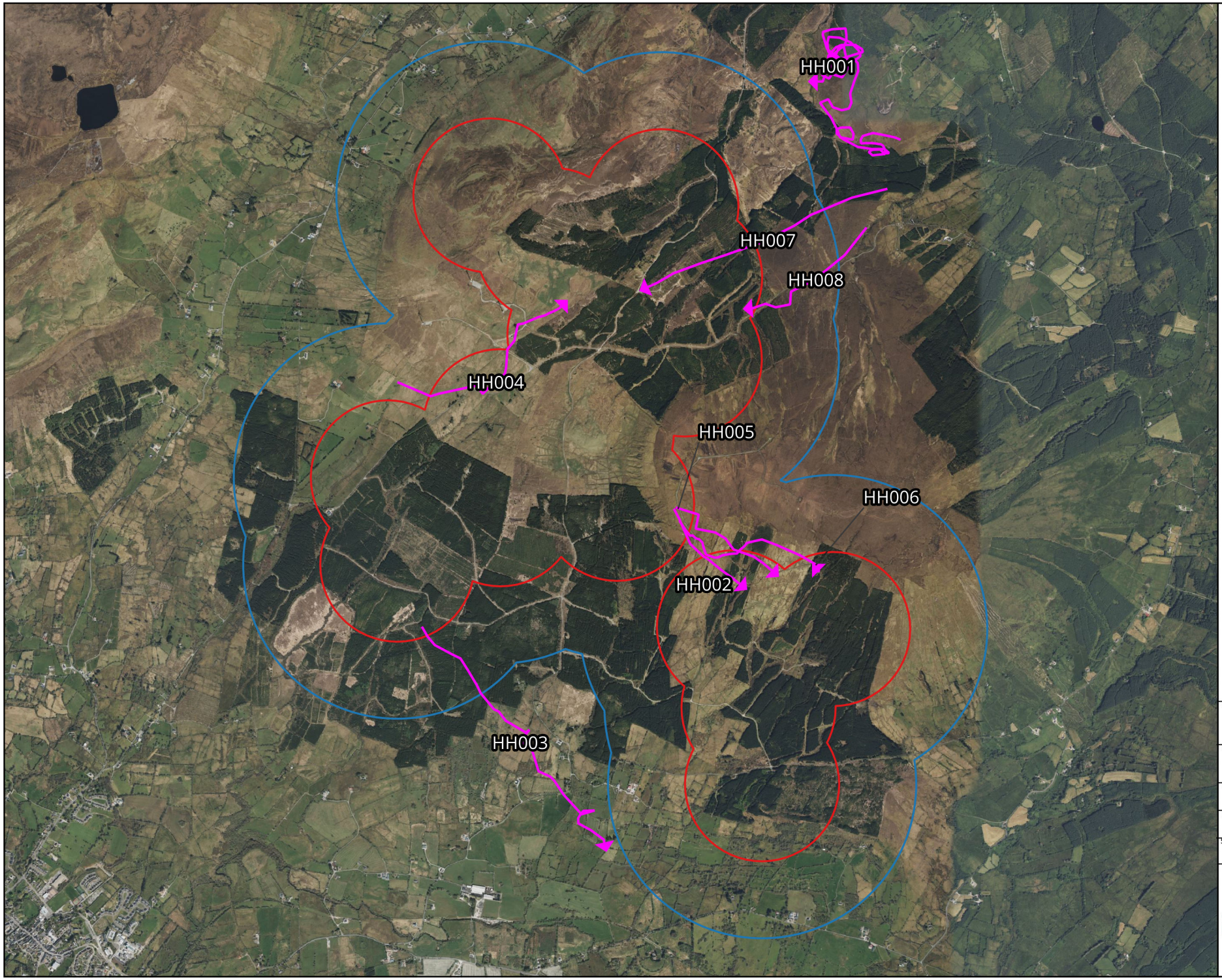

Map Legend

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- Lissinagroagh 500m radius
- Flightline

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Drawing Title	Hen Harrier Incidental Observations
Project Title	Lissinagroagh
Drawn By: AOD	Checked By: SD
Project No.: 200217-j	Drawing No.: Fig 3.0
Scale: 1:32,000	Date: 12.12.2025

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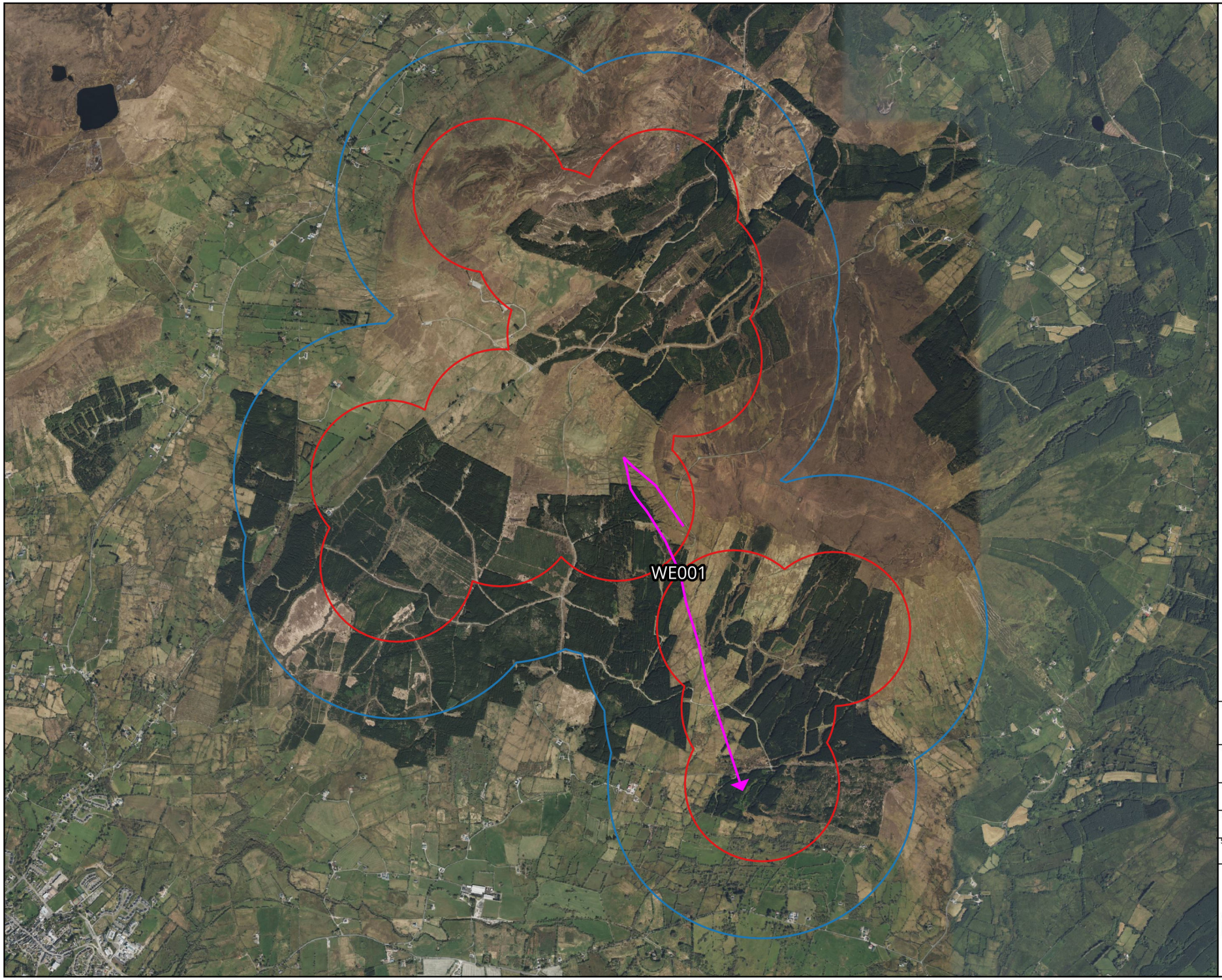

Map Legend

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- Lissinagroagh 500m radius
- Flightline

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Drawing Title
White-tailed Eagle Incidental Observations

Project Title
Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 3.1
Scale	Date
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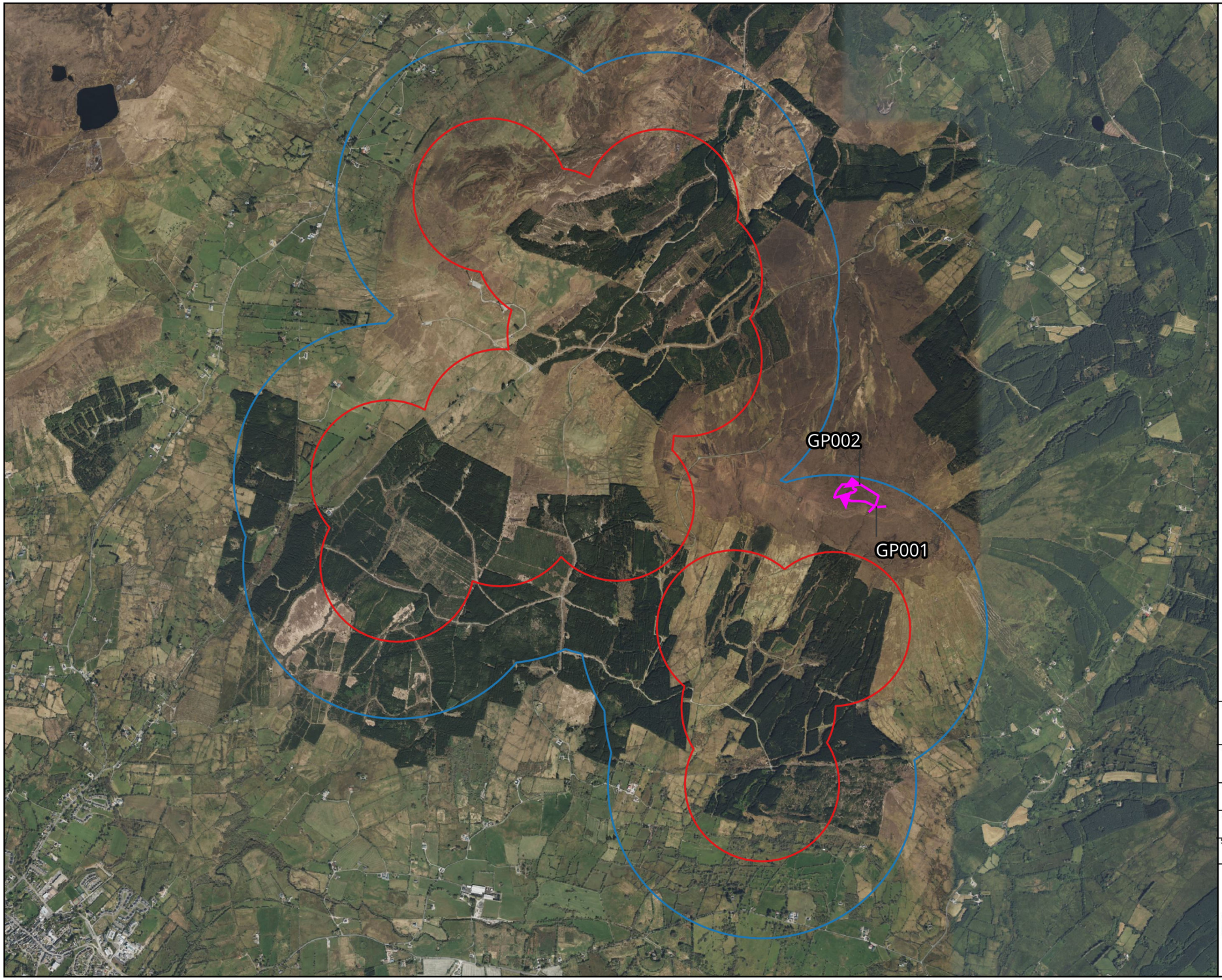

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title
Golden Plover Incidental Observations

Project Title
Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 3.2
Scale	Date
1:32,000	12.12.2025

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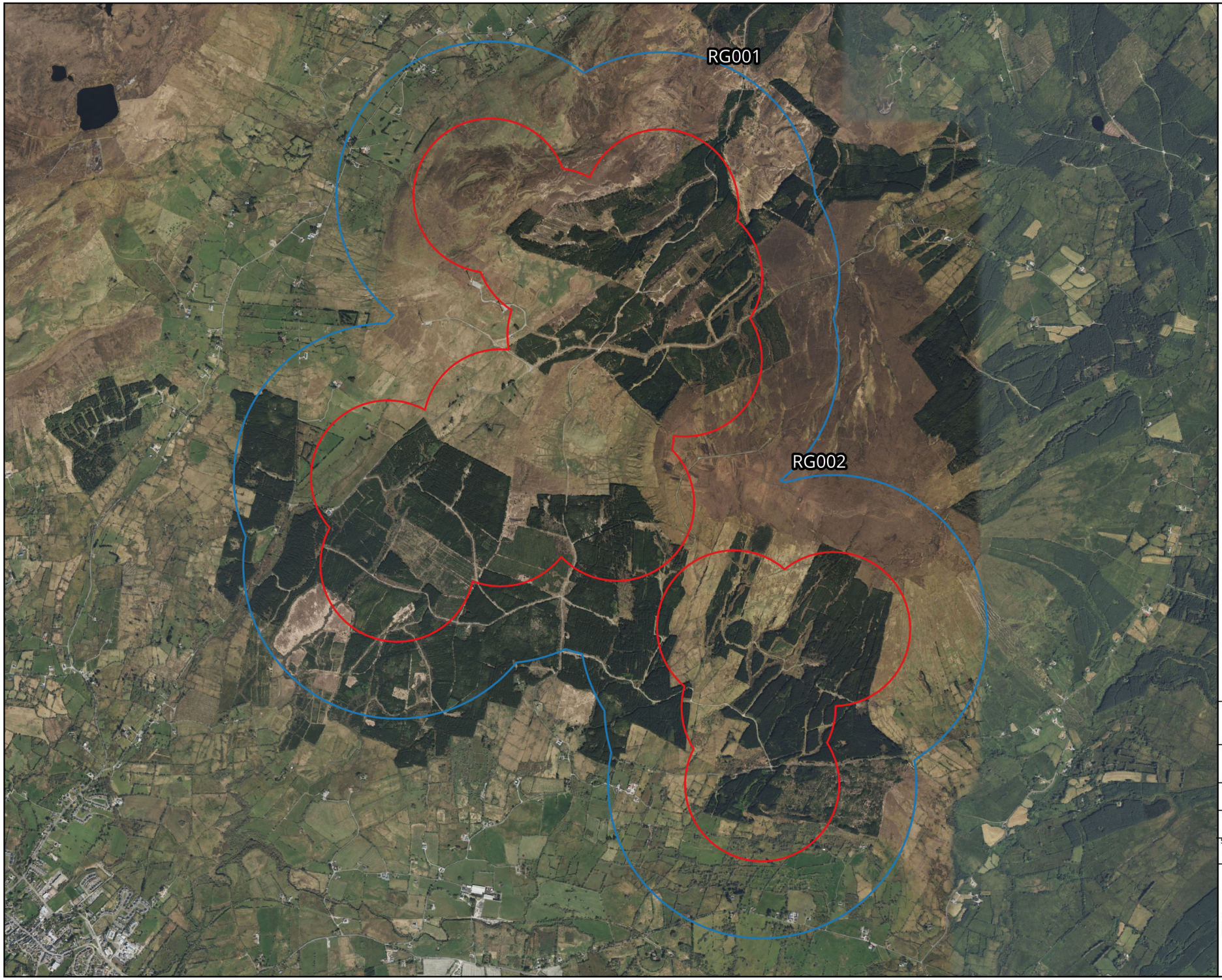

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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Drawing Title	Red Grouse Incidental Observations
Project Title	Lissinagroagh
Drawn By: AOD	Checked By: SD
Project No.: 200217-j	Drawing No.: Fig 3.3
Scale: 1:32,000	Date: 12.12.2025

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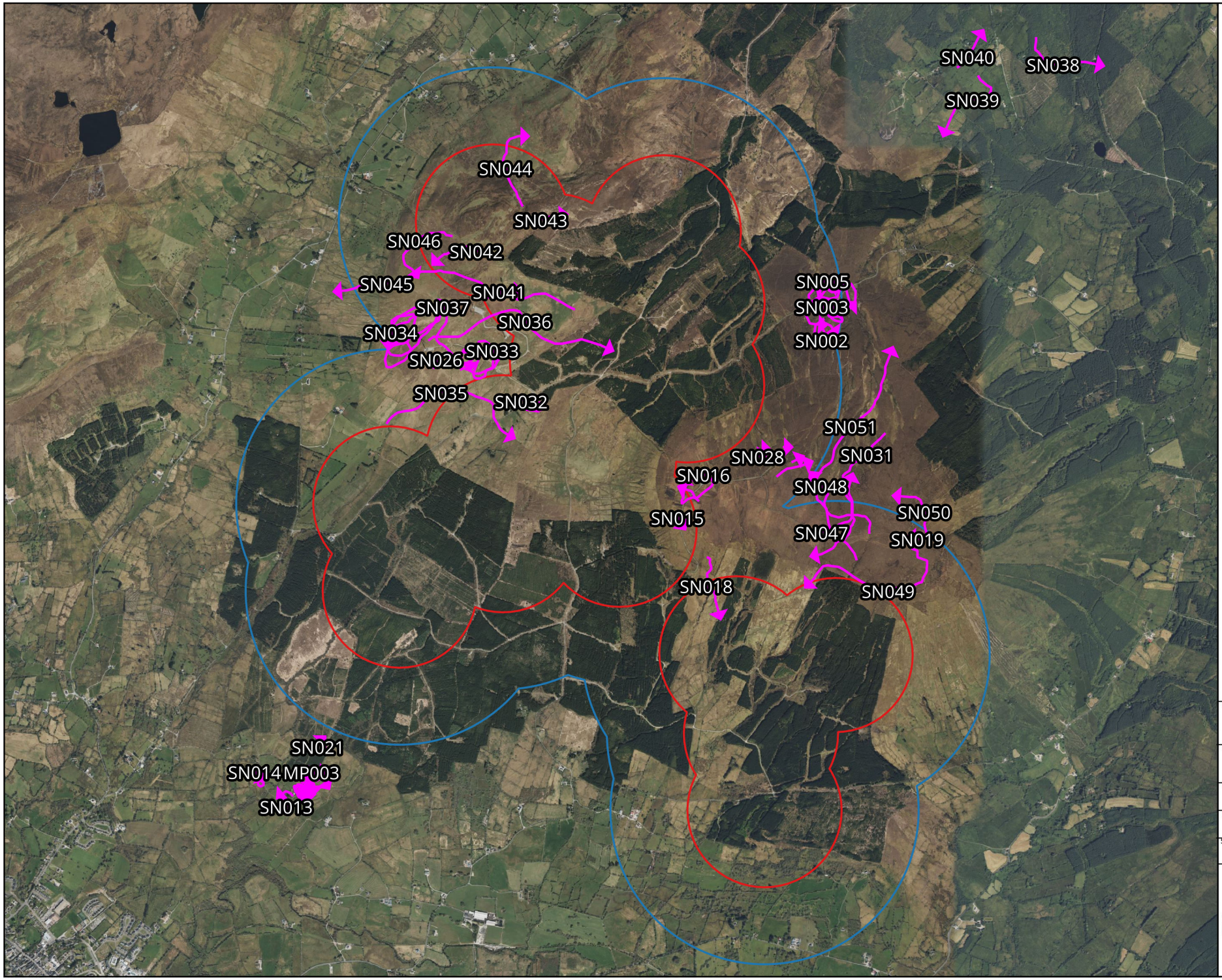

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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N

Drawing Title

Snipe Incidental Observations

Project Title

Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 3.4
Scale	Date
1:32,000	12.12.2025

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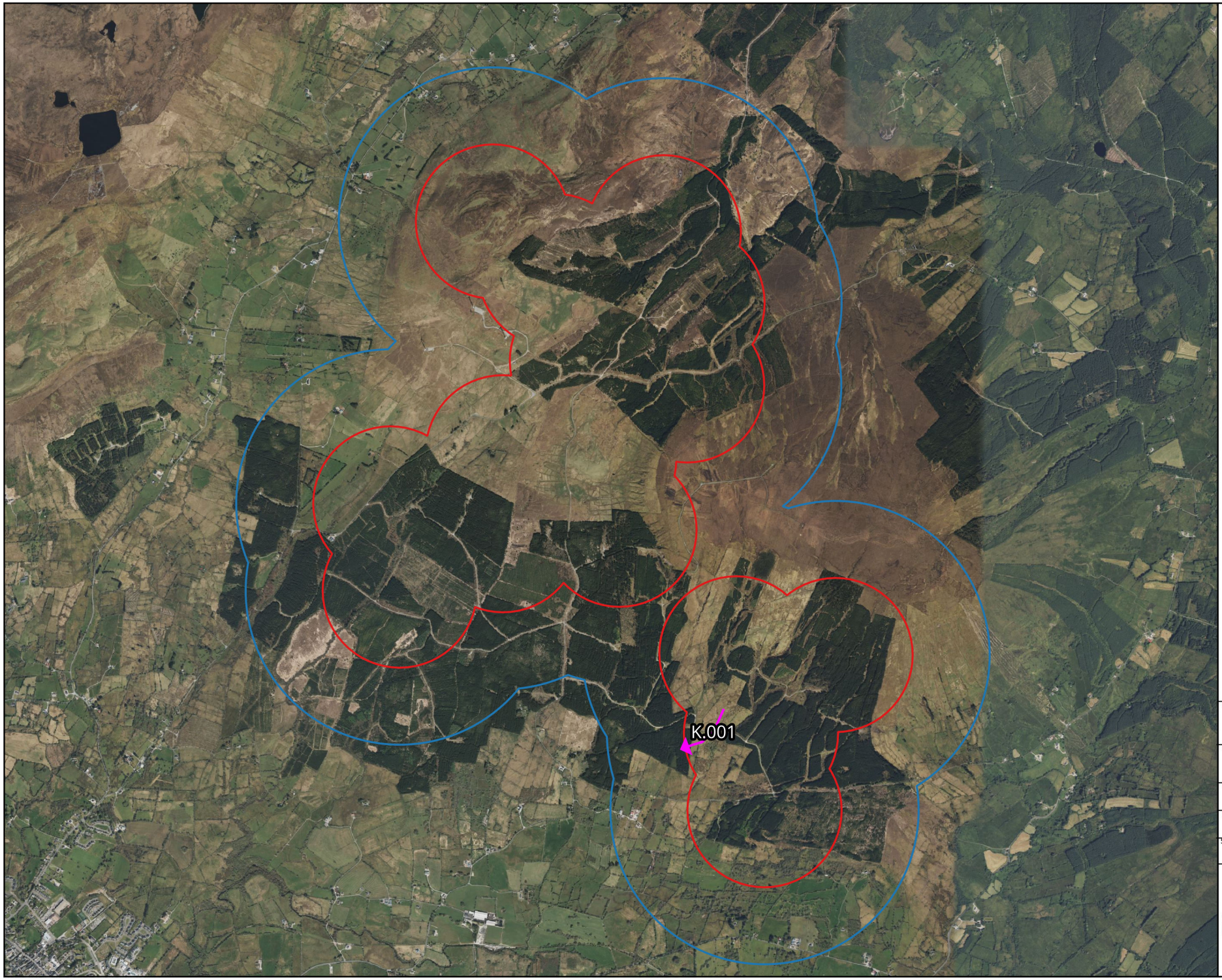

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

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N

Drawing Title

Kestrel Incidental Observations

Project Title

Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 3.5
Scale	Date
1:32,000	12.12.2025

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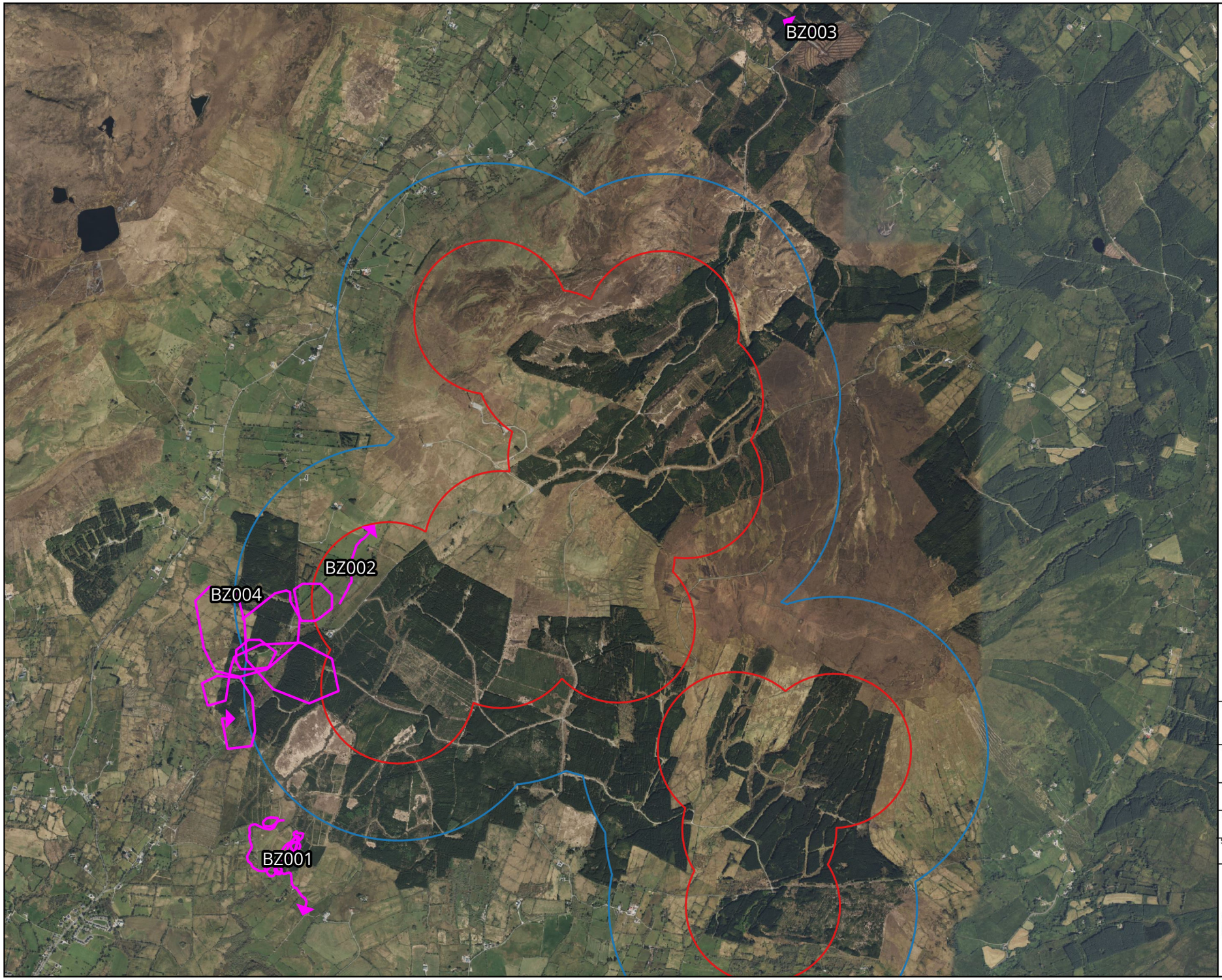

Map Legend

- Lissinagroagh site boundary
- Lissinagroagh 500m radius
- Flightline

N

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Drawing Title

Buzzard Incidental Observations

Project Title

Lissinagroagh

Drawn By	Checked By
AOD	SD
Project No.	Drawing No.
200217-j	Fig 3.6
Scale	Date
1:32,000	12.12.2025

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APPENDIX 2

DETAILED SURVEY DATA

Table 1.0 Survey Effort

Date	Survey	Location	Duration (h)	Weather Conditions	Comments	Surveyor
08/04/2025	Vantage Point Survey	VP3	3:00 starting at 14:50	Visibility: good; Wind speed and direction: light breeze ESE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Clear and bright throughout. High cirrus cloud. Light breeze, 9 - 15°C	NM
08/04/2025	Vantage Point Survey	VP3	3:00 starting at 18:20	Visibility: good; Wind speed and direction: light breeze SE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Heat haze apparent on moor. Dusk survey. Sunset - 20:20	NM
09/04/2025	Vantage Point Survey	VP4	3:00 starting at 14:50	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Clear and bright throughout. Light breeze. Warm, heat haze. 10 - 17°C	NM
09/04/2025	Vantage Point Survey	VP4	3:00 starting at 18:22	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Dusk survey. Sunset - 20:22	NM
10/04/2025	Vantage Point Survey	VP2	3:00 starting at 14:55	Visibility: good; Wind speed and direction: gentle breeze WNW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Clear and bright throughout. Warm, 9 - 18°C	NM
10/04/2025	Vantage Point Survey	VP2	3:00 starting at 18:25	Visibility: good; Wind speed and direction: light breeze W; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Dusk survey. Sunset - 20:24	NM
11/04/2025	Vantage Point Survey	VP1	3:00 starting at 14:55	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Clear and bright throughout.	NM
11/04/2025	Vantage Point Survey	VP1	3:00 starting at 18:25	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Cloud cover increasing in evening. Dusk survey. Sunset - 20:26	NM
16/04/2025	Breeding Raptor Survey	BR1	3:00 starting at 13:15	Visibility: moderate; Wind speed and direction: fresh breeze NW; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none		AOD
16/04/2025	Breeding Raptor Survey	BR4	3:00 starting at 16:50	Visibility: moderate; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
17/04/2025	Breeding Raptor Survey	BR10	3:00 starting at 06:00	Visibility: moderate; Wind speed and direction: light breeze N; Cloud cover and height: 0-33% >500m; Rain: none; Frost: light; Snow: none		CM
17/04/2025	Breeding Raptor Survey	BR11	3:00 starting at 09:30	Visibility: moderate; Wind speed and direction: gentle breeze N; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		CM
24/04/2025	Breeding Raptor Survey	BR5	3:00 starting at 06:00	Visibility: moderate; Wind speed and direction: gentle breeze SE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		CM
24/04/2025	Breeding Raptor Survey	BR12	3:00 starting at 09:30	Visibility: moderate; Wind speed and direction: gentle breeze SE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		CM
25/04/2025	Breeding Raptor Survey	BR1	3:00 starting at 15:00	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		AOD
25/04/2025	Breeding Raptor Survey	BR8	2:00 starting at 19:00	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% >500m; Rain: heavy showers; Frost: none; Snow: none		AOD
28/04/2025	Breeding Raptor Survey	BR4	3:00 starting at 14:15	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD

28/04/2025	Breeding Raptor Survey	BR13	3:00 starting at 17:25	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
08/05/2025	Vantage Point Survey	VP4	3:00 starting at 04:40	Visibility: good; Wind speed and direction: light breeze NW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Clear and bright throughout. Dawn survey. Sunrise - 05:42	NM
08/05/2025	Vantage Point Survey	VP4	3:00 starting at 08:10	Visibility: good; Wind speed and direction: gentle breeze WNW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Breeze picking up slightly	NM
08/05/2025	Breeding Raptor Survey	BR7	3:00 starting at 16:15	Visibility: poor; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
08/05/2025	Breeding Raptor Survey	BR7	3:00 starting at 16:15	Visibility: poor; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
08/05/2025	Breeding Raptor Survey	BR8	2:00 starting at 19:25	Visibility: poor; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
08/05/2025	Breeding Raptor Survey	BR8	2:00 starting at 19:25	Visibility: poor; Wind speed and direction: light breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
09/05/2025	Vantage Point Survey	VP3	3:00 starting at 04:40	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: light; Snow: none	Light frost early. Clear and bright throughout. Cold at dawn, gradually warming. 2 - 15°C. Dawn survey. Sunrise - 05:40	NM
09/05/2025	Vantage Point Survey	VP3	3:00 starting at 08:10	Visibility: good; Wind speed and direction: light air WSW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	Breeze dying gradually throughout	NM
20/05/2025	Breeding Raptor Survey	BR1	2:00 starting at 13:55	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
20/05/2025	Breeding Raptor Survey	BR1	1:00 starting at 18:00	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
22/05/2025	Breeding Raptor Survey	BR4	3:00 starting at 11:20	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
23/05/2025	Breeding Raptor Survey	BR13	3:00 starting at 10:25	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		AOD
23/05/2025	Breeding Raptor Survey	BR13	1:00 starting at 13:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		AOD
26/05/2025	Vantage Point Survey	VP1	3:00 starting at 04:10	Visibility: limited; Wind speed and direction: moderate breeze W; Cloud cover and height: 3% <150m; Rain: light showers; Frost: none; Snow: none	Low cloud/Fog throughout	RV
26/05/2025	Vantage Point Survey	VP1	3:00 starting at 07:40	Visibility: limited; Wind speed and direction: moderate breeze W; Cloud cover and height: 3% <150m; Rain: light showers; Frost: none; Snow: none	Low cloud/Fog throughout	RV
27/05/2025	Breeding Raptor Survey	BR1	3:00 starting at 15:25	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
27/05/2025	Breeding Raptor Survey	BR1	3:00 starting at 18:45	Visibility: moderate; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
28/05/2025	Vantage Point Survey	VP2	3:00 starting at 04:10	Visibility: poor; Wind speed and direction: gentle breeze W; Cloud cover and height: 3% <150m; Rain: drizzle; Frost: none; Snow: none	Low cloud clearing slowly	RV

28/05/2025	Vantage Point Survey	VP2	3:00 starting at 07:40	Visibility: poor; Wind speed and direction: gentle breeze W; Cloud cover and height: 3% <150m; Rain: drizzle; Frost: none; Snow: none	Low cloud clearing slowly	RV
30/05/2025	Breeding Raptor Survey	BR13	3:00 starting at 15:45	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 33-66% >500m; Rain: light showers; Frost: none; Snow: none		AOD
30/05/2025	Breeding Raptor Survey	BR13	3:00 starting at 18:45	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 33-66% >500m; Rain: light showers; Frost: none; Snow: none		AOD
05/06/2025	Breeding Raptor Survey	BR13	3:00 starting at 07:20	Visibility: moderate; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		AOD
05/06/2025	Breeding Raptor Survey	BR2	1:00 starting at 10:45	Visibility: moderate; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none		AOD
08/06/2025	Breeding Raptor Survey	brvp5	3:00 starting at 07:00	Visibility: moderate; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		KB
08/06/2025	Breeding Raptor Survey	brvp8	3:00 starting at 10:30	Visibility: good; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		KB
10/06/2025	Breeding Raptor Survey	BR2	3:00 starting at 07:05	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
10/06/2025	Breeding Raptor Survey	BR2	3:00 starting at 10:05	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
10/06/2025	Breeding Raptor Survey	brvp7	3:00 starting at 16:00	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		KB
10/06/2025	Breeding Raptor Survey	brvp10	3:00 starting at 19:30	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		KB
13/06/2025	Breeding Raptor Survey	BR13	3:00 starting at 15:40	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		AOD
16/06/2025	Breeding Raptor Survey	BR4	3:00 starting at 06:00	Visibility: poor; Wind speed and direction: fresh breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none	Cool and fresh. BRVP was in cloud until 8am, visibility improving dramaticaly thereafter.	NM
16/06/2025	Breeding Raptor Survey	BR4	3:00 starting at 09:15	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none	Largely overcast but bright, sunny patches. 12 - 19°C throughout	NM
19/06/2025	Vantage Point Survey	VP3	6:30 starting at 05:30	Visibility: good; Wind speed and direction: light breeze SE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	SH,LB,BZ and c. 15 MP around VP	RV
20/06/2025	Vantage Point Survey	VP2	6:30 starting at 15:30	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none	3 SI around VP for most of survey	RV
23/06/2025	Breeding Raptor Survey	BR2	3:00 starting at 06:00	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Largely fair, sunny spells and scattered cloud. Moderate breeze with fresh gusts. Humid, damp underfoot	NM

23/06/2025	Breeding Raptor Survey	BR2	3:00 starting at 09:15	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none	Bright throughout. Becoming warmer towards noon, 11 - 19°C	NM
25/06/2025	Vantage Point Survey	VP1	3:00 starting at 05:10	Visibility: moderate; Wind speed and direction: moderate breeze SSW; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none	Low cloud and fog first 2 hours, Male HH	RV
25/06/2025	Vantage Point Survey	VP1	3:00 starting at 08:40	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none	Low cloud and fog first 2 hours, Male HH	RV
28/06/2025	Vantage Point Survey	VP4	6:30 starting at 05:50	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none	SH carrying prey, BZ Pair	RV
30/06/2025	Breeding Raptor Survey	BR2	1:00 starting at 08:15	Visibility: limited; Wind speed and direction: light air S; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
30/06/2025	Breeding Raptor Survey	BR8	3:00 starting at 09:35	Visibility: limited; Wind speed and direction: light air S; Cloud cover and height: 66-100% <150m; Rain: persistent; Frost: none; Snow: none		AOD
01/07/2025	Breeding Raptor Survey	BR2	3:00 starting at 07:25	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
01/07/2025	Breeding Raptor Survey	BR2	3:00 starting at 10:25	Visibility: good; Wind speed and direction: light breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
08/07/2025	Breeding Raptor Survey	BR13	3:00 starting at 06:40	Visibility: limited; Wind speed and direction: gentle breeze S; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
08/07/2025	Breeding Raptor Survey	BR10	3:00 starting at 09:55	Visibility: poor; Wind speed and direction: light breeze S; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		AOD
09/07/2025	Breeding Raptor Survey	brvp 12	3:00 starting at 15:30	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		KB
09/07/2025	Breeding Raptor Survey	brvp 10	3:00 starting at 19:00	Visibility: good; Wind speed and direction: gentle breeze SW; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		KB
14/07/2025	Breeding Raptor Survey	BR10	3:00 starting at 16:45	Visibility: moderate; Wind speed and direction: light breeze SW; Cloud cover and height: 33-66% >500m; Rain: heavy showers; Frost: none; Snow: none		CM
15/07/2025	Breeding Raptor Survey	brvp 5	3:00 starting at 07:30	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 66-100% >500m; Rain: heavy showers; Frost: none; Snow: none		KB
15/07/2025	Vantage Point Survey	VP1	3:00 starting at 10:30	Visibility: moderate; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none	Visibility limited in passing heavy showers	CM
15/07/2025	Breeding Raptor Survey	brvp 7	3:00 starting at 11:00	Visibility: good; Wind speed and direction: gentle breeze NW; Cloud cover and height: 66-100% >500m; Rain: heavy showers; Frost: none; Snow: none		KB
15/07/2025	Vantage Point Survey	VP1	3:00 starting at 14:00	Visibility: moderate; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none		CM
17/07/2025	Breeding Raptor Survey	BR5	3:00 starting at 08:50	Visibility: poor; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% <150m; Rain: heavy showers; Frost: none; Snow: none		CM
18/07/2025	Breeding Raptor Survey	BR7	3:00 starting at 06:15	Visibility: poor; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		CM
18/07/2025	Breeding Raptor Survey	BR9	3:00 starting at 09:30	Visibility: moderate; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: light showers; Frost: none; Snow: none		CM

22/07/2025	Breeding Raptor Survey	BR1	3:00 starting at 05:40	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		NS
22/07/2025	Breeding Raptor Survey	BR6	3:00 starting at 09:10	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		NS
22/07/2025	Vantage Point Survey	VP3	3:00 starting at 15:15	Visibility: good; Wind speed and direction: gentle breeze WNW; Cloud cover and height: 3% >500m; Rain: none; Frost: none; Snow: none	BZ,SN,K	RV
22/07/2025	Vantage Point Survey	VP3	3:00 starting at 18:45	Visibility: good; Wind speed and direction: gentle breeze WNW; Cloud cover and height: 3% >500m; Rain: none; Frost: none; Snow: none		RV
23/07/2025	Breeding Raptor Survey	BR4	3:00 starting at 05:40	Visibility: good; Wind speed and direction: fresh breeze W; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		NS
23/07/2025	Breeding Raptor Survey	BR3	3:00 starting at 09:10	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		NS
23/07/2025	Vantage Point Survey	VP2	3:00 starting at 15:15	Visibility: moderate; Wind speed and direction: gentle breeze NNW; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none	K,HH,BZ,SH	RV
23/07/2025	Vantage Point Survey	VP2	3:00 starting at 18:45	Visibility: moderate; Wind speed and direction: gentle breeze NNW; Cloud cover and height: 3% 150-500m; Rain: none; Frost: none; Snow: none		RV
24/07/2025	Breeding Raptor Survey	BR10	3:00 starting at 05:55	Visibility: moderate; Wind speed and direction: light air S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		CM
24/07/2025	Breeding Raptor Survey	BR11	3:00 starting at 09:30	Visibility: moderate; Wind speed and direction: gentle breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		CM
25/07/2025	Breeding Raptor Survey	BR13	3:00 starting at 09:00	Visibility: moderate; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none	New location (BR13) to follow up HH activity.	CM
27/07/2025	Vantage Point Survey	VP4	3:00 starting at 06:30	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none	BZ,K	RV
27/07/2025	Vantage Point Survey	VP4	3:00 starting at 10:00	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		RV
28/07/2025	Breeding Raptor Survey	BR13	3:00 starting at 06:10	Visibility: moderate; Wind speed and direction: light air W; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none	New location (BR13) to follow up HH activity.	CM
07/08/2025	Breeding Raptor Survey	BR10	3:00 starting at 09:00	Visibility: moderate; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		CM
08/08/2025	Breeding Raptor Survey	BR5	3:00 starting at 06:20	Visibility: moderate; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		CM
08/08/2025	Breeding Raptor Survey	BR7	3:00 starting at 09:45	Visibility: moderate; Wind speed and direction: moderate breeze SW; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		CM
08/08/2025	Vantage Point Survey	VP1	6:30 starting at 14:45	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none	HH,WE,MP	RV
09/08/2025	Vantage Point Survey	VP2	6:30 starting at 06:15	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none	WE,PE,K,MP	RV
10/08/2025	Vantage Point Survey	VP3	6:30 starting at 14:30	Visibility: moderate; Wind speed and direction: gentle breeze SW; Cloud cover and height: 3% 150-500m; Rain: light showers; Frost: none; Snow: none	MP	RV

11/08/2025	Breeding Raptor Survey	BR6	3:00 starting at 06:20	Visibility: poor; Wind speed and direction: light air S; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		CM
11/08/2025	Vantage Point Survey	VP4	6:30 starting at 14:30	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 2% >500m; Rain: none; Frost: none; Snow: none	BZ,MP. SH Juveniles heard but not seen to west of VP	RV
12/08/2025	Breeding Raptor Survey	BR4	3:00 starting at 06:25	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		CM
12/08/2025	Breeding Raptor Survey	BR11	3:00 starting at 09:35	Visibility: good; Wind speed and direction: light breeze S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		CM
19/08/2025	Breeding Raptor Survey	BR3	2:00 starting at 06:15	Visibility: poor; Wind speed and direction: light breeze NE; Cloud cover and height: 66-100% <150m; Rain: none; Frost: none; Snow: none		CM
19/08/2025	Breeding Raptor Survey	BR3	1:00 starting at 08:15	Visibility: moderate; Wind speed and direction: gentle breeze NE; Cloud cover and height: 33-66% 150-500m; Rain: none; Frost: none; Snow: none		CM
19/08/2025	Breeding Raptor Survey	BR2	3:00 starting at 09:30	Visibility: moderate; Wind speed and direction: gentle breeze E; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		CM
22/08/2025	Breeding Raptor Survey	BR8	3:00 starting at 06:10	Visibility: moderate; Wind speed and direction: light air S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		CM
22/08/2025	Breeding Raptor Survey	BR9	3:00 starting at 09:25	Visibility: moderate; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		CM
27/08/2025	Breeding Raptor Survey	BR1	3:00 starting at 09:10	Visibility: moderate; Wind speed and direction: light breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		CM
29/08/2025	Breeding Raptor Survey	BR12	3:00 starting at 09:30	Visibility: poor; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none		CM
03/09/2025	Breeding Raptor Survey	BR1	3:00 starting at 06:15	Visibility: moderate; Wind speed and direction: light air NW; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none		CM
03/09/2025	Breeding Raptor Survey	BR3	3:00 starting at 09:35	Visibility: moderate; Wind speed and direction: light breeze NW; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		CM
03/09/2025	Breeding Raptor Survey	BR10	3:00 starting at 13:30	Visibility: good; Wind speed and direction: moderate breeze W; Cloud cover and height: 33-66% >500m; Rain: heavy showers; Frost: none; Snow: none	Sunny spells and scattered heavy showers. Rain easing throughout afternoon. Blustery breeze throughout, 14 - 17°C	NM
03/09/2025	Breeding Raptor Survey	BR9	3:00 starting at 17:15	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 33-66% >500m; Rain: drizzle; Frost: none; Snow: none	Becoming largely fair with occasional drizzle	NM
04/09/2025	Breeding Raptor Survey	BR7	3:00 starting at 06:45	Visibility: moderate; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% 150-500m; Rain: heavy showers; Frost: none; Snow: none		CM
04/09/2025	Breeding Raptor Survey	BR8	3:00 starting at 10:05	Visibility: moderate; Wind speed and direction: light breeze NW; Cloud cover and height: 33-66% >500m; Rain: light showers; Frost: none; Snow: none		CM
05/09/2025	Breeding Raptor Survey	BR12	3:00 starting at 06:50	Visibility: good; Wind speed and direction: fresh breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none	Mostly overcast but fair, fleeting sunshine. Fresh breeze, 13 - 17°C	NM

05/09/2025	Breeding Raptor Survey	BR11	3:00 starting at 11:00	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% >500m; Rain: drizzle; Frost: none; Snow: none	Faint blustery drizzle	NM
08/09/2025	Vantage Point Survey	VP1	3:00 starting at 14:45	Visibility: good; Wind speed and direction: moderate breeze SW; Cloud cover and height: 33-66% >500m; Rain: light showers; Frost: none; Snow: none		CM
09/09/2025	Vantage Point Survey	VP1	2:00 starting at 06:05	Visibility: moderate; Wind speed and direction: moderate breeze S; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none		CM
09/09/2025	Vantage Point Survey	VP1	1:00 starting at 08:05	Visibility: poor; Wind speed and direction: fresh breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		CM
09/09/2025	Breeding Raptor Survey	BR5	3:00 starting at 09:30	Visibility: poor; Wind speed and direction: moderate breeze SE; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		CM
16/09/2025	Breeding Raptor Survey	BR6	3:00 starting at 09:35	Visibility: moderate; Wind speed and direction: gentle breeze W; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		CM
16/09/2025	Vantage Point Survey	VP2	3:00 starting at 13:15	Visibility: moderate; Wind speed and direction: moderate breeze W; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		CM
16/09/2025	Breeding Raptor Survey	BR4	2:00 starting at 16:30	Visibility: moderate; Wind speed and direction: light breeze SW; Cloud cover and height: 66-100% >500m; Rain: none; Frost: none; Snow: none	Forecast heavy rain arriving from south, postponed final hour.	CM
17/09/2025	Vantage Point Survey	VP2	3:00 starting at 06:10	Visibility: poor; Wind speed and direction: fresh breeze SW; Cloud cover and height: 66-100% <150m; Rain: drizzle; Frost: none; Snow: none		CM
17/09/2025	Breeding Raptor Survey	BR4	1:00 starting at 09:30	Visibility: moderate; Wind speed and direction: moderate breeze SW; Cloud cover and height: 66-100% 150-500m; Rain: drizzle; Frost: none; Snow: none		CM
17/09/2025	Breeding Raptor Survey	BR2	3:00 starting at 11:00	Visibility: moderate; Wind speed and direction: fresh breeze S; Cloud cover and height: 66-100% >500m; Rain: light showers; Frost: none; Snow: none		CM
25/09/2025	Vantage Point Survey	VP4	3:00 starting at 09:20	Visibility: good; Wind speed and direction: gentle breeze S; Cloud cover and height: 0-33% >500m; Rain: none; Frost: none; Snow: none		AOD
25/09/2025	Vantage Point Survey	VP4	1:00 starting at 13:05	Visibility: good; Wind speed and direction: moderate breeze SE; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		AOD
29/09/2025	Vantage Point Survey	VP4	2:00 starting at 06:40	Visibility: good; Wind speed and direction: light air S; Cloud cover and height: 66-100% 150-500m; Rain: none; Frost: none; Snow: none		AOD
26/09/2026	Vantage Point Survey	VP3	3:00 starting at 06:25	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		KB
26/09/2026	Vantage Point Survey	VP3	3:00 starting at 09:55	Visibility: good; Wind speed and direction: moderate breeze S; Cloud cover and height: 33-66% >500m; Rain: none; Frost: none; Snow: none		KB

Table 1.1 Vantage Point Surveys

Ref.	VP	Date	Time	Species	Number	Duration of flight (s)	Band 1	Band 2	Band 3	Band 4	Habitat and activity	Surveyor
MP001	VP3	08/04/2025	15:00	Meadow Pipit	11	0	0	0	0	0	bogs; flitting, calling, displaying, perched, within moorland adjacent to vp throughout. scattered, numbers rough. max flock - 11	NM
SN001	VP3	08/04/2025	15:49	Snipe	1	3	3	0	0	0	bogs; flitting, landing, fluttering low over moor very briefly, landing	NM
HH001	VP3	08/04/2025	16:10	Hen Harrier	1	110	0	0	30	80	bogs and conifer plantation; skydancing, male	NM
BZ001	VP3	08/04/2025	16:10	Buzzard	2	700	0	0	0	700	bogs, conifer plantation and improved agricultural grassland; soaring, circling, off site	NM
SN002	VP3	08/04/2025	16:15	Snipe	13	0	0	0	0	0	bogs; chirping on ground, frequent calls throughout on moor adjacent to vp, numbers rough	NM
SN003	VP3	08/04/2025	16:36	Snipe	3	8	8	0	0	0	bogs; flitting, chasing, fluttering low over moor very briefly, landing	NM
SN004	VP3	08/04/2025	16:58	Snipe	1	25	10	15	0	0	bogs and scrub; flying, calling, landing	NM
BZ002	VP3	08/04/2025	17:41	Buzzard	1	70	0	0	15	55	conifer plantation, bogs and improved agricultural grassland; soaring, circling	NM
SN005	VP3	08/04/2025	19:04	Snipe	1	30	0	0	30	0	bogs; flying, calling	NM
PE001	VP3	08/04/2025	19:23	Peregrine Falcon	1	50	0	0	20	30	bogs and conifer plantation; travelling	NM
BZ003	VP3	08/04/2025	20:17	Buzzard	1	40	0	0	30	10	conifer plantation and bogs; gliding, circling	NM
SN006	VP3	08/04/2025	20:19	Snipe	7	15	15	0	0	0	bogs; flitting, fluttering, courting, calling, flurry of calls. followed by fluttering low over moor very briefly	NM
SN007	VP3	08/04/2025	20:28	Snipe	1	5	5	0	0	0	bogs; flitting, fluttering, fluttering low over moor very briefly, landing	NM
SN008	VP3	08/04/2025	20:41	Snipe	3	10	10	0	0	0	bogs; flitting, fluttering, chasing, fluttering low over moor very briefly, landing	NM
SN009	VP3	08/04/2025	20:50	Snipe	5	2100	50	50	1000	1000	bogs; drumming, swirling, chasing, over vp at dusk. scattered + separate territories, numbers rough. active until end of survey	NM
GB001	VP4	09/04/2025	15:14	Great Black-backed Gull	2	55	0	45	10	0	improved agricultural grassland and linear woodland/scrub; travelling, calling	NM
MP002	VP4	09/04/2025	15:30	Meadow Pipit	3	0	0	0	0	0	mixed conifer woodland, improved agricultural grassland and scrub; flying, calling, perched, regular flights across vp area throughout, occasional display calls. numbers rough, max flock - 3	NM

LB001	VP4	09/04/2025	16:08	Lesser Black-backed Gull	12	370	0	0	0	370	improved agricultural grassland; swirling, calling, off site. moving away southwest	NM
LB002	VP4	09/04/2025	16:39	Lesser Black-backed Gull	3	45	0	0	30	15	conifer plantation, scrub and bogs; travelling	NM
BZ004	VP4	09/04/2025	17:07	Buzzard	1	210	0	20	40	150	improved agricultural grassland and scrub/transitional woodland; soaring, circling, off site. descending into farmland	NM
SN010	VP4	09/04/2025	17:48	Snipe	2	25	0	0	25	0	mixed conifer woodland, scrub and improved agricultural grassland; flying, calling	NM
LB003	VP4	09/04/2025	18:31	Lesser Black-backed Gull	4	45	0	0	20	25	improved agricultural grassland; travelling	NM
LB004	VP4	09/04/2025	18:59	Lesser Black-backed Gull	1	35	0	0	0	35	conifer plantation, scrub and improved agricultural grassland; travelling	NM
BZ005	VP4	09/04/2025	19:37	Buzzard	2	65	0	10	40	15	conifer plantation and scrub; circling, calling, dropping into forestry	NM
SN011	VP4	09/04/2025	20:19	Snipe	1	30	0	0	0	30	improved agricultural grassland and mixed conifer woodland; flying, calling	NM
SN012	VP4	09/04/2025	20:35	Snipe	1	150	0	60	90	0	bogs, scrub and highly modified/non-native woodland; drumming, swooping	NM
SN013	VP4	09/04/2025	20:53	Snipe	2	1200	0	100	1000	100	improved agricultural grassland and semi-natural grassland; drumming, over boggy pasture, numbers rough	NM
MP003	VP2	10/04/2025	15:00	Meadow Pipit	9	0	0	0	0	0	bogs and semi-natural grassland; flitting, calling, displaying, perched, scattered throughout moorland adjacent to vp throughout survey, numbers rough. max flock - 9	NM
W.001	VP2	10/04/2025	15:09	Wheatear	3	50	50	0	0	0	bogs and semi-natural grassland; flitting, perched	NM
BZ006	VP2	10/04/2025	15:50	Buzzard	2	670	0	0	40	630	improved agricultural grassland, conifer plantation and scrub/transitional woodland; soaring, circling, off site, moving gradually south	NM
BZ007	VP2	10/04/2025	16:22	Buzzard	2	310	0	0	45	265	bogs and improved agricultural grassland; soaring, hanging high on breeze	NM
SN014	VP2	10/04/2025	17:05	Snipe	1	40	5	10	25	0	bogs and semi-natural grassland; flying, calling, dropping into rough farmland	NM
SN015	VP2	10/04/2025	17:47	Snipe	2	35	10	10	15	0	bogs, conifer plantation and improved agricultural grassland; flying, calling, swooping	NM
BZ008	VP2	10/04/2025	18:26	Buzzard	1	50	0	20	20	10	conifer plantation and improved agricultural grassland; gliding, swirling	NM
BZ009	VP2	10/04/2025	19:08	Buzzard	1	40	0	0	0	40	improved agricultural grassland; soaring, circling, off site to southwest	NM
K.001	VP2	10/04/2025	19:57	Kestrel	1	120	30	40	50	0	bogs; hunting, hovering	NM
SN016	VP2	10/04/2025	19:58	Snipe	1	30	0	0	30	0	bogs and semi-natural grassland; flying, calling	NM

SN017	VP2	10/04/2025	20:18	Snipe	1	20	0	0	20	0	bogs and conifer plantation; flying, calling	NM
BZ010	VP2	10/04/2025	20:19	Buzzard	1	110	0	0	0	110	conifer plantation, scrub/transitional woodland and bogs; soaring, circling	NM
SN018	VP2	10/04/2025	20:40	Snipe	5	2880	0	180	2150	550	bogs and semi-natural grassland; drumming, swooping, scattered, separate territories. over vp area at dusk, numbers rough. continuing until end of survey (and persisting afterwards)	NM
SN019	VP2	10/04/2025	20:57	Snipe	2	40	10	10	20	0	bogs and semi-natural grassland; calling, swooping	NM
SN020	VP2	10/04/2025	21:06	Snipe	1	20	0	20	0	0	bogs and semi-natural grassland; flying, alarming	NM
SN021	VP2	10/04/2025	21:11	Snipe	2	25	10	15	0	0	bogs; flying, calling, swooping, appeared to be chasing	NM
SN022	VP2	10/04/2025	21:21	Snipe	1	15	0	0	15	0	bogs and semi-natural grassland; flying, calling	NM
MP004	VP1	11/04/2025	15:10	Meadow Pipit	11	0	0	0	0	0	bogs and semi-natural grassland; flitting, calling, displaying, perched, active in vp area throughout. numbers rough, max flock - 11	NM
LB005	VP1	11/04/2025	15:27	Lesser Black-backed Gull	2	80	0	0	30	50	improved agricultural grassland; travelling, off site	NM
SN023	VP1	11/04/2025	15:53	Snipe	1	15	0	0	15	0	bogs; flying, calling	NM
SN024	VP1	11/04/2025	16:09	Snipe	1	30	0	0	30	0	bogs, conifer plantation and semi-natural grassland; flying, calling	NM
BZ011	VP1	11/04/2025	16:22	Buzzard	1	430	0	0	70	360	improved agricultural grassland and highly modified/non-native woodland; soaring, circling, off site to south	NM
SN025	VP1	11/04/2025	17:09	Snipe	1	25	0	0	25	0	conifer plantation, bogs and semi-natural grassland; flying, calling	NM
SN026	VP1	11/04/2025	17:29	Snipe	2	20	20	0	0	0	bogs and semi-natural grassland; chasing, fluttering, possibly territorial	NM
H.001	VP1	11/04/2025	18:37	Grey Heron	1	65	0	30	35	0	mixed conifer woodland, improved agricultural grassland and scrub; travelling	NM
BZ012	VP1	11/04/2025	19:09	Buzzard	1	250	0	20	60	170	conifer plantation, scrub and bogs; soaring, circling, descending into woodland	NM
SN027	VP1	11/04/2025	19:27	Snipe	2	15	0	15	0	0	bogs and highly modified/non-native woodland; flying, calling	NM
LB006	VP1	11/04/2025	19:35	Lesser Black-backed Gull	3	75	0	0	15	60	improved agricultural grassland, conifer plantation and bogs; travelling, swooping, calling, traversing across site	NM
SN028	VP1	11/04/2025	20:19	Snipe	7	0	0	0	0	0	bogs; chirping, flurry of calls in evening, numbers rough	NM
SN029	VP1	11/04/2025	20:26	Snipe	1	20	0	0	20	0	bogs and conifer plantation; flying, calling	NM

SN030	VP1	11/04/2025	20:41	Snipe	4	2460	0	300	760	1400	bogs; drumming, swooping, alarming, overhead at dusk, vp area. on and off from 20:41 onwards. numbers rough	NM
SN031	VP1	11/04/2025	20:56	Snipe	1	10	0	0	10	0	bogs; flying, calling	NM
SN032	VP4	08/05/2025	05:15	Snipe	1	250	0	125	125	0	bogs and scrub/transitional woodland; drumming, exact location was rough due to twilight	NM
LB007	VP4	08/05/2025	05:34	Lesser Black-backed Gull	3	60	0	0	60	0	improved agricultural grassland and conifer plantation; travelling	NM
SN033	VP4	08/05/2025	05:46	Snipe	2	900	0	500	400	0	scrub and semi-natural grassland; drumming, swooping, chasing	NM
MP005	VP4	08/05/2025	06:00	Meadow Pipit	4	0	0	0	0	0	improved agricultural grassland and conifer plantation; flying, calling, displaying, occasional flights across vp throughout. numbers rough, max flock - 4	NM
LB008	VP4	08/05/2025	06:02	Lesser Black-backed Gull	1	50	0	25	25	0	conifer plantation, scrub and improved agricultural grassland; travelling	NM
BZ013	VP4	08/05/2025	06:19	Buzzard	2	100	0	0	40	60	improved agricultural grassland; soaring, circling, pair, off site	NM
BH001	VP4	08/05/2025	06:23	Black-headed Gull	3	50	0	0	50	0	highly modified/non-native woodland and improved agricultural grassland; travelling	NM
BZ014	VP4	08/05/2025	06:27	Buzzard	1	25	0	25	0	0	scrub/transitional woodland and conifer plantation; travelling, dropping into forestry	NM
SN034	VP4	08/05/2025	07:16	Snipe	2	30	0	10	20	0	improved agricultural grassland and highly modified/non-native woodland; flying, calling	NM
BZ015	VP4	08/05/2025	08:31	Buzzard	2	140	0	30	110	0	conifer plantation; soaring, calling, circling, pair, dropping into forestry	NM
LB009	VP4	08/05/2025	09:36	Lesser Black-backed Gull	8	70	0	15	55	0	improved agricultural grassland; travelling, swooping	NM
LB010	VP4	08/05/2025	09:56	Lesser Black-backed Gull	6	90	0	30	60	0	improved agricultural grassland and conifer plantation; travelling, soaring	NM
SN035	VP4	08/05/2025	09:58	Snipe	1	30	0	0	30	0	improved agricultural grassland; flying	NM
BZ016	VP4	08/05/2025	10:16	Buzzard	1	90	0	0	70	20	improved agricultural grassland; soaring, circling	NM
SN036	VP4	08/05/2025	10:31	Snipe	1	25	0	25	0	0	highly modified/non-native woodland and improved agricultural grassland; flying, dropping	NM
SH001	VP4	08/05/2025	10:47	Sparrowhawk	1	30	25	5	0	0	improved agricultural grassland and scrub/transitional woodland; travelling, vanishing into scrubby woodland	NM
BZ017	VP4	08/05/2025	11:02	Buzzard	1	20	0	0	20	0	improved agricultural grassland; soaring	NM
SN037	VP3	09/05/2025	04:48	Snipe	1	0	0	0	0	0	bogs; chirping, numbers rough	NM
SN038	VP3	09/05/2025	04:58	Snipe	5	4740	50	700	3800	190	bogs; drumming, swooping, chasing, persistent drumming over moorland in dawn and early	NM

											morning, not all at once but consistently throughout the morning. scattered, separate territories, chasing and interacting at times. numbers rough	
SN039	VP3	09/05/2025	05:16	Snipe	2	0	0	0	0	0	bogs; chirping, numbers rough	NM
SN040	VP3	09/05/2025	05:18	Snipe	2	0	0	0	0	0	bogs; chirping, numbers rough	NM
SN041	VP3	09/05/2025	05:31	Snipe	1	20	5	15	0	0	bogs; flying, alarming, dropping into moorland	NM
SN042	VP3	09/05/2025	05:31	Snipe	2	0	0	0	0	0	bogs; chirping, numbers rough	NM
LB011	VP3	09/05/2025	05:38	Lesser Black-backed Gull	3	65	0	5	60	0	bogs and conifer plantation; travelling, calling, swooping	NM
ML001	VP3	09/05/2025	05:57	Merlin	1	55	40	15	0	0	bogs; hunting, chasing, female. chasing and flushing passerines, mostly meadow pipit	NM
MP006	VP3	09/05/2025	05:58	Meadow Pipit	40	80	30	30	20	0	bogs; flushed, calling, escaping, alarming, flushed from moorland by merlin. actively being chased, chaotic flights over moorland	NM
SN043	VP3	09/05/2025	06:00	Snipe	2	35	0	25	10	0	bogs and conifer plantation; flying, alarming	NM
MP007	VP3	09/05/2025	06:00	Meadow Pipit	10	0	0	0	0	0	bogs and scrub; flying, calling, displaying, flitting, perched	NM
SN044	VP3	09/05/2025	06:02	Snipe	2	30	0	15	15	0	bogs; travelling	NM
ML002	VP3	09/05/2025	06:17	Merlin	1	0	0	0	0	0	bogs and scrub; perched, preening, female (same individual), perched on fence post	NM
LB012	VP3	09/05/2025	06:21	Lesser Black-backed Gull	2	45	0	0	45	0	bogs and conifer plantation; travelling	NM
ML003	VP3	09/05/2025	06:28	Merlin	1	30	25	5	0	0	bogs and conifer plantation; departing, travelling, female (same individual), moving downhill	NM
SN045	VP3	09/05/2025	06:47	Snipe	6	0	0	0	0	0	bogs; chirping, flitting, numbers rough, observed courting within moorland	NM
SI001	VP3	09/05/2025	07:03	Swift	5	45	0	0	45	0	bogs; foraging, swirling, moving south, high across hilltop moorland	NM
SN046	VP3	09/05/2025	07:03	Snipe	1	45	15	30	0	0	bogs and conifer plantation; flying, calling, swooping	NM
SN047	VP3	09/05/2025	07:11	Snipe	3	0	0	0	0	0	bogs; chirping	NM
SN048	VP3	09/05/2025	07:30	Snipe	4	0	0	0	0	0	bogs; chirping, courting, flurry of calls within moorland. numbers rough, observed briefly with moorland	NM
SI002	VP3	09/05/2025	07:45	Swift	2	25	0	10	15	0	bogs; flying, swooping	NM
K.002	VP3	09/05/2025	08:12	Kestrel	1	65	5	55	5	0	bogs and semi-natural grassland; hunting, hovering, dropping abruptly	NM
LB013	VP3	09/05/2025	08:12	Lesser Black-backed Gull	1	35	0	10	25	0	conifer plantation and bogs; travelling, lost behind forestry	NM

BZ018	VP3	09/05/2025	09:04	Buzzard	1	340	0	0	280	60	conifer plantation, bogs and scrub; soaring, travelling, traversing north of site	NM
SN049	VP3	09/05/2025	09:34	Snipe	2	0	0	0	0	0	bogs; chirping	NM
SI003	VP3	09/05/2025	09:59	Swift	14	160	0	0	120	40	bogs and highly modified/non-native woodland; swirling, foraging, moving north, lost over br6 area	NM
LB014	VP3	09/05/2025	10:08	Lesser Black-backed Gull	5	100	0	0	80	20	improved agricultural grassland and highly modified/non-native woodland; travelling, swooping, far to north, 3 - 4km off site	NM
BZ019	VP3	09/05/2025	10:23	Buzzard	1	70	0	0	60	10	improved agricultural grassland, highly modified/non-native woodland and linear woodland/scrub; soaring, gliding	NM
BZ020	VP3	09/05/2025	10:56	Buzzard	1	25	0	0	0	25	improved agricultural grassland and highly modified/non-native woodland; soaring, circling, off site	NM
MP008	VP1	26/05/2025	10:40	Meadow Pipit	15	0	0	0	0	0	eroding blanket bog; provisioning, atleast 15 around vp and on way to/from car	RV
BZ021	VP2	28/05/2025	09:55	Buzzard	1	45	0	45	0	0	cutover bog and conifer plantation; flying, flew low along edge of plantation	RV
HG001	VP2	28/05/2025	10:27	Herring Gull	1	75	0	75	0	0	cutover bog, conifer plantation and improved agricultural grassland; flying, adult flying north	RV
MP009	VP2	28/05/2025	10:40	Meadow Pipit	19	0	0	0	0	0	eroding blanket bog; provisioning, adults around vp and walk to car	RV
SH002	VP3	19/06/2025	06:41	Sparrowhawk	1	13	13	0	0	0	cutover bog and conifer plantation; flying, male, low over bog and plantation	RV
SH003	VP3	19/06/2025	07:42	Sparrowhawk	1	29	11	18	0	0	conifer plantation; circling/flying, male again, circled then into plantation	RV
LB015	VP3	19/06/2025	09:22	Lesser Black-backed Gull	3	85	0	85	0	0	improved agricultural grassland; circling, 3 adults circling	RV
BZ022	VP3	19/06/2025	09:25	Buzzard	1	370	0	0	370	0	improved agricultural grassland; circling, circling and hanging in wind	RV
BZ023	VP3	19/06/2025	10:12	Buzzard	1	410	0	0	410	0	improved agricultural grassland; circling, circling and hanging in wind	RV
MP010	VP3	19/06/2025	12:00	Meadow Pipit	15	0	0	0	0	0	cutover bog; provisiong/displaying, min 15, some displaying	RV
SI004	VP2	20/06/2025	15:30	Swift	3	0	0	0	0	0	cutover bog; feeding, 3 hunting along hill most of survey	RV
BZ024	VP2	20/06/2025	15:39	Buzzard	1	405	0	0	405	0	improved agricultural grassland; circling, circling and drifting north	RV
BZ025	VP2	20/06/2025	17:53	Buzzard	1	125	0	0	125	0	improved agricultural grassland and conifer plantation; flying, flying and briefly circling	RV

BZ026	VP2	20/06/2025	18:19	Buzzard	1	260	0	0	260	0	improved agricultural grassland and conifer plantation; hunting, hanging in wind, drifting east	RV
SH004	VP2	20/06/2025	18:24	Sparrowhawk	1	9	9	0	0	0	cutover bog; flying, male flew below vp	RV
BH002	VP2	20/06/2025	20:01	Black-headed Gull	3	240	0	0	240	0	improved agricultural grassland and conifer plantation; flying, 3 ad flew se off site, mostly off map	RV
HG002	VP2	20/06/2025	20:27	Herring Gull	1	215	35	180	0	0	improved agricultural grassland and conifer plantation; flying, 1 ad across site	RV
MP011	VP2	20/06/2025	22:00	Meadow Pipit	25	0	0	0	0	0	cutover bog; feeding, min 25, mostly roving about in small flocks.	RV
SH005	VP1	25/06/2025	07:04	Sparrowhawk	1	12	12	0	0	0	cutover bog; flying, male low past vp	RV
BZ027	VP1	25/06/2025	07:51	Buzzard	1	135		45	90	0	conifer plantation and improved agricultural grassland; flying, slowly circled then flew west	RV
HH002	VP1	25/06/2025	09:35	Hen Harrier	1	46	46	0	0	0	cutover bog and conifer plantation; hunting, male flew past vp, low and continued east	RV
BZ028	VP1	25/06/2025	10:54	Buzzard	1	65	0	65	0	0	improved agricultural grassland and conifer plantation; circling, flew from plantation, slowly circled and back to original spot	RV
MP012	VP1	25/06/2025	11:40	Meadow Pipit	20	0	0	0	0	0	cutover bog; feeding, min 20 around vp	RV
SH006	VP4	28/06/2025	05:46	Sparrowhawk	1	14	0	14	0	0	improved agricultural grassland; carrying prey, male carrying prey past vp	RV
BZ029	VP4	28/06/2025	06:21	Buzzard	1	115	0	0	115	0	improved agricultural grassland and mixed broadleaved woodland; circling, circling and calling	RV
BZ030	VP4	28/06/2025	06:48	Buzzard	1	480	0	0	480	0	conifer plantation, improved agricultural grassland and cutover bog; hunting, slowly circling and hanging in wind	RV
SH007	VP4	28/06/2025	06:59	Sparrowhawk	1	9	9	0	0	0	improved agricultural grassland; flying, male again, low past vp	RV
BZ031	VP4	28/06/2025	08:04	Buzzard	1	255	0	0	255	0	conifer plantation and improved agricultural grassland; circling, cirling and calling high over vp	RV
CA001	VP4	28/06/2025	11:04	Cormorant	1	42	0	0	42	0	improved agricultural grassland; flying, flying west	RV
BZ032	VP4	28/06/2025	11:19	Buzzard	2	85	0	85	0	0	mixed broadleaved woodland and improved agricultural grassland; circling, pair circling and calling	RV
BZ033	VP4	28/06/2025	11:24	Buzzard	1	240	0	0	240	0	mixed broadleaved woodland and improved agricultural grassland; circling, circling and drifting west	RV
BZ034	VP4	28/06/2025	11:51	Buzzard	1	285	0	0	285	0	improved agricultural grassland and scrub; hunting, circling and hanging in wind, drifting se	RV

MP013	VP4	28/06/2025	12:20	Meadow Pipit	6	0	0	0	0	0	improved agricultural grassland; feeding, small number around vp	RV
K.003	VP1	15/07/2025	10:46	Kestrel	1	21	21	0	0	0	conifer plantation and bogs; hunting, one of two hunting nearby	CM
K.004	VP1	15/07/2025	10:46	Kestrel	1	7	7	0	0	0	bogs and conifer plantation; hunting, one of two hunting nearby	CM
GB002	VP1	15/07/2025	11:26	Great Black-backed Gull	1	84	0	0	84	0	conifer plantation, bogs and improved agricultural grassland; flying	CM
HH003	VP1	15/07/2025	12:02	Hen Harrier	1	129	0	40	89	0	conifer plantation and improved agricultural grassland; travelling, male, observed travelling similar direction yesterday.	CM
K.005	VP1	15/07/2025	12:56	Kestrel	1	41	10	31	0	0	conifer plantation; hunting, dropped into forestry break	CM
MP014	VP1	15/07/2025	17:00	Meadow Pipit	17	-	-	-	-	-	bogs; flitting, total for six hour effort.	CM
BZ035	VP3	22/07/2025	15:31	Buzzard	1	640	0	0	640	0	eroding blanket bog; hunting, circling and hanging in wind over hill	RV
BZ036	VP3	22/07/2025	15:34	Buzzard	1	285	0	0	285	0	eroding blanket bog; hunting, separate from #1, but also circling and hanging in wind.	RV
SN050	VP3	22/07/2025	15:56	Snipe	1	0	0	0	0	0	eroding blanket bog; displaying, heard chipping across road, barely audible. after survey, heard clearly, possibly 2 birds present.	RV
BZ037	VP3	22/07/2025	16:19	Buzzard	1	85	0	0	0	0	improved agricultural grassland; flying, briefly hanging in wind, circled and continued.	RV
K.006	VP3	22/07/2025	18:21	Kestrel	1	315	20	295	0	0	eroding blanket bog; hunting, juvenile hunting over bog, mobbed by hirrundines	RV
K.007	VP3	22/07/2025	18:53	Kestrel	1	130	0	130	0	0	eroding blanket bog; hunting, juv again, hunting behind vp	RV
MP015	VP3	22/07/2025	21:45	Meadow Pipit	19	0	0	0	0	0	eroding blanket bog; feeding, feeding around vp, 19 in air when kestrel flew by	RV
K.008	VP2	23/07/2025	16:12	Kestrel	1	210	20	190	0	0	improved agricultural grassland; hunting, juvenile hunting over hill, then low below vp	RV
HH004	VP2	23/07/2025	17:47	Hen Harrier	1	185	185	0	0	0	improved agricultural grassland and eroding blanket bog; hunting, adult male, hunting low around turbines	RV
BZ038	VP2	23/07/2025	18:06	Buzzard	1	31	0	31	0	0	conifer plantation and improved agricultural grassland; flying, 1 flew west across site	RV
BZ040	VP2	23/07/2025	18:41	Buzzard	1	85	0	40	45	0	conifer plantation; circling/flying, probably same as above, circled and flew across site.	RV
BZ041	VP2	23/07/2025	18:58	Buzzard	1	265	0	0	265	0	improved agricultural grassland and eroding blanket bog; circling/hunting, circling over hill behind turbines and hunting/hanging in wind	RV

SH008	VP2	23/07/2025	20:51	Sparrowhawk	1	18	3	15	0	0	conifer plantation; mobbing/flying, tussled briefly with raven, then down hill and into plantation	RV
MP016	VP2	23/07/2025	21:45	Meadow Pipit	23	0	0	0	0	0	improved agricultural grassland; feeding, min 23 feeding around vp and fields below, mobile.	RV
BZ042	VP4	27/07/2025	07:26	Buzzard	1	110	0	0	110	0	conifer plantation and improved agricultural grassland; hunting, hunting and hanging in wind	RV
BZ043	VP4	27/07/2025	08:04	Buzzard	1	45	0	45	0	0	improved agricultural grassland and mixed broadleaved woodland; flying/circling, flew in from s, circled and lost into trees	RV
BZ044	VP4	27/07/2025	08:36	Buzzard	1	55	0	25	30	0	mixed broadleaved woodland and improved agricultural grassland; flying, flew from same area as above, gained height and flew quickly east	RV
BZ045	VP4	27/07/2025	10:13	Buzzard	1	90	0	65	25	0	conifer plantation and eroding blanket bog; hunting, slowly flying over area, watching below drifting sw	RV
K.009	VP4	27/07/2025	12:19	Kestrel	1	125	0	125	0	0	improved agricultural grassland and scrub; hunting, male, hunting behind vp, dropped to ground and didn't fly up again.	RV
K.010	VP4	27/07/2025	12:29	Kestrel	1	35	0	35	0	0	improved agricultural grassland; flying, male again, flew from behind house and away to nw	RV
MP017	VP4	27/07/2025	13:00	Meadow Pipit	3	0	0	0	0	0	improved agricultural grassland; feeding, just 3 seen or heard during vp, mobbed k when it was hunting by vp	RV
HH005	VP1	08/08/2025	15:18	Hen Harrier	1	18	18	0	0	0	eroding blanket bog and conifer plantation; hunting, moulting male, short tail and patchy wings, quickly low over ground in strong wind.	RV
WE001	VP1	08/08/2025	19:53	White-tailed Eagle	1	635	0	635	0	0	eroding blanket bog and conifer plantation; soaring, imm, sat and wing tagged, green left wing, maybe blue right wing, only digit 6 seen.hanging in wind along hillside, dove steeply and into plantation out of view.	RV
WE002	VP1	08/08/2025	20:13	White-tailed Eagle	1	185	0	65	120	0	conifer plantation and eroding blanket bog; soaring, slowly gliding and hanging in wind, mobbed by 30+ rn, likely roosted on hill between plantations.	RV
MP018	VP1	08/08/2025	21:15	Meadow Pipit	15	0	0	0	0	0	eroding blanket bog; feeding, minimum of 15 feeding around vp and on slope below.	RV
PE002	VP2	09/08/2025	10:11	Peregrine Falcon	1	135	0	0	135	0	improved agricultural grassland and eroding blanket bog; soaring, ad male, hanging in wind almost kestrel like, slowly circled and ne behind hill.	RV
K.011	VP2	09/08/2025	11:13	Kestrel	1	55	15	40	0	0	improved agricultural grassland and eroding blanket bog; hunting, male, hunting along hill, but	RV

											strong wind hampered it and it quickly moved north around hill	
MP019	VP2	09/08/2025	12:45	Meadow Pipit	8	0	0	0	0	0	improved agricultural grassland and eroding blanket bog; feeding, min of 8 feeding around vp, ranging widely.	RV
MP020	VP3	10/08/2025	21:00	Meadow Pipit	6	0	0	0	0	0	eroding blanket bog; feeding, along road, flushed by passing cars, otherwise unobtrusive and rarely seen or heard.	RV
BZ046	VP4	11/08/2025	14:38	Buzzard	1	50	0	50	0	0	improved agricultural grassland and scrub; flying/circling, ad. arrived from east,landing in scrub behind cottage, calling	RV
BZ047	VP4	11/08/2025	14:58	Buzzard	1	42	0	42	0	0	improved agricultural grassland and scrub; provisioning, different ad, carrying food and landed in similar area to #1, lots of calling/ begging heard.	RV
BZ048	VP4	11/08/2025	15:04	Buzzard	1	35	0	10	25	0	scrub, improved agricultural grassland and mixed broadleaved woodland; circling, flew from behind cottage, circled and west.	RV
BZ049	VP4	11/08/2025	15:21	Buzzard	1	45	0	20	25	0	mixed broadleaved woodland and conifer plantation; circling, circled north over road and houses, juvenile.	RV
BZ050	VP4	11/08/2025	16:12	Buzzard	1	25	0	25	0	0	improved agricultural grassland and mixed broadleaved woodland; flying, ad. flying east over fields.	RV
BZ051	VP4	11/08/2025	17:23	Buzzard	1	155	0	0	155	0	improved agricultural grassland, scrub and mixed broadleaved/conifer woodland; circling, ad, circled from behind cottage and gained height before drifting south.	RV
BZ052	VP4	11/08/2025	18:34	Buzzard	1	125	0	0	125	0	conifer plantation; circling, circling, looking into light, looked fresh so probably a juv.	RV
BZ053	VP4	11/08/2025	18:49	Buzzard	1	75	0	0	75	0	scrub and improved agricultural grassland; circling, circled up from behind cottage and away to east	RV
BZ054	VP4	11/08/2025	19:31	Buzzard	1	20	0	20	0	0	conifer plantation, improved agricultural grassland and scrub; flying, ad flying south into scrub behind cottage	RV
BZ055	VP4	11/08/2025	20:06	Buzzard	1	34	0	34	0	0	scrub and improved agricultural grassland; circling/flying, adult circled from behind cottage and away to east.	RV
MP021	VP4	11/08/2025	21:00	Meadow Pipit	1	0	0	0	0	0	improved agricultural grassland and scrub; feeding/flying, just 1 heard and seen, called in flight over vp several times, moving between fields.	RV

HH006	VP1	08/09/2025	15:53	Hen Harrier	1	66	30	15	21	0	bogs and conifer plantation; flying, adult male.	CM
K.012	VP1	08/09/2025	16:15	Kestrel	1	110	10	50	50	0	bogs; hunting, female, dived onto hillside out of view.	CM
K.013	VP1	08/09/2025	16:20	Kestrel	1	288	40	30	218	0	bogs and conifer plantation; hunting, female, perched then dropped into cover.	CM
K.014	VP1	08/09/2025	17:12	Kestrel	1	267	5	5	207	50	bogs and conifer plantation; hunting, female	CM
K.015	VP1	08/09/2025	17:35	Kestrel	1	141	0	50	91	0	bogs and conifer plantation; hunting, female	CM
MP022	VP1	08/09/2025	17:45	Meadow Pipit	17	-	-	-	-	-	bogs; flitting, total for three hour survey.	CM
SN051	VP1	09/09/2025	08:24	Snipe	6	46	0	0	46	0	bogs and conifer plantation; flying, flocking together in low cloud	CM
MP023	VP1	09/09/2025	09:05	Meadow Pipit	4	-	-	-	-	-	bogs; flitting, total for three hour survey.	CM
MP024	VP2	16/09/2025	16:05	Meadow Pipit	26	-	-	-	-	-	bogs; flitting, total for three hour effort.	CM
BZ056	VP2	17/09/2025	08:27	Buzzard	1	44	0	34	10	0	bogs; flying, adult	CM
MP025	VP2	17/09/2025	09:08	Meadow Pipit	17	-	-	-	-	-	bogs; flitting, total for three hour effort.	CM
MP026	VP4	25/09/2025	09:45	Meadow Pipit	3	-	-	-	-	-	conifer plantation; flying	AOD
SH009	VP4	25/09/2025	13:39	Sparrowhawk	1	10	0	10	0	0	conifer plantation; flying	AOD
K.016	VP4	25/09/2025	13:47	Kestrel	1	7	7	0	0	0	conifer plantation and wet grassland; flying, male	AOD
HH007	VP3	26/09/2025	07:14	Hen Harrier	1	20		2	18		conifer plantation; flying, adult male	KB
HH008	VP3	26/09/2025	12:25	Hen Harrier	1	12	12	0	0	0	bogs; flying, adult female	KB
SN052	VP3	26/09/2025	12:25	Snipe	1	5	2	3	0	0	bogs; flushed by hh	KB
MP027	VP3	26/09/2025	12:44	Meadow Pipit	4	-	-	-	-	-	bogs; flying	KB
BZ057	VP4	29/09/2025	07:36	Buzzard	3	-	-	-	-	-	conifer plantation; calling, calling unseen around the area	AOD
MA001	VP4	29/09/2025	07:37	Mallard	3	14	0	14	0	0	upland blanket bog and wet grassland; flying over, dropped into river	AOD

Table 1.2 Breeding Raptor Surveys

Ref.	BR	Date	Time	Species	Number	Habitat and activity	Breeding status	Surveyor
HH001	BR1	16/04/2025	13:57	Hen Harrier	2	conifer plantation, displaying, male skydancing joined by second male flew up from forestry	courtship and display; probable breeding	AOD
HH002	BR1	16/04/2025	14:10	Hen Harrier	1	conifer plantation, flying, adult male	suitable nesting habitat; possible breeder	AOD
HH003	BR1	16/04/2025	15:05	Hen Harrier	1	conifer plantation, flying, adult male	suitable nesting habitat; possible breeder	AOD
HH004	BR1	16/04/2025	15:16	Hen Harrier	1	conifer plantation, flying, adult male	suitable nesting habitat; possible breeder	AOD
HH005	BR1	16/04/2025	15:38	Hen Harrier	1	conifer plantation, flying, adult male	suitable nesting habitat; possible breeder	AOD
HH006	BR4	16/04/2025	18:04	Hen Harrier	2	conifer plantation, displaying, two males one sky dancing to west then looped back north. 2nd male flying low on site	courtship and display; probable breeding	AOD
K.001	BR12	24/04/2025	11:35	Kestrel	1	conifer plantation, flying, brief sighting, descending into forestry	suitable nesting habitat; possible breeder	CM
K.002	BR12	24/04/2025	11:40	Kestrel	1	conifer plantation and improved agricultural grassland, chasing, kestrel rose from forestry to chase corvid away	agitated behaviour; probable breeding	CM
HH007	BR1	25/04/2025	17:17	Hen Harrier	1	conifer plantation, flying, male soaring	suitable nesting habitat; possible breeder	AOD
HH008	BR1	28/04/2025	19:31	Hen Harrier	1	conifer plantation and upland blanket bog, flying, male flying low near historic nest	suitable nesting habitat; possible breeder	AOD
HH009	BR1	28/04/2025	19:54	Hen Harrier	2	conifer plantation, courtship, female up from low with male flew east male following close.dropped into mature forestry	courtship and display; probable breeding	AOD
K.003	BR7	08/05/2025	17:19	Kestrel	1	conifer plantation, flying perched, male adult	suitable nesting habitat; possible breeder	AOD
K.004	BR7	08/05/2025	17:19	Kestrel	1	conifer plantation, flying perched, male flew out from trees then perched.possible breeding area.	suitable nesting habitat; possible breeder	AOD
K.005	BR7	08/05/2025	17:55	Kestrel	1	conifer plantation, flying, male back around again	suitable nesting habitat; possible breeder	AOD
K.006	BR7	08/05/2025	17:55	Kestrel	1	conifer plantation, flying, male	suitable nesting habitat; possible breeder	AOD
K.007	BR7	08/05/2025	18:37	Kestrel	1	conifer plantation, flying perched hunting, female hunting	suitable nesting habitat; possible breeder	AOD
K.008	BR7	08/05/2025	18:45	Kestrel	1	conifer plantation, flying perched, female from same area as male perched 8mins then flew off north.likely breeding area.	suitable nesting habitat; possible breeder	AOD
HH010	BR1	20/05/2025	14:27	Hen Harrier	1	conifer plantation and upland blanket bog, soaring, adult male	suitable nesting habitat; possible breeder	AOD
BZ001	BR1	20/05/2025	14:28	Buzzard	1	conifer plantation, flying, calling mobbed by mg	suitable nesting habitat; possible breeder	AOD
BZ002	BR1	20/05/2025	18:59	Buzzard	1	conifer plantation, prey carrying	pair; probable breeding	AOD
BZ003	BR4	22/05/2025	14:00	Buzzard	1	conifer plantation, soaring	suitable nesting habitat; possible breeder	AOD
BZ004	BR1	23/05/2025	12:55	Buzzard	1	conifer plantation, flying	suitable nesting habitat; possible breeder	AOD
WE001	BR1	23/05/2025	14:31	White-tailed Eagle	1	conifer plantation, perched flying, immature bird perched in forestry. flew up through forestry low out of site.	suitable nesting habitat; possible breeder	AOD
SH001	BR1	27/05/2025	15:57	Sparrowhawk	1	conifer plantation, flying	suitable nesting habitat; possible breeder	AOD
SH002	BR1	27/05/2025	15:58	Sparrowhawk	1	conifer plantation, soaring	suitable nesting habitat; possible breeder	AOD

HH011	BR1	27/05/2025	16:14	Hen Harrier	1	conifer plantation, flying, male low in forestry breifly	suitable nesting habitat; possible breeder	AOD
HH012	BR1	27/05/2025	16:18	Hen Harrier	1	conifer plantation and upland blanket bog, foraging, male	suitable nesting habitat; possible breeder	AOD
HH013	BR1	27/05/2025	19:11	Hen Harrier	1	upland blanket bog and conifer plantation, flying, male	suitable nesting habitat; possible breeder	AOD
HH014	BR2	27/05/2025	21:26	Hen Harrier	1	conifer plantation and upland blanket bog, flying, male flew into tree.	suitable nesting habitat; possible breeder	AOD
HH015	BR13	30/05/2025	18:20	Hen Harrier	1	conifer plantation and upland blanket bog, flying perched, male flew low to perch	suitable nesting habitat; possible breeder	AOD
HH016	BR13	30/05/2025	18:26	Hen Harrier	1	conifer plantation, flying, ringtail bird up to west. female or immature. looked small for female.	suitable nesting habitat; possible breeder	AOD
HH017	BR13	30/05/2025	19:20	Hen Harrier	1	upland blanket bog, flying perched, adult male flying low to perch	suitable nesting habitat; possible breeder	AOD
HH018	BR13	30/05/2025	19:34	Hen Harrier	1	conifer plantation, flying soaring, male up soaring	suitable nesting habitat; possible breeder	AOD
BZ005	BR13	05/06/2025	10:09	Buzzard	1	upland blanket bog and conifer plantation, flying, mobbed by hc	suitable nesting habitat; possible breeder	AOD
BZ006	BR8	08/06/2025	13:24	Buzzard	1	conifer plantation, flying	suitable nesting habitat; possible breeder	KB
OP001	BR2	10/06/2025	09:34	Osprey	1	upland blanket bog, flying calling, adult osprey agitated calls flappy flight circling around the area. no obvious sign for agitation except several ravens present on carrion on ground nearby.flew nw.	agitated behaviour; probable breeding	AOD
SH003	BR2	10/06/2025	09:50	Sparrowhawk	1	upland blanket bog, flying, female	suitable nesting habitat; possible breeder	AOD
BZ007	BR7	10/06/2025	17:35	Buzzard	1	conifer plantation, calling	suitable nesting habitat; possible breeder	KB
K.009	BR7	10/06/2025	18:06	Kestrel	1	conifer plantation, flying - perched on antena - flying	suitable nesting habitat; possible breeder	KB
SH004	BR7	10/06/2025	18:25	Sparrowhawk	1	conifer plantation, flying	suitable nesting habitat; possible breeder	KB
K.010	BR7	10/06/2025	18:45	Kestrel	1	conifer plantation, flying with prey	adult carrying food/faecal sac; confirmed breeding	KB
BZ008	BR10	10/06/2025	19:46	Buzzard	1	bogs, flying	suitable nesting habitat; possible breeder	KB
BZ009	BR13	13/06/2025	15:43	Buzzard	1	conifer plantation, soaring	suitable nesting habitat; possible breeder	AOD
BZ010	BR13	13/06/2025	16:01	Buzzard	2	conifer plantation, soaring	suitable nesting habitat; possible breeder	AOD
BZ011	BR13	13/06/2025	16:34	Buzzard	1	upland blanket bog and conifer plantation, foraging	suitable nesting habitat; possible breeder	AOD
BZ012	BR13	13/06/2025	17:15	Buzzard	1	upland blanket bog, foraging, same bird still foraging in historic hen harrier nesting area. doubtful hh nesting here.	suitable nesting habitat; possible breeder	AOD
BZ013	BR13	13/06/2025	17:37	Buzzard	2	upland blanket bog and wet grassland, soaring	suitable nesting habitat; possible breeder	AOD
SH005	BR13	13/06/2025	17:48	Sparrowhawk	1	conifer plantation, prey carrying, carrying prey	adult carrying food/faecal sac; confirmed breeding	AOD
K.011	BR4	16/06/2025	08:53	Kestrel	1	bogs, semi-natural grassland and highly modified/non-native woodland, hunting, hovering, male. present for ~20mins, departing and swooping down towards vp2 area	suitable nesting habitat; possible breeder	NM
K.012	BR2	23/06/2025	06:39	Kestrel	1	bogs and improved agricultural grassland, hunting, hovering, dropping abruptly, dropping behind terrain	suitable nesting habitat; possible breeder	NM

K.013	BR2	23/06/2025	07:02	Kestrel	1	bogs and improved agricultural grassland, hunting, travelling, departing low downhill	suitable nesting habitat; possible breeder	NM
BZ014	BR2	23/06/2025	08:21	Buzzard	1	conifer plantation, bogs and improved agricultural grassland, soaring, calling, travelling, moving south across site	suitable nesting habitat; possible breeder	NM
BZ015	BR2	23/06/2025	10:03	Buzzard	1	improved agricultural grassland, highly modified/non-native woodland and linear woodland/scrub, travelling low, calling	suitable nesting habitat; possible breeder	NM
BZ016	BR2	23/06/2025	11:42	Buzzard	2	improved agricultural grassland and highly modified/non-native woodland, soaring, circling, off site	pair; probable breeding	NM
SH006	BR8	30/06/2025	11:07	Sparrowhawk	1	conifer plantation, flying	suitable nesting habitat; possible breeder	AOD
HH019	BR2	01/07/2025	09:01	Hen Harrier	1	wet grassland, conifer plantation and upland blanket bog, foraging soaring, male foraging failed attempt on mp flock then took up soaring high	suitable nesting habitat; possible breeder	AOD
HH020	BR10	08/07/2025	11:53	Hen Harrier	1	conifer plantation, wet grassland and upland blanket bog, flying foraging, adult male flying over then foraging uphill	suitable nesting habitat; possible breeder	AOD
BZ017	BR10	09/07/2025	19:26	Buzzard	1	conifer plantation, flying	suitable nesting habitat; possible breeder	KB
K.014	BR10	14/07/2025	17:05	Kestrel	1	bogs and conifer plantation, hunting	suitable nesting habitat; possible breeder	CM
K.015	BR10	14/07/2025	17:27	Kestrel	1	bogs and conifer plantation, hunting	suitable nesting habitat; possible breeder	CM
BZ018	BR10	14/07/2025	17:56	Buzzard	1	conifer plantation, flying	suitable nesting habitat; possible breeder	CM
K.016	BR10	14/07/2025	18:03	Kestrel	1	bogs, hunting	suitable nesting habitat; possible breeder	CM
HH021	BR10	14/07/2025	18:17	Hen Harrier	1	conifer plantation, carrying prey, adult male appeared to be carrying small prey item low over forestry.	adult carrying food/faecal sac; confirmed breeding	CM
BZ019	BR10	14/07/2025	18:29	Buzzard	1	#N/A	suitable nesting habitat; possible breeder	CM
BZ020	BR10	14/07/2025	19:10	Buzzard	1	conifer plantation and improved agricultural grassland, flying	suitable nesting habitat; possible breeder	CM
BZ021	BR10	14/07/2025	19:12	Buzzard	1	conifer plantation, soaring, descended rapidly	suitable nesting habitat; possible breeder	CM
K.017	BR10	14/07/2025	19:18	Kestrel	2	conifer plantation, flying, hunting kestrel joined by a second, following each other, descended into forestry	pair; probable breeding	CM
K.018	BR10	14/07/2025	19:44	Kestrel	1	bogs and conifer plantation, hunting, female	suitable nesting habitat; possible breeder	CM
SH007	BR7	15/07/2025	11:48	Sparrowhawk	2	conifer plantation, chick begging calls	nest with young; confirmed breeding	KB
BZ022	BR7	15/07/2025	13:55	Buzzard	1	conifer plantation, flying	suitable nesting habitat; possible breeder	KB
SH008	BR7	18/07/2025	09:09	Sparrowhawk	1	conifer plantation, mobbing, male, chasing two hooded crows off their perches repeatedly, other sparrowhawk calls coming from nearby forestry.	agitated behaviour; probable breeding	CM
SH009	BR7	18/07/2025	09:15	Sparrowhawk	2	conifer plantation, calling, sparrowhawk calling for prolonged periods throughout three hour survey. male observed chasing corvids nearby.	suitable nesting habitat; possible breeder	CM
SH010	BR9	18/07/2025	12:29	Sparrowhawk	1	conifer plantation, calling, heard calling periodically during survey from forestry south of vantage point, unseen.	suitable nesting habitat; possible breeder	CM
BZ023	BR1	22/07/2025	06:40	Buzzard	1	scrub, perched	suitable nesting habitat; possible breeder	NS
BZ024	BR1	22/07/2025	06:59	Buzzard	1	scrub and semi-natural grassland, hunting	suitable nesting habitat; possible breeder	NS

K.019	BR6	22/07/2025	09:15	Kestrel	1	bogs and scrub, hunting	suitable nesting habitat; possible breeder	NS
K.020	BR6	22/07/2025	09:40	Kestrel	1	bogs and scrub, hunting	suitable nesting habitat; possible breeder	NS
K.021	BR6	22/07/2025	10:25	Kestrel	1	bogs and conifer plantation, hunting	suitable nesting habitat; possible breeder	NS
K.022	BR6	22/07/2025	10:27	Kestrel	1	bogs, hunting	suitable nesting habitat; possible breeder	NS
K.023	BR6	22/07/2025	10:30	Kestrel	1	bogs and scrub, hunting	suitable nesting habitat; possible breeder	NS
K.024	BR6	22/07/2025	10:34	Kestrel	1	bogs and scrub, hunting	suitable nesting habitat; possible breeder	NS
BZ025	BR6	22/07/2025	10:40	Buzzard	1	bogs, conifer plantation and scrub, hunting	suitable nesting habitat; possible breeder	NS
K.025	BR6	22/07/2025	11:15	Kestrel	2	bogs and conifer plantation, hunting	suitable nesting habitat; possible breeder	NS
K.026	BR6	22/07/2025	11:23	Kestrel	2	bogs, hunting	suitable nesting habitat; possible breeder	NS
K.027	BR6	22/07/2025	11:29	Kestrel	2	bogs and conifer plantation, hunting	suitable nesting habitat; possible breeder	NS
K.028	BR6	22/07/2025	11:38	Kestrel	2	bogs, hunting	suitable nesting habitat; possible breeder	NS
K.029	BR6	22/07/2025	11:40	Kestrel	1	bogs, hunting	suitable nesting habitat; possible breeder	NS
K.030	BR4	23/07/2025	06:08	Kestrel	1	bogs, hunt	suitable nesting habitat; possible breeder	NS
K.031	BR4	23/07/2025	06:14	Kestrel	1	bogs, hunt	suitable nesting habitat; possible breeder	NS
K.032	BR4	23/07/2025	06:29	Kestrel	1	bogs, hunt	suitable nesting habitat; possible breeder	NS
K.033	BR4	23/07/2025	06:48	Kestrel	1	bogs, hunt	suitable nesting habitat; possible breeder	NS
K.034	BR4	23/07/2025	07:15	Kestrel	1	bogs, hunt	suitable nesting habitat; possible breeder	NS
K.035	BR4	23/07/2025	07:20	Kestrel	1	bogs, hunt	suitable nesting habitat; possible breeder	NS
K.036	BR4	23/07/2025	07:33	Kestrel	1	bogs, hunt	suitable nesting habitat; possible breeder	NS
K.037	BR4	23/07/2025	07:34	Kestrel	1	bogs, hunt	suitable nesting habitat; possible breeder	NS
K.038	BR4	23/07/2025	07:45	Kestrel	1	bogs, hunt	suitable nesting habitat; possible breeder	NS
K.039	BR4	23/07/2025	08:03	Kestrel	1	bogs, hunr	suitable nesting habitat; possible breeder	NS
K.040	BR4	23/07/2025	08:13	Kestrel	1	bogs, perched, same male, oerched in fencing post	suitable nesting habitat; possible breeder	NS
K.041	BR4	23/07/2025	08:22	Kestrel	1	bogs, flying, moved to diff post	suitable nesting habitat; possible breeder	NS
K.042	BR3	23/07/2025	10:23	Kestrel	1	bogs, hunting	suitable nesting habitat; possible breeder	NS
K.043	BR3	23/07/2025	10:49	Kestrel	1	bogs, hunting	suitable nesting habitat; possible breeder	NS
K.044	BR3	23/07/2025	11:16	Kestrel	1	bogs, hunting	suitable nesting habitat; possible breeder	NS
HH022	BR13	25/07/2025	10:12	Hen Harrier	1	bogs and conifer plantation, flying, ringtail, previously had male carrying prey this direction approx 3km away at br10	suitable nesting habitat; possible breeder	CM
SH011	BR13	25/07/2025	10:30	Sparrowhawk	1	improved agricultural grassland and scrub/transitional woodland, hunting, attempted to take pigeon in flight, likely a female.	suitable nesting habitat; possible breeder	CM
PE001	BR13	25/07/2025	11:18	Peregrine Falcon	1	bogs, improved agricultural grassland and conifer plantation, hunting, lost during rapid dive	suitable nesting habitat; possible breeder	CM

HH023	BR13	28/07/2025	08:14	Hen Harrier	1	bogs and conifer plantation, hunting, adult male, no breeding activity observed, ringtail observed three days before 1.6km away.	suitable nesting habitat; possible breeder	CM
BZ026	BR10	07/08/2025	09:24	Buzzard	1	conifer plantation and improved agricultural grassland, flying, flew from perch.	suitable nesting habitat; possible breeder	CM
BZ027	BR10	07/08/2025	10:59	Buzzard	1	conifer plantation, improved agricultural grassland and bogs, soaring, calling, adult, flying at height.	suitable nesting habitat; possible breeder	CM
K.045	BR10	07/08/2025	11:18	Kestrel	1	bogs and conifer plantation, hunting	suitable nesting habitat; possible breeder	CM
K.046	BR7	08/08/2025	11:35	Kestrel	1	bogs and conifer plantation, hunting	suitable nesting habitat; possible breeder	CM
WE002	BR4	12/08/2025	08:16	White-tailed Eagle	1	bogs and lakes and ponds, resting, flying, sub-adult, first observed perched on hilltop for 45 minutes, potentially roosted here as roosting observed nearby recently. flew to lough sandy, settled with several corvids possibly on carrion.	summering; non-breeding	CM
SH012	BR11	12/08/2025	12:51	Sparrowhawk	1	bogs, hunting, female, flushing pipits, landed on fence but observed surveyor and flew away.	suitable nesting habitat; possible breeder	CM
HH024	BR3	19/08/2025	09:04	Hen Harrier	1	bogs and improved agricultural grassland, hunting, female.	suitable nesting habitat; possible breeder	CM
HH025	BR3	19/08/2025	09:12	Hen Harrier	1	bogs and improved agricultural grassland, hunting, female, second observation.	suitable nesting habitat; possible breeder	CM
BZ028	BR2	19/08/2025	12:05	Buzzard	1	conifer plantation and bogs, soaring, distant, rising on thermal. second buzzard nearby.	suitable nesting habitat; possible breeder	CM
BZ029	BR2	19/08/2025	12:07	Buzzard	1	conifer plantation and bogs, hunting, second buzzard soaring nearby	suitable nesting habitat; possible breeder	CM
BZ030	BR8	22/08/2025	06:39	Buzzard	1	recently-felled woodland and conifer plantation, perching, flying, moving between perches, until out of sight	suitable nesting habitat; possible breeder	CM
SH013	BR8	22/08/2025	08:02	Sparrowhawk	1	mixed broadleaved/conifer woodland, mobbed, flying, chased by flock of passerine	suitable nesting habitat; possible breeder	CM
SH014	BR9	22/08/2025	11:06	Sparrowhawk	2	improved agricultural grassland and mixed broadleaved/conifer woodland, flying, perching, female with juvenile, potentially third individual inside hedgerow. juveniles heard calling here on previous visit.	fledged young; confirmed breeding	CM
WE003	BR9	22/08/2025	11:16	White-tailed Eagle	1	bogs and conifer plantation, travelling, sub-adult, observed in the area recently with roosting activity also recorded.	summering; non-breeding	CM
SH015	BR9	22/08/2025	11:36	Sparrowhawk	1	conifer plantation, flying, un-aged/sexed, juveniles seen in the area earlier.	suitable nesting habitat; possible breeder	CM
BZ031	BR12	29/08/2025	11:07	Buzzard	1	bogs and improved agricultural grassland, hunting	suitable nesting habitat; possible breeder	CM
K.047	BR12	29/08/2025	12:23	Kestrel	1	bogs, hunting, mobbed, male, dived on by hooded crow.	suitable nesting habitat; possible breeder	CM
K.048	BR3	03/09/2025	12:17	Kestrel	1	bogs, hunting	suitable nesting habitat; possible breeder	CM
BZ032	BR10	03/09/2025	16:19	Buzzard	1	conifer plantation and scrub/transitional woodland, circling, calling, dropping into forestry near mast	suitable nesting habitat; possible breeder	NM
BZ033	BR9	03/09/2025	18:07	Buzzard	1	conifer plantation and scrub/transitional woodland, soaring, circling, calling, lost behind forestry	suitable nesting habitat; possible breeder	NM

BZ034	BR9	03/09/2025	19:58	Buzzard	1	improved agricultural grassland and conifer plantation, travelling, calling, relatively low, moving north and towards br8 area	suitable nesting habitat; possible breeder	NM
K.049	BR7	04/09/2025	07:53	Kestrel	1	bogs and semi-natural woodland, hunting, mobbed	suitable nesting habitat; possible breeder	CM
K.050	BR12	05/09/2025	07:15	Kestrel	1	bogs, hunting, hovering, adult female, joined and shadowed by juvenile. dropping abruptly into moorland	suitable nesting habitat; possible breeder	NM
K.051	BR12	05/09/2025	07:16	Kestrel	1	bogs, shadowing, calling, hovering, swooping, perched, br12. juvenile, shadowing and hunting with adult female	fledged young; confirmed breeding	NM
K.052	BR12	05/09/2025	07:21	Kestrel	1	linear woodland/scrub, bogs and improved agricultural grassland, perched, juvenile perched within faughary area	fledged young; confirmed breeding	NM
K.053	BR12	05/09/2025	07:29	Kestrel	1	bogs and improved agricultural grassland, departing, shadowing, chasing, juvenile departing perched, joining adult once again before swooping downhill	fledged young; confirmed breeding	NM
K.054	BR12	05/09/2025	07:29	Kestrel	1	bogs and improved agricultural grassland, hunting, hovering, swooping, adult joined and chased by juvenile before swooping downhill into cartrongibbagh area	suitable nesting habitat; possible breeder	NM
K.055	BR11	05/09/2025	11:19	Kestrel	1	bogs and semi-natural grassland, hunting, hovering, swooping, departing downhill, lost behind forestry	suitable nesting habitat; possible breeder	NM
BZ035	BR11	05/09/2025	11:37	Buzzard	1	scrub/transitional woodland, conifer plantation and improved agricultural grassland, soaring, circling, off site. moving away north	suitable nesting habitat; possible breeder	NM
K.056	BR11	05/09/2025	12:48	Kestrel	1	bogs and improved agricultural grassland, hunting, hovering, dropping abruptly, lost behind terrain	suitable nesting habitat; possible breeder	NM
BZ036	BR11	05/09/2025	13:04	Buzzard	1	conifer plantation, bogs and improved agricultural grassland, soaring high, killea / rathkeelin areas	suitable nesting habitat; possible breeder	NM
BZ037	BR11	05/09/2025	13:52	Buzzard	2	improved agricultural grassland, highly modified/non-native woodland and bogs, soaring, circling, travelling, off site, present high for a long period. eventually swirling and descending	pair; probable breeding	NM
K.057	BR2	17/09/2025	12:47	Kestrel	1	conifer plantation and bogs, hunting, brief view, dropped behind forestry.	suitable nesting habitat; possible breeder	CM

Table 1.3 Non-Target Observations

Date	Survey	Species	Notes	Surveyor
08/04/2025	Vantage Point Survey, VP3	House Martin		NM
08/04/2025	Vantage Point Survey, VP3	Hooded Crow		NM
08/04/2025	Vantage Point Survey, VP3	Barn Swallow		NM
08/04/2025	Vantage Point Survey, VP3	Willow Warbler		NM
08/04/2025	Vantage Point Survey, VP3	Magpie		NM
08/04/2025	Vantage Point Survey, VP3	Siskin		NM
08/04/2025	Vantage Point Survey, VP3	Woodpigeon		NM
08/04/2025	Vantage Point Survey, VP3	Blackbird		NM
08/04/2025	Vantage Point Survey, VP3	Raven		NM
08/04/2025	Vantage Point Survey, VP3	Song Thrush		NM
08/04/2025	Vantage Point Survey, VP3	Stonechat		NM
08/04/2025	Vantage Point Survey, VP3	Robin		NM
08/04/2025	Vantage Point Survey, VP3	Wren		NM
08/04/2025	Vantage Point Survey, VP3	Great Tit		NM
08/04/2025	Vantage Point Survey, VP3	Jay		NM
09/04/2025	Vantage Point Survey, VP4	Willow Warbler		NM
09/04/2025	Vantage Point Survey, VP4	Magpie		NM
09/04/2025	Vantage Point Survey, VP4	Blackcap		NM
09/04/2025	Vantage Point Survey, VP4	Chaffinch		NM
09/04/2025	Vantage Point Survey, VP4	Robin		NM
09/04/2025	Vantage Point Survey, VP4	Woodpigeon		NM
09/04/2025	Vantage Point Survey, VP4	Siskin		NM
09/04/2025	Vantage Point Survey, VP4	Goldcrest		NM
09/04/2025	Vantage Point Survey, VP4	Goldfinch		NM
09/04/2025	Vantage Point Survey, VP4	Bullfinch		NM
09/04/2025	Vantage Point Survey, VP4	Wren		NM
09/04/2025	Vantage Point Survey, VP4	Mistle Thrush		NM
09/04/2025	Vantage Point Survey, VP4	Great Tit		NM
09/04/2025	Vantage Point Survey, VP4	Raven		NM
10/04/2025	Vantage Point Survey, VP2	Sand Martin		NM

10/04/2025	Vantage Point Survey, VP2	Raven		NM
10/04/2025	Vantage Point Survey, VP2	Willow Warbler		NM
10/04/2025	Vantage Point Survey, VP2	Skylark		NM
10/04/2025	Vantage Point Survey, VP2	Robin		NM
10/04/2025	Vantage Point Survey, VP2	Wheatear		NM
10/04/2025	Vantage Point Survey, VP2	Whinchat		NM
10/04/2025	Vantage Point Survey, VP2	Pied Wagtail		NM
10/04/2025	Vantage Point Survey, VP2	Hooded Crow		NM
10/04/2025	Vantage Point Survey, VP2	Cuckoo		NM
10/04/2025	Vantage Point Survey, VP2	Blue Tit		NM
10/04/2025	Vantage Point Survey, VP2	Jackdaw		NM
10/04/2025	Vantage Point Survey, VP2	Pheasant		NM
11/04/2025	Vantage Point Survey, VP1	Robin		NM
11/04/2025	Vantage Point Survey, VP1	Skylark		NM
11/04/2025	Vantage Point Survey, VP1	Chaffinch		NM
11/04/2025	Vantage Point Survey, VP1	Goldcrest		NM
11/04/2025	Vantage Point Survey, VP1	Barn Swallow		NM
11/04/2025	Vantage Point Survey, VP1	Raven		NM
11/04/2025	Vantage Point Survey, VP1	Siskin		NM
11/04/2025	Vantage Point Survey, VP1	Sand Martin		NM
11/04/2025	Vantage Point Survey, VP1	Blackcap		NM
11/04/2025	Vantage Point Survey, VP1	Willow Warbler		NM
11/04/2025	Vantage Point Survey, VP1	Hooded Crow		NM
11/04/2025	Vantage Point Survey, VP1	House Martin		NM
11/04/2025	Vantage Point Survey, VP1	Woodpigeon		NM
11/04/2025	Vantage Point Survey, VP1	Blackbird		NM
11/04/2025	Vantage Point Survey, VP1	Wren		NM
08/05/2025	Vantage Point Survey, VP4	Bullfinch		NM
08/05/2025	Vantage Point Survey, VP4	Goldfinch		NM
08/05/2025	Vantage Point Survey, VP4	Starling		NM
08/05/2025	Vantage Point Survey, VP4	Hooded Crow		NM
08/05/2025	Vantage Point Survey, VP4	Robin		NM
08/05/2025	Vantage Point Survey, VP4	Blackbird		NM
08/05/2025	Vantage Point Survey, VP4	Chaffinch		NM

08/05/2025	Vantage Point Survey, VP4	Pied Wagtail		NM
08/05/2025	Vantage Point Survey, VP4	Chiffchaff		NM
08/05/2025	Vantage Point Survey, VP4	Wren		NM
08/05/2025	Vantage Point Survey, VP4	Cuckoo		NM
08/05/2025	Vantage Point Survey, VP4	Lesser Redpoll		NM
08/05/2025	Vantage Point Survey, VP4	Long-tailed Tit		NM
08/05/2025	Vantage Point Survey, VP4	Jay		NM
08/05/2025	Vantage Point Survey, VP4	Raven		NM
08/05/2025	Vantage Point Survey, VP4	Willow Warbler		NM
08/05/2025	Vantage Point Survey, VP4	Barn Swallow		NM
08/05/2025	Vantage Point Survey, VP4	Blackcap		NM
08/05/2025	Vantage Point Survey, VP4	Stonechat		NM
08/05/2025	Vantage Point Survey, VP4	Mistle Thrush		NM
08/05/2025	Vantage Point Survey, VP4	Woodpigeon		NM
08/05/2025	Vantage Point Survey, VP4	Magpie		NM
09/05/2025	Vantage Point Survey, VP3	Wren		NM
09/05/2025	Vantage Point Survey, VP3	Robin		NM
09/05/2025	Vantage Point Survey, VP3	Barn Swallow		NM
09/05/2025	Vantage Point Survey, VP3	House Martin		NM
09/05/2025	Vantage Point Survey, VP3	Stonechat		NM
09/05/2025	Vantage Point Survey, VP3	Willow Warbler		NM
09/05/2025	Vantage Point Survey, VP3	Cuckoo		NM
09/05/2025	Vantage Point Survey, VP3	Woodpigeon		NM
09/05/2025	Vantage Point Survey, VP3	Magpie		NM
09/05/2025	Vantage Point Survey, VP3	Raven		NM
09/05/2025	Vantage Point Survey, VP3	Rook		NM
09/05/2025	Vantage Point Survey, VP3	Wheatear		NM
09/05/2025	Vantage Point Survey, VP3	Skylark		NM
09/05/2025	Vantage Point Survey, VP3	Mistle Thrush		NM
09/05/2025	Vantage Point Survey, VP3	Magpie		NM
26/05/2025	Vantage Point Survey, VP1	Robin	3	RV
26/05/2025	Vantage Point Survey, VP1	Wren	4	RV
26/05/2025	Vantage Point Survey, VP1	Dunnock	1	RV
26/05/2025	Vantage Point Survey, VP1	Blackcap	1	RV

26/05/2025	Vantage Point Survey, VP1	Blackbird	2	RV
26/05/2025	Vantage Point Survey, VP1	Song Thrush	3	RV
26/05/2025	Vantage Point Survey, VP1	Mistle Thrush	2	RV
26/05/2025	Vantage Point Survey, VP1	Skylark	4	RV
26/05/2025	Vantage Point Survey, VP1	Raven	2	RV
26/05/2025	Vantage Point Survey, VP1	Hooded Crow	11	RV
26/05/2025	Vantage Point Survey, VP1	Magpie	6	RV
26/05/2025	Vantage Point Survey, VP1	Jackdaw	25	RV
26/05/2025	Vantage Point Survey, VP1	Jay	3	RV
26/05/2025	Vantage Point Survey, VP1	Woodpigeon	3	RV
26/05/2025	Vantage Point Survey, VP1	Sand Martin	2	RV
26/05/2025	Vantage Point Survey, VP1	Barn Swallow	3	RV
26/05/2025	Vantage Point Survey, VP1	Goldcrest	3	RV
26/05/2025	Vantage Point Survey, VP1	Willow Warbler	2	RV
26/05/2025	Vantage Point Survey, VP1	Chiffchaff	1	RV
26/05/2025	Vantage Point Survey, VP1	Reed Bunting	2	RV
26/05/2025	Vantage Point Survey, VP1	Crossbill	4	RV
26/05/2025	Vantage Point Survey, VP1	Chaffinch	5	RV
26/05/2025	Vantage Point Survey, VP1	Siskin	9	RV
26/05/2025	Vantage Point Survey, VP1	Lesser Redpoll	2	RV
28/05/2025	Vantage Point Survey, VP2	Skylark	4	RV
28/05/2025	Vantage Point Survey, VP2	Robin	2	RV
28/05/2025	Vantage Point Survey, VP2	Wren	3	RV
28/05/2025	Vantage Point Survey, VP2	Dunnock	1	RV
28/05/2025	Vantage Point Survey, VP2	Siskin	7	RV
28/05/2025	Vantage Point Survey, VP2	Lesser Redpoll	1	RV
28/05/2025	Vantage Point Survey, VP2	Crossbill	2	RV
28/05/2025	Vantage Point Survey, VP2	Chaffinch	3	RV
28/05/2025	Vantage Point Survey, VP2	Hooded Crow	8	RV
28/05/2025	Vantage Point Survey, VP2	Raven	7	RV
28/05/2025	Vantage Point Survey, VP2	Magpie	4	RV
28/05/2025	Vantage Point Survey, VP2	Jackdaw	20	RV
28/05/2025	Vantage Point Survey, VP2	Rook	3	RV
28/05/2025	Vantage Point Survey, VP2	Jay	2	RV

28/05/2025	Vantage Point Survey, VP2	Woodpigeon	2	RV
28/05/2025	Vantage Point Survey, VP2	Blackbird	2	RV
28/05/2025	Vantage Point Survey, VP2	Song Thrush	3	RV
28/05/2025	Vantage Point Survey, VP2	Mistle Thrush	2	RV
28/05/2025	Vantage Point Survey, VP2	Sand Martin	14	RV
28/05/2025	Vantage Point Survey, VP2	Coal Tit	2	RV
28/05/2025	Vantage Point Survey, VP2	Chiffchaff	1	RV
28/05/2025	Vantage Point Survey, VP2	Willow Warbler	2	RV
28/05/2025	Vantage Point Survey, VP2	Goldcrest	3	RV
28/05/2025	Vantage Point Survey, VP2	Blackcap	1	RV
28/05/2025	Vantage Point Survey, VP2	Barn Swallow	3	RV
28/05/2025	Vantage Point Survey, VP2	Grasshopper Warbler	1	RV
19/06/2025	Vantage Point Survey, VP3	Wren	8	RV
19/06/2025	Vantage Point Survey, VP3	Robin	3	RV
19/06/2025	Vantage Point Survey, VP3	Dunnock	3	RV
19/06/2025	Vantage Point Survey, VP3	Reed Bunting	2	RV
19/06/2025	Vantage Point Survey, VP3	Skylark	9	RV
19/06/2025	Vantage Point Survey, VP3	Woodpigeon	7	RV
19/06/2025	Vantage Point Survey, VP3	Hooded Crow	7	RV
19/06/2025	Vantage Point Survey, VP3	Raven	2	RV
19/06/2025	Vantage Point Survey, VP3	Starling	1, lone juvenile	RV
19/06/2025	Vantage Point Survey, VP3	Jay	3	RV
19/06/2025	Vantage Point Survey, VP3	Magpie	4	RV
19/06/2025	Vantage Point Survey, VP3	Crossbill	9, flyovers	RV
19/06/2025	Vantage Point Survey, VP3	Siskin	7, flyovers	RV
19/06/2025	Vantage Point Survey, VP3	Lesser Redpoll	2	RV
19/06/2025	Vantage Point Survey, VP3	Willow Warbler	4, family party	RV
19/06/2025	Vantage Point Survey, VP3	Blackcap	2, singing	RV
19/06/2025	Vantage Point Survey, VP3	Chiffchaff	2, singing	RV
19/06/2025	Vantage Point Survey, VP3	Goldcrest	2, singing	RV
19/06/2025	Vantage Point Survey, VP3	Chaffinch	14, flyovers	RV
19/06/2025	Vantage Point Survey, VP3	Mistle Thrush	2	RV
19/06/2025	Vantage Point Survey, VP3	Blackbird	3, singing	RV
19/06/2025	Vantage Point Survey, VP3	Song Thrush	3, singing	RV

19/06/2025	Vantage Point Survey, VP3	Coal Tit	5	RV
19/06/2025	Vantage Point Survey, VP3	Blue Tit	2	RV
19/06/2025	Vantage Point Survey, VP3	Great Tit	1	RV
19/06/2025	Vantage Point Survey, VP3	House Martin	1	RV
19/06/2025	Vantage Point Survey, VP3	Sand Martin	3	RV
19/06/2025	Vantage Point Survey, VP3	Barn Swallow	4	RV
20/06/2025	Vantage Point Survey, VP2	Sand Martin	15, from nearby colony	RV
20/06/2025	Vantage Point Survey, VP2	Barn Swallow	8	RV
20/06/2025	Vantage Point Survey, VP2	House Martin	3	RV
20/06/2025	Vantage Point Survey, VP2	Skylark	12, displaying	RV
20/06/2025	Vantage Point Survey, VP2	Mistle Thrush	2	RV
20/06/2025	Vantage Point Survey, VP2	Blackbird	3, singing	RV
20/06/2025	Vantage Point Survey, VP2	Song Thrush	1, singing	RV
20/06/2025	Vantage Point Survey, VP2	Robin	2, singing	RV
20/06/2025	Vantage Point Survey, VP2	Wren	8	RV
20/06/2025	Vantage Point Survey, VP2	Dunnock	1, singing	RV
20/06/2025	Vantage Point Survey, VP2	Willow Warbler	3	RV
20/06/2025	Vantage Point Survey, VP2	Chiffchaff	1, singing	RV
20/06/2025	Vantage Point Survey, VP2	Woodpigeon	7	RV
20/06/2025	Vantage Point Survey, VP2	Raven	20, minimum arriving to roost	RV
20/06/2025	Vantage Point Survey, VP2	Hooded Crow	9	RV
20/06/2025	Vantage Point Survey, VP2	Jackdaw	19	RV
20/06/2025	Vantage Point Survey, VP2	Rook	6	RV
20/06/2025	Vantage Point Survey, VP2	Starling	30 plus, juv flock	RV
20/06/2025	Vantage Point Survey, VP2	Linnet	2, pair	RV
20/06/2025	Vantage Point Survey, VP2	Goldfinch	6, along track	RV
20/06/2025	Vantage Point Survey, VP2	Crossbill	8, several flyovers	RV
20/06/2025	Vantage Point Survey, VP2	Chaffinch	10, several flyovers	RV
20/06/2025	Vantage Point Survey, VP2	Siskin	12, several flyovers	RV
20/06/2025	Vantage Point Survey, VP2	Lesser Redpoll	2, pair	RV
20/06/2025	Vantage Point Survey, VP2	Coal Tit	4	RV
20/06/2025	Vantage Point Survey, VP2	Great Tit	1, heard	RV
20/06/2025	Vantage Point Survey, VP2	Goldcrest	4	RV
20/06/2025	Vantage Point Survey, VP2	Great Spotted Woodpecker	1, heard	RV

20/06/2025	Vantage Point Survey, VP2	Pied Wagtail	3, 1 ad and 2 juv	RV
25/06/2025	Vantage Point Survey, VP1	Raven	18	RV
25/06/2025	Vantage Point Survey, VP1	Hooded Crow	8, several flyovers	RV
25/06/2025	Vantage Point Survey, VP1	Magpie	6	RV
25/06/2025	Vantage Point Survey, VP1	Jackdaw	15	RV
25/06/2025	Vantage Point Survey, VP1	Starling	35, roving flock of juv	RV
25/06/2025	Vantage Point Survey, VP1	Jay	3	RV
25/06/2025	Vantage Point Survey, VP1	Crossbill	6, flyovers	RV
25/06/2025	Vantage Point Survey, VP1	Siskin	17, feeding flock by vp	RV
25/06/2025	Vantage Point Survey, VP1	Chaffinch	8, several flyovers	RV
25/06/2025	Vantage Point Survey, VP1	Lesser Redpoll	3, feeding with sk	RV
25/06/2025	Vantage Point Survey, VP1	Goldfinch	3	RV
25/06/2025	Vantage Point Survey, VP1	Coal Tit	3	RV
25/06/2025	Vantage Point Survey, VP1	Goldcrest	1 juv around vp on ground	RV
25/06/2025	Vantage Point Survey, VP1	Robin	2, singing	RV
25/06/2025	Vantage Point Survey, VP1	Wren	3, singing	RV
25/06/2025	Vantage Point Survey, VP1	Dunnock	1, singing	RV
25/06/2025	Vantage Point Survey, VP1	Blackbird	2, singing	RV
25/06/2025	Vantage Point Survey, VP1	Song Thrush	1, singing	RV
25/06/2025	Vantage Point Survey, VP1	Mistle Thrush	2, pair	RV
25/06/2025	Vantage Point Survey, VP1	Willow Warbler	1, singing	RV
25/06/2025	Vantage Point Survey, VP1	Woodpigeon	3, several flyovers	RV
25/06/2025	Vantage Point Survey, VP1	Feral Pigeon	4, flyovers	RV
25/06/2025	Vantage Point Survey, VP1	Barn Swallow	4 adults and juvs around vp	RV
25/06/2025	Vantage Point Survey, VP1	Sand Martin	10, several flyovers	RV
25/06/2025	Vantage Point Survey, VP1	Skylark	7, displaying and flyovers	RV
25/06/2025	Vantage Point Survey, VP1	Reed Bunting	2, pair	RV
28/06/2025	Vantage Point Survey, VP4	Willow Warbler	4 adults and juvs around vp	RV
28/06/2025	Vantage Point Survey, VP4	Chiffchaff	1, heard	RV
28/06/2025	Vantage Point Survey, VP4	Goldcrest	6, adults and juv	RV
28/06/2025	Vantage Point Survey, VP4	Blackcap	3, singing, pair seen	RV
28/06/2025	Vantage Point Survey, VP4	Whitethroat	1, singing	RV
28/06/2025	Vantage Point Survey, VP4	Blue Tit	7, adults and juveniles	RV
28/06/2025	Vantage Point Survey, VP4	Great Tit	2, pair	RV

28/06/2025	Vantage Point Survey, VP4	Coal Tit	3	RV
28/06/2025	Vantage Point Survey, VP4	Long-tailed Tit	6, adults and juvs	RV
28/06/2025	Vantage Point Survey, VP4	Chaffinch	7, flyovers	RV
28/06/2025	Vantage Point Survey, VP4	Goldfinch	4	RV
28/06/2025	Vantage Point Survey, VP4	Siskin	4 feeding by vp	RV
28/06/2025	Vantage Point Survey, VP4	Lesser Redpoll	1, briefly with sk	RV
28/06/2025	Vantage Point Survey, VP4	Bullfinch	3, 1 male and 2 juv	RV
28/06/2025	Vantage Point Survey, VP4	Siskin	2	RV
28/06/2025	Vantage Point Survey, VP4	Reed Bunting	7, adults and juveniles	RV
28/06/2025	Vantage Point Survey, VP4	Woodpigeon	11, flyovers	RV
28/06/2025	Vantage Point Survey, VP4	Collared Dove	2, pair around houses	RV
28/06/2025	Vantage Point Survey, VP4	Feral Pigeon	3, flyovers	RV
28/06/2025	Vantage Point Survey, VP4	Great Spotted Woodpecker	2, heard	RV
28/06/2025	Vantage Point Survey, VP4	Raven	4, family party	RV
28/06/2025	Vantage Point Survey, VP4	Rook	7	RV
28/06/2025	Vantage Point Survey, VP4	Jackdaw	12, regular flyovers	RV
28/06/2025	Vantage Point Survey, VP4	Hooded Crow	6, regular flyovers	RV
28/06/2025	Vantage Point Survey, VP4	Magpie	3	RV
28/06/2025	Vantage Point Survey, VP4	Spotted Flycatcher	3, 1 ad and 2 juv by cottage	RV
28/06/2025	Vantage Point Survey, VP4	Robin	4 adults and juvs around vp	RV
28/06/2025	Vantage Point Survey, VP4	Dunnock	2, heard	RV
28/06/2025	Vantage Point Survey, VP4	Wren	8, adults and juvs aroundvp	RV
28/06/2025	Vantage Point Survey, VP4	Sand Martin	8	RV
28/06/2025	Vantage Point Survey, VP4	Barn Swallow	10	RV
28/06/2025	Vantage Point Survey, VP4	House Martin	3	RV
28/06/2025	Vantage Point Survey, VP4	Blackbird	4, singing, 2 juvs seen	RV
28/06/2025	Vantage Point Survey, VP4	Song Thrush	2, heard	RV
28/06/2025	Vantage Point Survey, VP4	Mistle Thrush	2, flyovers	RV
15/07/2025	Vantage Point Survey, VP1	Raven		CM
15/07/2025	Vantage Point Survey, VP1	Woodpigeon		CM
15/07/2025	Vantage Point Survey, VP1	Hooded Crow		CM
15/07/2025	Vantage Point Survey, VP1	Skylark		CM
15/07/2025	Vantage Point Survey, VP1	Sand Martin		CM
15/07/2025	Vantage Point Survey, VP1	Barn Swallow		CM

08/08/2025	Vantage Point Survey, VP1	Raven	35, mobbing we and roosting in pines by track down hill	RV
08/08/2025	Vantage Point Survey, VP1	Hooded Crow	9	RV
08/08/2025	Vantage Point Survey, VP1	Rook	4	RV
08/08/2025	Vantage Point Survey, VP1	Jackdaw	12, flocks passing and feeding in sheep fields	RV
08/08/2025	Vantage Point Survey, VP1	Magpie	6	RV
08/08/2025	Vantage Point Survey, VP1	Jay	3	RV
08/08/2025	Vantage Point Survey, VP1	Woodpigeon	13, flyovers	RV
08/08/2025	Vantage Point Survey, VP1	Starling	45, minimum, flock of mostly juveniles.	RV
08/08/2025	Vantage Point Survey, VP1	Mistle Thrush	7, flyovers	RV
08/08/2025	Vantage Point Survey, VP1	Blackbird	1, singing	RV
08/08/2025	Vantage Point Survey, VP1	Song Thrush	2, singing	RV
08/08/2025	Vantage Point Survey, VP1	Skylark	3	RV
08/08/2025	Vantage Point Survey, VP1	Reed Bunting	1	RV
08/08/2025	Vantage Point Survey, VP1	Siskin	12, roving flock	RV
08/08/2025	Vantage Point Survey, VP1	Lesser Redpoll	1, flyovers	RV
08/08/2025	Vantage Point Survey, VP1	Chaffinch	9, flyovers	RV
08/08/2025	Vantage Point Survey, VP1	Bullfinch	2, flyovers	RV
08/08/2025	Vantage Point Survey, VP1	Goldcrest	3	RV
08/08/2025	Vantage Point Survey, VP1	Willow Warbler	1, singing	RV
08/08/2025	Vantage Point Survey, VP1	Coal Tit	4	RV
08/08/2025	Vantage Point Survey, VP1	Barn Swallow	40, minimum, large flock feeding over plantation east of vp late in evening	RV
08/08/2025	Vantage Point Survey, VP1	Sand Martin	15	RV
08/08/2025	Vantage Point Survey, VP1	House Martin	6	RV
08/08/2025	Vantage Point Survey, VP1	Wren	1, singing	RV
09/08/2025	Vantage Point Survey, VP2	Raven	14	RV
09/08/2025	Vantage Point Survey, VP2	Hooded Crow	9	RV
09/08/2025	Vantage Point Survey, VP2	Magpie	4	RV
09/08/2025	Vantage Point Survey, VP2	Jay	1	RV
09/08/2025	Vantage Point Survey, VP2	Starling	15, flock of juv	RV
09/08/2025	Vantage Point Survey, VP2	Jackdaw	6	RV
09/08/2025	Vantage Point Survey, VP2	Woodpigeon	6	RV
09/08/2025	Vantage Point Survey, VP2	Mistle Thrush	3	RV

09/08/2025	Vantage Point Survey, VP2	Song Thrush	1	RV
09/08/2025	Vantage Point Survey, VP2	Blackbird	1, singing	RV
09/08/2025	Vantage Point Survey, VP2	Siskin	8, flyovers	RV
09/08/2025	Vantage Point Survey, VP2	Lesser Redpoll	2, flyovers	RV
09/08/2025	Vantage Point Survey, VP2	Chaffinch	8, feeding in pines	RV
09/08/2025	Vantage Point Survey, VP2	Goldfinch	7, feeding along road	RV
09/08/2025	Vantage Point Survey, VP2	Goldcrest	2, feeding in pines	RV
09/08/2025	Vantage Point Survey, VP2	Coal Tit	4	RV
09/08/2025	Vantage Point Survey, VP2	Great Tit	2	RV
09/08/2025	Vantage Point Survey, VP2	Barn Swallow	13	RV
09/08/2025	Vantage Point Survey, VP2	Sand Martin	10	RV
09/08/2025	Vantage Point Survey, VP2	Robin	2, singing	RV
09/08/2025	Vantage Point Survey, VP2	Wren	3	RV
09/08/2025	Vantage Point Survey, VP2	Dunnock	1, singing	RV
10/08/2025	Vantage Point Survey, VP3	Raven	3	RV
10/08/2025	Vantage Point Survey, VP3	Hooded Crow	4	RV
10/08/2025	Vantage Point Survey, VP3	Magpie	2	RV
10/08/2025	Vantage Point Survey, VP3	Jay	1, flyover	RV
10/08/2025	Vantage Point Survey, VP3	Woodpigeon	3	RV
10/08/2025	Vantage Point Survey, VP3	Mistle Thrush	1	RV
10/08/2025	Vantage Point Survey, VP3	Blackbird	1, singing	RV
10/08/2025	Vantage Point Survey, VP3	Song Thrush	1, singing	RV
10/08/2025	Vantage Point Survey, VP3	Siskin	4	RV
10/08/2025	Vantage Point Survey, VP3	Lesser Redpoll	1, flyover	RV
10/08/2025	Vantage Point Survey, VP3	Crossbill	8, one flock flyover	RV
10/08/2025	Vantage Point Survey, VP3	Chaffinch	4	RV
10/08/2025	Vantage Point Survey, VP3	Goldfinch	6, feeding along road	RV
10/08/2025	Vantage Point Survey, VP3	Wren	4	RV
10/08/2025	Vantage Point Survey, VP3	Robin	1, singing	RV
10/08/2025	Vantage Point Survey, VP3	Dunnock	1, singing	RV
10/08/2025	Vantage Point Survey, VP3	Coal Tit	4	RV
10/08/2025	Vantage Point Survey, VP3	Blue Tit	1, calling	RV
10/08/2025	Vantage Point Survey, VP3	Barn Swallow	4	RV
10/08/2025	Vantage Point Survey, VP3	Sand Martin	8	RV

10/08/2025	Vantage Point Survey, VP3	Willow Warbler	1, singing	RV
11/08/2025	Vantage Point Survey, VP4	Wren	8	RV
11/08/2025	Vantage Point Survey, VP4	Robin	3	RV
11/08/2025	Vantage Point Survey, VP4	Dunnock	4	RV
11/08/2025	Vantage Point Survey, VP4	Blue Tit	4	RV
11/08/2025	Vantage Point Survey, VP4	Great Tit	3	RV
11/08/2025	Vantage Point Survey, VP4	Coal Tit	4	RV
11/08/2025	Vantage Point Survey, VP4	Long-tailed Tit	7, adult and juveniles	RV
11/08/2025	Vantage Point Survey, VP4	Willow Warbler	2	RV
11/08/2025	Vantage Point Survey, VP4	Blackcap	3	RV
11/08/2025	Vantage Point Survey, VP4	Chiffchaff	1, singing	RV
11/08/2025	Vantage Point Survey, VP4	Goldcrest	6	RV
11/08/2025	Vantage Point Survey, VP4	Siskin	10, lots of flyovers	RV
11/08/2025	Vantage Point Survey, VP4	Lesser Redpoll	3,flyovers	RV
11/08/2025	Vantage Point Survey, VP4	Chaffinch	10, lots of flyovers	RV
11/08/2025	Vantage Point Survey, VP4	Bullfinch	4, 2 pairs	RV
11/08/2025	Vantage Point Survey, VP4	Goldfinch	8	RV
11/08/2025	Vantage Point Survey, VP4	Barn Swallow	40, feeding over fields	RV
11/08/2025	Vantage Point Survey, VP4	Sand Martin	10, feeding over fields	RV
11/08/2025	Vantage Point Survey, VP4	House Martin	4, feeding over fields	RV
11/08/2025	Vantage Point Survey, VP4	Raven	3,flyovers	RV
11/08/2025	Vantage Point Survey, VP4	Hooded Crow	4	RV
11/08/2025	Vantage Point Survey, VP4	Magpie	5	RV
11/08/2025	Vantage Point Survey, VP4	Jay	3	RV
11/08/2025	Vantage Point Survey, VP4	Starling	1, juv	RV
11/08/2025	Vantage Point Survey, VP4	Jackdaw	6	RV
11/08/2025	Vantage Point Survey, VP4	Woodpigeon	13, flyovers	RV
11/08/2025	Vantage Point Survey, VP4	Song Thrush	2	RV
11/08/2025	Vantage Point Survey, VP4	Blackbird	6	RV
11/08/2025	Vantage Point Survey, VP4	Mistle Thrush	3	RV
11/08/2025	Vantage Point Survey, VP4	Reed Bunting	2, pair	RV
11/08/2025	Vantage Point Survey, VP4	Skylark	2, flyovers	RV
11/08/2025	Vantage Point Survey, VP4	Great Spotted Woodpecker	1, calling	RV
08/09/2025	Vantage Point Survey, VP1	Barn Swallow		CM

08/09/2025	Vantage Point Survey, VP1	Sand Martin		CM
08/09/2025	Vantage Point Survey, VP1	House Martin		CM
08/09/2025	Vantage Point Survey, VP1	Raven		CM
08/09/2025	Vantage Point Survey, VP1	Goldfinch		CM
09/09/2025	Vantage Point Survey, VP1	Raven		CM
09/09/2025	Vantage Point Survey, VP1	Goldcrest		CM
09/09/2025	Vantage Point Survey, VP1	Wren		CM
16/09/2025	Vantage Point Survey, VP2	Hooded Crow		CM
16/09/2025	Vantage Point Survey, VP2	Raven		CM
16/09/2025	Vantage Point Survey, VP2	Jay		CM
16/09/2025	Vantage Point Survey, VP2	Robin		CM
16/09/2025	Vantage Point Survey, VP2	Skylark		CM
16/09/2025	Vantage Point Survey, VP2	Goldfinch		CM
17/09/2025	Vantage Point Survey, VP2	Raven		CM
17/09/2025	Vantage Point Survey, VP2	Robin		CM
17/09/2025	Vantage Point Survey, VP2	Great Tit		CM
17/09/2025	Vantage Point Survey, VP2	Lesser Redpoll		CM
17/09/2025	Vantage Point Survey, VP2	Wren		CM
17/09/2025	Vantage Point Survey, VP2	Barn Swallow		CM
17/09/2025	Vantage Point Survey, VP2	Goldfinch		CM
25/09/2025	Vantage Point Survey, VP4	Robin		AOD
25/09/2025	Vantage Point Survey, VP4	Blackbird		AOD
25/09/2025	Vantage Point Survey, VP4	Wren		AOD
25/09/2025	Vantage Point Survey, VP4	Goldcrest		AOD
26/09/2025	Vantage Point Survey, VP3	Raven		KB
26/09/2025	Vantage Point Survey, VP3	Stonechat		KB
29/09/2025	Vantage Point Survey, VP4	Robin		AOD
29/09/2025	Vantage Point Survey, VP4	Wren		AOD
29/09/2025	Vantage Point Survey, VP4	Jay		AOD
29/09/2025	Vantage Point Survey, VP4	Blackbird		AOD
29/09/2025	Vantage Point Survey, VP4	Mistle Thrush		AOD

Table 1.4 Incidental Observations

Ref.	Location	Date	Time	Species	Number	Habitat and activity	Surveyor
SN001	Vantage Point Survey; VP3 area	08/04/2025	18:01	Snipe	3	bogs; chirping	NM
SN002	Vantage Point Survey; VP3 area	08/04/2025	21:24	Snipe	2	bogs; drumming	NM
SN003	Vantage Point Survey; VP3 area	08/04/2025	21:27	Snipe	1	bogs; flushed, alarming	NM
SN004	Vantage Point Survey; VP3 area	08/04/2025	21:33	Snipe	1	bogs; drumming	NM
SN005	Vantage Point Survey; VP3 area	08/04/2025	21:47	Snipe	5	bogs; drumming, swirling, over moorland at twilight, numbers rough overhead	NM
BZ001	Vantage Point Survey; Skreeny / VP4 area	09/04/2025	14:09	Buzzard	1	conifer plantation, improved agricultural grassland and linear woodland/scrub; soaring, circling, calling, travelling	NM
SN006	Vantage Point Survey; VP4 area (Skreeny)	09/04/2025	14:33	Snipe	1	improved agricultural grassland; flushed, alarming	NM
SN007	Vantage Point Survey; VP4 area (Skreeny)	09/04/2025	14:39	Snipe	1	improved agricultural grassland; flushed, alarming	NM
MP001	Vantage Point Survey; VP4 area	09/04/2025	14:41	Meadow Pipit	4	semi-natural grassland and improved agricultural grassland; flitting, calling, perched	NM
SN008	Vantage Point Survey; VP4 area (Skreeny)	09/04/2025	21:31	Snipe	3	improved agricultural grassland; chirping	NM
SN009	Vantage Point Survey; VP4 area (Skreeny)	09/04/2025	21:33	Snipe	1	improved agricultural grassland; drumming	NM
SN010	Vantage Point Survey; VP4 area (Skreeny)	09/04/2025	21:34	Snipe	2	improved agricultural grassland; chirping	NM
SN011	Vantage Point Survey; VP4 area (Skreeny)	09/04/2025	21:35	Snipe	1	improved agricultural grassland; flushed, alarming	NM
SN012	Vantage Point Survey; VP4 area (Skreeny)	09/04/2025	21:39	Snipe	3	improved agricultural grassland; drumming, swooping, numbers rough in darkness	NM
SN013	Vantage Point Survey; VP4 area (Skreeny)	09/04/2025	21:41	Snipe	3	improved agricultural grassland; chirping	NM
SN014	Vantage Point Survey; VP4 area (Skreeny)	09/04/2025	21:51	Snipe	3	improved agricultural grassland; drumming, swooping, numbers rough. scattered, separate territories	NM
SN015	Vantage Point Survey; VP2 area	10/04/2025	21:37	Snipe	2	bogs; flushed, alarming	NM
SN016	Vantage Point Survey; VP2 parking	10/04/2025	21:40	Snipe	3	bogs; drumming. swirling, numbers rough, scattered + separate territories	NM
SN017	Vantage Point Survey; VP2 area	10/04/2025	21:44	Snipe	1	bogs; flying, calling	NM
SN018	Vantage Point Survey; VP1 area	11/04/2025	14:46	Snipe	1	bogs and semi-natural grassland; flushed, alarming	NM
GL001	Breeding Raptor Survey; br10	17/04/2025	08:10	Grey Wagtail	2	improved agricultural grassland; flying, pair	CM
GP001	Breeding Raptor Survey; Dough Mountain	17/04/2025	10:03	Golden Plover	113	bogs; landing, flock settling onto the bog.	CM

SN019	Breeding Raptor Survey; Doagh Mountain	17/04/2025	12:13	Snipe	1	bogs; flushed	CM
SM001	Breeding Raptor Survey; Doagh	17/04/2025	12:54	Sand Martin	20	exposed rock; nesting, sand martins nesting in hillside above the road.	CM
SN020	Breeding Raptor Survey; BR4	28/04/2025	15:10	Snipe	1	upland blanket bog; chipping, chipping	AOD
GL002	Breeding Raptor Survey; BR13	28/04/2025	19:21	Grey Wagtail	2	conifer plantation; d	AOD
SN021	Vantage Point Survey; VP4 area	08/05/2025	04:33	Snipe	1	semi-natural grassland and highly modified/non-native woodland; flushed, alarming	NM
MP002	Vantage Point Survey; Skreeny	08/05/2025	04:39	Meadow Pipit	1	improved agricultural grassland; calling, numbers rough, pre-dawn	NM
SN022	Vantage Point Survey; Skreeny	08/05/2025	11:21	Snipe	2	semi-natural grassland and improved agricultural grassland; flushed, alarming	NM
MP003	Vantage Point Survey; Skreeny	08/05/2025	11:22	Meadow Pipit	6	improved agricultural grassland, semi-natural grassland and scrub/transitional woodland; flitting, calling, displaying	NM
SN023	Vantage Point Survey; Skreeny	08/05/2025	11:25	Snipe	1	improved agricultural grassland and semi-natural grassland; flushed, alarming	NM
MP004	Vantage Point Survey; Skreeny	08/05/2025	11:39	Meadow Pipit	3	improved agricultural grassland and linear woodland/scrub; flying, calling	NM
MP005	Vantage Point Survey; Skreeny	08/05/2025	11:43	Meadow Pipit	3	improved agricultural grassland and linear woodland/scrub; displaying, calling, perched	NM
HH001	Breeding Raptor Survey; BR1	08/05/2025	20:56	Hen Harrier	1	upland blanket bog; flying, male flew to perch	AOD
SN024	Vantage Point Survey; VP3 area	09/05/2025	04:22	Snipe	1	bogs and semi-natural grassland; drumming	NM
SN025	Vantage Point Survey; VP3 area	09/05/2025	04:34	Snipe	1	bogs; flushed, alarming	NM
MP006	Vantage Point Survey; VP3 area	09/05/2025	11:19	Meadow Pipit	30	bogs; flitting, displaying, courting, calling, scattered within moorland	NM
BZ002	Vantage Point Survey; Faughery	09/05/2025	11:34	Buzzard	1	improved agricultural grassland and linear woodland/scrub; travelling	NM
CM001	Breeding Raptor Survey; BR1	27/05/2025	16:46	Common Gull	1	conifer plantation and wet grassland; flying, adult	AOD
MP007	Breeding Raptor Survey; brvp5	08/06/2025	08:05	Meadow Pipit	1	bogs; singing	KB
SN026	Breeding Raptor Survey; Faughery	10/06/2025	07:14	Snipe	1	upland blanket bog; display call, chipping call	AOD
MP008	Breeding Raptor Survey; brvp7	10/06/2025	16:20	Meadow Pipit	1	conifer plantation; singing	KB
MP009	Breeding Raptor Survey; brvp10	10/06/2025	19:32	Meadow Pipit	1	bogs; singing	KB
SN027	Breeding Raptor Survey; BR4	16/06/2025	06:26	Snipe	1	bogs; travelling, calling, not seen, only heard overhead in cloud	NM
MP010	Breeding Raptor Survey; BR4	16/06/2025	08:10	Meadow Pipit	95	bogs; flitting, courting, displaying, perched, foraging, consistent activity in surrounding moorland throughout survey. scattered, numbers rough, max flock - 5. frequent pairs	NM
SN028	Breeding Raptor Survey; BR4	16/06/2025	09:08	Snipe	2	bogs; chirping, numbers rough	NM
SN029	Breeding Raptor Survey; BR4	16/06/2025	10:07	Snipe	2	bogs; chirping, in moorland, numbers rough	NM
MP011	Breeding Raptor Survey; BR4	16/06/2025	10:28	Meadow Pipit	3	bogs; flitting, fluttering, chasing	NM
SN030	Breeding Raptor Survey; BR4	16/06/2025	11:33	Snipe	1	bogs; chirping, within moorland, numbers rough	NM
SN031	Breeding Raptor Survey; BR4	16/06/2025	11:51	Snipe	1	bogs; travelling, swooping, lost behind terrain	NM

MP012	Breeding Raptor Survey; Faughary	23/06/2025	05:42	Meadow Pipit	18	bogs, improved grassland and scrub/transitional woodland; flitting, calling, perched, displaying, scattered in open moorland / grassland. pairs chasing. numbers rough	NM
SN032	Breeding Raptor Survey; Faughary	23/06/2025	05:44	Snipe	1	improved agricultural grassland and bogs; drumming	NM
MP013	Breeding Raptor Survey; BR2 approach (Faughary WF)	23/06/2025	05:50	Meadow Pipit	37	improved agricultural grassland and bogs; flitting, calling, displaying, perched, scattered in pasture along access track, pairs chasing. numbers rough, max flock - 6	NM
SN033	Breeding Raptor Survey; Faughary WF	23/06/2025	05:51	Snipe	2	bogs and improved agricultural grassland; drumming, swooping, separate territories	NM
SN034	Breeding Raptor Survey; BR2	23/06/2025	06:05	Snipe	2	bogs and improved agricultural grassland; drumming, chasing, finished at ~ 06:25	NM
MP014	Breeding Raptor Survey; BR2	23/06/2025	06:15	Meadow Pipit	94	bogs and improved agricultural grassland; flitting, calling, perched, displaying, activity throughout, frequent flights in brvp area and surrounding moorland. scattered, numbers rough. max flock - 10	NM
SN035	Breeding Raptor Survey; BR2	23/06/2025	06:27	Snipe	1	improved agricultural grassland and bogs; travelling, calling, dropping into gully	NM
SN036	Breeding Raptor Survey; BR2	23/06/2025	07:33	Snipe	1	bogs; flushed, departing	NM
SN037	Breeding Raptor Survey; BR2	23/06/2025	12:14	Snipe	1	improved agricultural grassland and bogs; travelling, calling	NM
MP015	Breeding Raptor Survey; Faughary WF	23/06/2025	12:21	Meadow Pipit	33	improved agricultural grassland and bogs; flitting, calling, perched, display calls evident, scattered in area along access track. numbers rough, max flock - 7	NM
HH002	Breeding Raptor Survey; Faughary area / Saddle Hill (on site)	23/06/2025	13:04	Hen Harrier	1	improved agricultural grassland and bogs; travelling, foraging, male. moving low across rough farmland and moorland on site. through wf and lost over heather slopes	NM
MP016	Breeding Raptor Survey; brvp 12	09/07/2025	16:05	Meadow Pipit	2	bogs; singing	KB
MP017	Breeding Raptor Survey; brvp 10	09/07/2025	19:42	Meadow Pipit	2	wet grassland; flying	KB
SI001	Breeding Raptor Survey; Lissinagroagh	14/07/2025	18:03	Swift	1	conifer plantation; flying	CM
K.001	Breeding Raptor Survey; Lissinagroagh	14/07/2025	20:52	Kestrel	1	bogs and conifer plantation; flying, male, observed after survey	CM
MP018	Breeding Raptor Survey; brvp 7	15/07/2025	13:50	Meadow Pipit	2	conifer plantation; foraging	KB
SI002	Breeding Raptor Survey; Br9	18/07/2025	12:12	Swift	1	conifer plantation; flying	CM
SI003	Breeding Raptor Survey; Raheelin	18/07/2025	12:23	Swift	2	conifer plantation; flying, feeding	CM
FOX001	Breeding Raptor Survey; Boleyboy	24/07/2025	07:30	Fox	1	conifer plantation and improved agricultural grassland; walking, fox cub, this years.	CM
WE001	Vantage Point Survey; VP2	09/08/2025	09:29	White-tailed Eagle	1	eroding blanket bog, conifer plantation and improved agricultural grassland; soaring, same imm as previous evening, soaring over vp, hanging in wind and then gliding south until lost against hill over marakill lough.	RV
RG001	Breeding Raptor Survey; Lisdarush	11/08/2025	08:13	Red Grouse	1	bogs; calling, heard, not seen.	CM

RG002	Breeding Raptor Survey; Doagh	12/08/2025	09:00	Red Grouse	1	bogs; calling, heard twice but not seen.	CM
GP002	Breeding Raptor Survey; Doagh	12/08/2025	10:59	Golden Plover	1	bogs; flying, calling, landing	CM
CA001	Breeding Raptor Survey; Faughary	19/08/2025	08:59	Cormorant	1	bogs and improved agricultural grassland; flying	CM
RED SQUIRREL001	Breeding Raptor Survey; Raheelin	22/08/2025	08:15	Red Squirrel	2	mixed broadleaved/conifer woodland; foraging	CM
PINE MARTEN001	Breeding Raptor Survey; Raheelin	22/08/2025	08:20	Pine Marten	1	mixed broadleaved/conifer woodland; travelling, squirrel alarm calling nearby	CM
MP019	Breeding Raptor Survey; BR10	03/09/2025	13:40	Meadow Pipit	66	improved agricultural grassland, bogs and scrub/transitional woodland; flying, calling, perched, frequent flights and calls within brvp area throughout. numbers rough, max flock - 5	NM
MP020	Breeding Raptor Survey; BR9	03/09/2025	17:30	Meadow Pipit	45	improved agricultural grassland, scrub/transitional woodland and highly modified/non-native woodland; flitting, calling, perched, flyover, regular sightings in br area throughout, mostly within scrub and rough farmland across from brvp (~75m west). numbers rough, max flock - 12	NM
SN038	Breeding Raptor Survey; BR9	03/09/2025	17:57	Snipe	1	conifer plantation and scrub/transitional woodland; flying, calling	NM
SN039	Breeding Raptor Survey; BR9	03/09/2025	19:16	Snipe	1	improved agricultural grassland and scrub/transitional woodland; flying, calling	NM
SN040	Breeding Raptor Survey; BR9	03/09/2025	19:52	Snipe	1	improved agricultural grassland and conifer plantation; flying	NM
GL003	Breeding Raptor Survey; BR9	03/09/2025	20:32	Grey Wagtail	1	improved agricultural grassland and scrub/transitional woodland; flying, calling	NM
BZ003	Breeding Raptor Survey; BR7	04/09/2025	13:22	Buzzard	1	active quarries and mines; flushed, flying, observed after survey	CM
MP021	Breeding Raptor Survey; Faughary	05/09/2025	06:12	Meadow Pipit	1	bogs and semi-natural grassland; flying, calling	NM
MP022	Breeding Raptor Survey; Faughary	05/09/2025	06:16	Meadow Pipit	5	bogs and improved agricultural grassland; flitting, calling, along wf track	NM
MP023	Breeding Raptor Survey; Faughary	05/09/2025	06:27	Meadow Pipit	3	bogs and improved agricultural grassland; flying, calling	NM
SN041	Breeding Raptor Survey; Faughary	05/09/2025	06:29	Snipe	1	bogs; flushed, alarming	NM
SN042	Breeding Raptor Survey; Faughary	05/09/2025	06:34	Snipe	1	bogs; flushed, alarming	NM
MP024	Breeding Raptor Survey; Faughary	05/09/2025	06:35	Meadow Pipit	12	bogs; flushed, flitting, perched, calling	NM
MP025	Breeding Raptor Survey; BR12	05/09/2025	06:41	Meadow Pipit	1	bogs; flying, calling	NM
SN043	Breeding Raptor Survey; BR12	05/09/2025	06:43	Snipe	1	bogs; flushed, alarming	NM
MP026	Breeding Raptor Survey; BR12	05/09/2025	06:46	Meadow Pipit	1	bogs; flying, calling	NM
SN044	Breeding Raptor Survey; BR12	05/09/2025	06:56	Snipe	1	bogs; flushed, alarming, landing within moorland downhill	NM
MP027	Breeding Raptor Survey; BR12	05/09/2025	07:00	Meadow Pipit	58	bogs; flying, calling, perched, flitting, scattered within moorland adjacent to brvp throughout, some further away. numbers rough, max flock - 9	NM
LB001	Breeding Raptor Survey; BR12	05/09/2025	07:19	Lesser Black-backed Gull	9	improved agricultural grassland, highly modified/non-native woodland and scrub/transitional woodland; travelling, swooping, off site, moving within glen towards l. melvin	NM
SN045	Breeding Raptor Survey; BR12	05/09/2025	08:36	Snipe	2	bogs and improved agricultural grassland; travelling, calling	NM
SN046	Breeding Raptor Survey; Faughary	05/09/2025	09:56	Snipe	1	bogs; flushed, alarming, dropping back into moorland	NM

MP028	Breeding Raptor Survey; Faughary	05/09/2025	09:59	Meadow Pipit	3	bogs and improved agricultural grassland; flying, calling	NM
BZ004	Breeding Raptor Survey; Faughary	05/09/2025	10:01	Buzzard	1	conifer plantation; circling, soaring	NM
MP029	Breeding Raptor Survey; Faughary	05/09/2025	10:05	Meadow Pipit	32	bogs, improved agricultural grassland and scrub; flitting, calling, perched, scattered within area surrounding wf entrance	NM
MP030	Breeding Raptor Survey; Dough Mtn.	05/09/2025	10:20	Meadow Pipit	32	bogs; flitting, calling, perched, scattered within moorland adjacent to summit (trig pillar and sheepfold)	NM
SN047	Breeding Raptor Survey; BR11 approach	05/09/2025	10:29	Snipe	1	bogs; flushed, alarming	NM
MP031	Breeding Raptor Survey; BR11 approach	05/09/2025	10:35	Meadow Pipit	51	bogs and semi-natural grassland; flitting, calling, perched, flying, scattered across moorland. numbers rough, max flock - 5	NM
SN048	Breeding Raptor Survey; BR11 approach	05/09/2025	10:37	Snipe	1	bogs; flushed, alarming	NM
SN049	Breeding Raptor Survey; BR11	05/09/2025	10:44	Snipe	1	bogs; flushed, alarming, departing, frantic flight	NM
SN050	Breeding Raptor Survey; BR11	05/09/2025	11:11	Snipe	1	bogs; flushed, alarming, landing within moorland	NM
MP032	Breeding Raptor Survey; BR11	05/09/2025	11:20	Meadow Pipit	90	bogs; flying, calling, perched, flitting, foraging	NM
SN051	Breeding Raptor Survey; BR11	05/09/2025	12:39	Snipe	2	bogs; travelling, calling, moving north towards vp3 area	NM
MP033	Breeding Raptor Survey; BR11 retreat	05/09/2025	14:15	Meadow Pipit	43	bogs; flitting, calling, flushed, flying, scattered across upland moorland. numbers rough, max flock - 7	NM

Appendix 6-10

Species Importance

Appendix 6-10 SPECIES IMPORTANCE

Table 6.10.1: Information for Bird Species to Support Evaluation of Species Importance

Common Name	Peak Count Recorded During Surveys[1]	Details of Observations	National Population Estimate (Individuals)	National Population Source	% of Peak Count of National Population	Regional / County Population Estimate Available	Regional / County Population Estimate (Individuals)	Regional / County Population Estimate Source	% of Peak Count of Regional / County Population Estimate
Black-headed gull	134 (b)	Flight activity surveys (no breeding observed)	15,620 (b)	European Environment Agency (n.d.)	0.86 (b)	No	N/A	N/A	N/A
Common kestrel	1 (nb) 2 (b)	Flight activity surveys Breeding and winter walkover surveys Breeding raptor surveys (no breeding observed within site; confirmed within wider area)	13,500 (b)	European Environment Agency (n.d.)	0.01 (b) 0.01 (nb)	No	N/A	N/A	N/A
Common snipe	21 (nb) 2 (b)	Flight activity surveys Breeding and winter walkover surveys (no confirmed breeding observed; likely two territories)	8,550 (b) 835 (nb; likely to be large underestimate)	European Environment Agency (n.d.) (Burke et al., 2025)	0.02 (b)	County estimate for non-breeding season only	7 (nb; likely to be large underestimate)	(Burke et al., 2025)	300.00
Common swift	3 (b)	Breeding walkover surveys (no breeding observed)	51,728 (b)	European Environment Agency (n.d.)	0.01 (b)	No	N/A	N/A	N/A
Eurasian woodcock	2 (nb) 2 (b)	Flight activity surveys Winter walkover surveys	27,434 (b)	O'Neill (2024)	0.007 (b and nb)	No	N/A	N/A	N/A

[1] Key to survey season type: b = breeding season, nb = non-breeding season

Common Name	Peak Count Recorded During Surveys[1]	Details of Observations	National Population Estimate (Individuals)	National Population Source	% of Peak Count of National Population	Regional / County Population Estimate Available	Regional / County Population Estimate (Individuals)	Regional / County Population Estimate Source	% of Peak Count of Regional / County Population Estimate
		Breeding woodcock surveys (probably breeding within site; two to three territories)							
European golden plover	100 (nb) 75 (b)	Flight activity surveys (no breeding observed; birds likely on passage)	80,707 (nb)	European Environment Agency (n.d.))	0.09 (b)	County estimate for non-breeding season only	0 (underestimate)	(Burke et al., 2025)	N/A – cannot calculate based on 0 value
Golden eagle	1 (nb)	Winter walkover survey	10 (b)	European Environment Agency (n.d.)	10.00 (nb)	No	N/A	N/A	N/A
Great cormorant	3 (b)	Flight activity surveys (no breeding observed)	9,376 (b)	European Environment Agency (n.d.)	0.03 (b)	County estimate for non-breeding season only	N/A	N/A	N/A
Grey wagtail	3 (b)	Breeding walkover surveys (possible breeding within site and 500 m surrounds)	101,536 (b)	European Environment Agency (n.d.)	0.003 (b)	No	N/A	N/A	N/A
Hen harrier	4 (nb) 4 (b)	Flight activity surveys Breeding and winter walkover surveys Hen harrier winter roost surveys (no roosting observed) Breeding raptor surveys (confirmed breeding within site; maximum	212 (b) 406 (nb)	O'Donoghue (2020); Ruddock et al., (2024)	4.25 (b) 0.99 (nb)	Regional estimate for breeding season only	4 (b)	Ruddock et al. (2024)[2]	40.91 (b)

[2] Region defined as Leitrim Uplands non-designated important breeding area

Common Name	Peak Count Recorded During Surveys[1]	Details of Observations	National Population Estimate (Individuals)	National Population Source	% of Peak Count of National Population	Regional / County Population Estimate Available	Regional / County Population Estimate (Individuals)	Regional / County Population Estimate Source	% of Peak Count of Regional / County Population Estimate
		two pairs in site and one pair off-site) Foraging hen harrier surveys							
Herring gull	18 (b)	Flight activity surveys (no breeding observed)	20,666 (b)	European Environment Agency (n.d.)	0.09 (b)	County estimate for non-breeding season only	N/A	N/A	N/A
Lesser black-backed gull	37 (b)	Flight activity surveys Breeding walkover survey (no breeding observed)	14,224 (b)	European Environment Agency (n.d.)	0.26 (b)	County estimate for non-breeding season only	N/A	N/A	N/A
Little egret	3 (b)	Flight activity surveys (no breeding observed)	1,290 (b)	European Environment Agency (n.d.)	0.23 (b)	County estimate for non-breeding season only	N/A	N/A	N/A
Mallard	13 (b)	Flight activity survey Summer walkover survey (one pair confirmed breeding within site)	30,800 (b)	European Environment Agency (n.d.)	0.04 (b)	County estimate for non-breeding season only	N/A	N/A	N/A
Meadow pipit	38 (nb) 12 (b)	Breeding and winter walkover surveys (confirmed breeding within site)	1,351,995 (b)	European Environment Agency (n.d.)	0.02 (nb) 0.0009 (b)	No	N/A	N/A	N/A
Merlin	1 (nb) 1 (b)	Flight activity surveys Breeding and winter walkover surveys	400 (b)	European Environment Agency (n.d.)	0.25 (b and nb)	No	N/A	N/A	N/A

Common Name	Peak Count Recorded During Surveys[1]	Details of Observations	National Population Estimate (Individuals)	National Population Source	% of Peak Count of National Population	Regional / County Population Estimate Available	Regional / County Population Estimate (Individuals)	Regional / County Population Estimate Source	% of Peak Count of Regional / County Population Estimate
		Breeding raptor surveys (no breeding / roosting observed)							
Osprey	1 (b)	Breeding raptor surveys (no breeding / roosting observed)	None available	TBC	N/A	N/A	N/A	N/A	N/A
Red grouse	2 (nb) 2 (b)	Flight activity surveys Breeding and winter walkover surveys Red grouse surveys (confirmed breeding within site)	3,796 (b)	European Environment Agency (n.d.)	0.05 (b and nb)	No	N/A	N/A	N/A
Redwing	75 (nb)	Winter walkover surveys	None available	European Environment Agency (n.d.)	N/A	N/A	N/A	N/A	N/A
White-tailed eagle	1 (b)	Flight activity surveys Breeding walkover surveys Breeding raptor surveys (no breeding observed)	24 (b)	European Environment Agency (n.d.)	4.17 (b)	N/A	N/A	N/A	N/A
Whooper swan	30 (nb)	Flight activity surveys Winter walkover surveys (no foraging / roosting observed; just commuting)	14,467 (nb)	Burke et al. (2021)	0.21 (nb)	County estimate for non-breeding season only	386	Burke et al. (2021)	7.78





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Appendix 6-11

Species Legal and Conservation Status, and Population Trends

Appendix 6-11 Species Legal and Conservation Status, and Population Trends

Table 6.11.1: Additional Information for Bird Species to Support Evaluation of Species Importance

Common Name	Listed under Annex I of EU Birds Directives	BoCCI4 Status	BoCCI4 Qualifying Criteria	Population Trend for Relevant Population
Black-headed gull	No	Amber	Moderate breeding range decline over shorter and longer time periods of -58% and -55%, respectively Localised breeding populations	See BoCCI4 qualifying criteria
Common kestrel	No	Red	Severe breeding population decline over shorter time period of -53%	See BoCCI4 qualifying criteria
Common snipe	No	Red	Severe breeding population decline over shorter and longer time periods of -50% and -78%, respectively	See BoCCI4 qualifying criteria
Common swift	No	Red	Severe breeding population decline over shorter time period of -56%	See BoCCI4 qualifying criteria
Eurasian woodcock	No	Red	Severe breeding range decline over longer time period of -73%	See BoCCI4 qualifying criteria
European golden plover	Yes	Red	Severe breeding population decline over longer time period of -84%	See BoCCI4 qualifying criteria for breeding population; decrease (12.3%) over last five years (Burke et al., 2025)

Common Name	Listed under Annex I of EU Birds Directives	BoCCI4 Status	BoCCI4 Qualifying Criteria	Population Trend for Relevant Population
				for non-breeding population
Golden eagle	Yes	Red	Historical decline in breeding population	Increase (233%) 2012-2018 and also 1980-2018 (European Environment Agency, n.d.)
Great cormorant	No	Amber	Localised breeding populations	Increase 2012-2018 and also 1980-2018 (European Environment Agency, n.d.)
Grey wagtail	No	Red	Severe breeding population decline over shorter time period of -50%	See BoCCI4 qualifying criteria
Hen harrier	Yes	Amber	SPEC3: unfavourable conservation status in Europe, with global population concentrated outside of Europe Moderate breeding population decline over longer time period of -29%	See BoCCI4 qualifying criteria
Herring gull	No	Amber	SPEC2: unfavourable conservation status in Europe, with global population concentrated inside of Europe Moderate breeding population decline of -29% and -50% over	See BoCCI4 qualifying criteria

Common Name	Listed under Annex I of EU Birds Directives	BoCCI4 Status	BoCCI4 Qualifying Criteria	Population Trend for Relevant Population
			shorter and longer time periods, respectively	
Lesser black-backed gull	No	Amber	Localised breeding populations	Increase 2012-2018 and also 1980-2018 (European Environment Agency, n.d.)
Little egret	Yes	Green	N/A	Increase 2012-2018 and also 1980-2018 (European Environment Agency, n.d.)
Mallard	No	Amber	Moderate non-breeding population decline over shorter time period of -41%	See BoCCI4 qualifying criteria
Meadow pipit	No	Red	SPEC1: global conservation concern	Decline of 12.4% 2006-2016 (European Environment Agency, n.d.)
Merlin	Yes	Amber	Moderate breeding range decline over longer time period of -40%	See BoCCI4 qualifying criteria
Red grouse	No	Red	Severe breeding population decline over longer time period of >50%	Decline (no magnitude given) 2000-2008 and 1980-2008 (European Environment Agency, n.d.)
Redwing	No	Red	SPEC1: global conservation concern	No information available

Common Name	Listed under Annex I of EU Birds Directives	BoCCI4 Status	BoCCI4 Qualifying Criteria	Population Trend for Relevant Population
White-tailed eagle	Yes	Red	Historical decline in breeding population	Increase (100%) 2012-2018 and 1980-2018
Whooper swan	Yes	Amber	A population of fewer than 100 breeding pairs in Ireland Localised non-breeding populations Internationally important non-breeding population in Ireland	Increase (24.9%) 2015-2020 (Burke et al., 2021)



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Appendix 6-12

Hen Harrier Foraging Habitat Loss Report

Hen Harrier Foraging Habitat Loss Report

Lissinagroagh Wind Farm

FuturEnergy Ireland

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Client Reference No: IR.008820

10 February 2026

Revision: 00

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
00	10 February 2026	Dr Jonathon Dunn	Duncan Watson	Duncan Watson
	Click to enter a date.			
	Click to enter a date.			
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	Click to enter a date.			

Basis of Report

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Executive Summary

This report presents an assessment of potential foraging habitat loss for breeding hen harrier *Circus cyaneu*s associated with the proposed Lissinagroagh Wind Farm in County Leitrim. The analysis integrates desk-based research, field surveys conducted between 2020 and 2024, and GIS-based habitat modelling to quantify habitat displacement effects and inform compensatory measures.

Hen harrier foraging habitat suitability was assessed using a combination of literature review and field-based habitat mapping. Habitats within 250 m of proposed turbine locations were classified as either potentially suitable or unsuitable for foraging, with further refinement into 'higher' and 'lower' suitability categories. The 250 m distance is a precautionary 'worst-case' scenario based on evidence of statistically significant foraging hen harrier displacement up to that distance, despite no indication of complete avoidance. Closed-canopy forestry within 250 m of proposed turbine locations was generally deemed potentially unsuitable, while open habitats such as blanket bog and wet grassland were considered potentially suitable to varying degrees.

Initial calculations estimate that 109 hectares of currently potentially suitable habitat may be lost due to displacement. When future forestry cycles are accounted for, recognising that some currently unsuitable forestry may become potentially suitable over time, the estimated loss increases to 140 hectares. Of this, approximately 76 hectares are of higher suitability and 64 hectares of lower suitability.

To refine these estimates, two approaches were used to assess functional habitat use by hen harrier: foraging territory mapping based on recorded flight lines and core foraging area buffering around proposed nesting enhancement areas (NEAs), which have been designed to encourage hen harriers to nest away from turbines. Foraging territory mapping showed that foraging areas varied annually, with the worst-case scenario showing that all habitats within 250 m of all turbines formed part of mapped foraging territories. Mean foraging territory-based estimates reduced habitat loss slightly (to c.79 ha based on current potential suitability and c.133 ha based on future potential suitability). The core foraging area method, based on a 2 km buffer around NEAs, resulted in a minor reduction in predicted habitat loss (to c.104 ha based on current potential suitability and c.135 ha based on future potential suitability).

Both functional usage methods have limitations. Foraging territory mapping does not account for future shifts in nesting or habitat preference, while the core foraging area approach assumes exclusive use of NEAs and a fixed foraging radius, which may not reflect actual behaviour. Nonetheless, both methods suggest that the initial habitat loss estimates are precautionary and likely to slightly overestimate actual displacement effects.

In conclusion, the most precautionary estimate of effective foraging habitat loss is 140 hectares (accounting for planned forestry cycles over the lifetime of the Project). This figure should therefore form the basis for compensation planning. Where feasible, compensatory habitats should be targeted to reflect the proportional loss of higher versus lower suitability habitats. This report will inform the Hen Harrier Management Plan for the site, ensuring that mitigation and enhancement measures are ecologically sound and proportionate to predicted impacts.

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Acronyms and Abbreviations

CEnv	Chartered Environmentalist
CIEEM	Chartered Institute of Ecology and Environmental Management
EcIA	Ecological Impact Assessment
EIAR	Environmental Impact Assessment Report
FEI	FuturEnergy Ireland
GIS	Geographic Information Systems
ITM	Irish Transverse Mercator
MCIEEM	Member of the Chartered Institute of Ecology and Environmental Management
NEA	Nesting Enhancement Area
Project	Lissinagroagh Wind Farm
Site	The Project location
SLR	SLR Environmental Consulting (Ireland) Ltd

1.0 Introduction

SLR Environmental Consulting (Ireland) Ltd (hereafter "SLR") was commissioned by FuturEnergy Ireland (hereafter "FEI") to calculate the potential loss of foraging habitat used by breeding hen harrier *Circus cyaneus* as a result of the proposed Lissinagroagh wind farm (hereafter "the Project") based on habitat and bird survey data and a review of relevant literature.

1.1 Brief Description of the Project Site

The Project (hereafter the location of the Project is referred to as "the Site") is located approximately at 592624, 842839 (Irish Transverse Mercator; ITM), c. 3 km northeast of Manorhamilton in Co. Leitrim and is shown in Figure 1, Appendix A.

The Site encompasses an upland landscape with habitats dominated by conifer plantation, improved and wet grasslands and peatland habitats. Numerous eroding, upland watercourses run throughout the Site including tributaries of the Owenmoore [Manorhamilton] fourth order watercourse in the south and the Lattone 35 third order watercourse in the north.

Existing land uses are predominantly commercial agroforestry and grazing by cattle and sheep. The management of land for red grouse *Lagopus lagopus* occurs nearby but outside the Site. The operational Faughary wind farm is located c. 550 m to the west.

Bird surveys conducted between 2020 and 2025[1,2,3,4,5,6,7] showed that there have been between 1-2 nesting hen harrier present within or close to the Site for most survey years with a 'northern' and 'southern' pair present. The southern pair have been present more consistently than the northern pair. There was also a third pair off-site outside the survey area c. 2.8 km to the northeast recorded in 2021. Historical, pre-2020 surveys recorded successful nesting attempts by the 'southern' pair in 2018 and 2019 also.

1.2 Brief Description of the Project

The Project comprises of 14 wind turbines spread over a single array along with ancillary infrastructure. A full description is given in the accompanying Environmental Impact Assessment Report (EIAR). As part of the Project, there will be two nesting enhancement areas created for hen harrier (hereafter "NEAs"). These are lands that will be created and managed to encourage hen harrier to nest away from the turbines, and form part of a compensatory strategy described elsewhere in the EIAR. They are mentioned in the context of the current report because they must be considered in the context of foraging hen harrier also, given that nesting and foraging locations are linked. The Project is shown in Figure 1, Appendix A.

Note that this report was completed prior to the finalisation of the Project description in the EIAR and as a result, turbine numbering in this report differs from that used elsewhere in the

[1] MKO (2025). Lissinagroagh Wind Farm, Co. Leitrim. Winter Season 2020-2021. MKO, Galway, Ireland.
[2] MKO (2025). Lissinagroagh Wind Farm, Co. Leitrim. Breeding Season 2021. MKO, Galway, Ireland.
[3] MKO (2023). Lissinagroagh Wind Farm, Co. Leitrim. Winter Bird Survey Report 2021/22. MKO, Galway, Ireland.
[4] MKO (2023). Lissinagroagh Wind Farm, Co. Leitrim. Breeding Bird Survey Report 2022. MKO, Galway, Ireland.
[5] MKO (2023). Lissinagroagh Wind Farm, Co. Leitrim. Breeding Bird Survey Report 2023. MKO, Galway, Ireland.
[6] MKO (2025). Lissinagroagh Wind Farm, Co. Leitrim. Breeding Bird Survey Report 2024. MKO, Galway, Ireland.
[7] MKO (2025). Lissinagroagh Wind Farm, Co. Leitrim. Breeding Bird Survey Report 2025. MKO, Galway, Ireland.

EIAR. A comparison is provided below in Table 1. The turbine locations themselves are unchanged and, accordingly, the findings and conclusions of this report remain valid.

Table 1: Turbine Numbering Key

Turbine Number in Current Report	Corresponding Turbine Number in EIAR
T1	T12
T2	T10
T3	T8
T4	T7
T5	T9
T6	T6
T7	T5
T8	T2
T9	T1
T10	T4
T11	T3
T12	T11
T13	T13
T14	T14

1.3 Purpose of this Report

The purpose of this report is to:

- Identify habitats considered potentially suitable for foraging hen harrier through desk study;
- Categorise the suitability of the habitats mapped during field survey at the Site for foraging hen harrier;
- Calculate the area of currently available foraging habitats that may effectively be lost due to potential displacement and also consider how those areas may change over the lifetime of the Project as a result of habitat changes;
- Explore how functional usage of foraging habitats by hen harriers, based on bird survey data collected at the site, could affect habitat loss calculations identified in the previous step; and
- Assess the area of compensatory habitats required to offset the predicted loss.

This report informs a hen harrier management plan[8], which outlines mitigation, compensation and enhancement proposed for the benefit of hen harriers at the Site and should be read alongside the current report.

[8] SLR (2025). Lissinagroagh Wind Farm, Co. Leitrim. Hen Harrier Management Plan. SLR Environmental Consulting (Ireland) Ltd.

2.0 Methods

2.1 Project Team

Jonathon Dunn MCIEEM PhD wrote this report and undertook all habitat loss calculations including GIS manipulation. He is an Associate Ornithologist specialising in ornithology and wind farm projects. Jonathon has over a decade of experience in the environmental sector and is skilled in the preparation of ornithological baseline reports, EIAR chapters, Ecological Impact Assessment (EcIA) reports, Natura Impact Statements and collision risk modelling reports. He has worked on numerous wind farm applications in Ireland.

Duncan Watson CEnv MCIEEM MSc reviewed this report and directed the work. He is a Technical Director specialising in ornithology and wind farm projects. Duncan has over 26 years of professional experience and has managed or undertaken assessments at over 90 proposed wind farms, demonstrating significant expertise in the power sector. He has contributed to the revision of the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland serves on various conservation committees.

Details of the Tobin team are included in Appendix 6.13 which accompanies the EIAR. The Tobin team carried out the habitat surveys referred to in this report.

Details of the MKO team are included in Appendices 6.2-6.9 which accompanies the EIAR. The MKO team carried out the bird surveys referred to in this report.

2.2 Baseline Data Collection

2.2.1 Desk Study

To support the assessment of hen harrier foraging habitat loss associated with the Project, an initial desk study was conducted to determine:

1 Whether foraging hen harriers are displaced by wind turbines, and if so, the extent of displacement; and

2 The types of habitats typically used by foraging hen harriers.

This study involved a review of recent scientific literature and academic research, along with any ‘grey literature’ or unpublished governmental and non-governmental reports, as detailed below.

The literature review was implemented based on a framework developed by Arksey and O’Malley (2005)[9] and involved updating a literature review carried out by MKO at an earlier stage of the Project. This involved searching the Web of Science online database and Google Scholar using the search terms given in Table 2-1 below.

This was refined by screening for the following in first the article title and abstract, and then secondly the full text:

- Focused on hen harrier; and
- Evaluated foraging habitat use by hen harrier.

[9] Arksey, H. and O’Malley, L. (2005) Scoping studies: towards a methodological framework. International Journal of Social Research Methodology, 8:1, 19-32.

Table 2-1: Literature Review Inclusion Criteria

Database	Search Terms	No. of Articles Returned	No. Abstracts Screened In	No. Full Text Articles Screened In
Web of Science	('hen harrier' OR 'Circus cyaneus') AND ('forage' OR 'foraging' OR 'hunting') AND 'habitat'	41	15	7
Google Scholar	Hen harrier foraging Ireland	1,050	6	5

A list of sources consulted for review is given in Appendix B.

2.2.2 Field Survey

Habitat mapping was carried out by Tobin in 2024 during the optimal survey period (May 2024) and was focused on folios of land within the Site. All habitats were classified according to Fossitt (2000)[10]. Full details are contained within Appendix 6.13 which accompanies the EIAR.

Ornithological field survey data were collected by MKO between September 2020 and 2024 within at least 2 km of the Site, using NatureScot[11] best-practice guidance in place at that time to inform the scope of bird surveys undertaken. Relevant surveys for hen harrier included flight activity surveys, winter roost and breeding raptor surveys. In the breeding 2023 and 2024 seasons, data were collected on whether the flights were foraging flights and if possible, whether the flights were from the northern or southern pair. Full details are contained within Appendices 6.2-6.9 which accompany the EIAR.

2.3 Habitat Loss Calculations

2.3.1 Current Habitat Suitability

Habitat Categorisation

Habitats identified during the 2024 field survey were initially categorised as either potentially 'suitable' or 'unsuitable' for foraging hen harriers. This classification was based on the mapped Fossitt habitat types, as well as Coillte forestry data provided by FEI, and informed by the literature review outlined in Section 2.2.1.

Following this classification, each habitat parcel was assessed for its proximity to proposed turbine locations. Using QGIS, all habitats were clipped within a 250 m buffer (see Section 3.1 for rationale regarding choice of buffer size) around the central point of each turbine tower (an area of 19.6 ha per turbine). The total area of all clipped, potentially suitable habitats was then calculated to estimate the maximum extent of foraging habitat that could be effectively lost due to displacement by operational wind turbines.

The result of this calculation is referred to as the '*current habitat loss – simple*' scenario, representing the most precautionary assessment based on existing baseline conditions at the Site.

[10] Fossitt, J.A. (2000). A guide to habitats in Ireland. The Heritage Council. Dublin, Ireland.

[11] NatureScot. (2025). Recommended bird survey methods to inform impact assessment of onshore windfarms. NatureScot, Battleby, Scotland.

To refine this estimate, potentially suitable habitats were further categorised into 'higher' and 'lower' suitability for hen harrier foraging, as detailed in Table 2-2. This refinement was informed by the literature review (see Section 3.1).

The areas of potentially suitable habitats were recalculated. This produced the '*current habitat loss – refined*' scenario, offering a more nuanced estimate of potential habitat loss under current baseline conditions.

Table 2-2: Habitat Suitability Categories for 'Habitat Loss – Refined' Scenario

Suitability Category for Foraging Hen Harrier		Description
0	None	Artificial habitats and/or habitats with no known suitability for foraging hen harrier
1	Lower	Habitats with known suitability for foraging hen harrier but with weaker evidence base for use or evidence habitats not preferentially used
2	Higher	Habitats known to be suitable for foraging hen harrier with stronger evidence base for use or evidence habitats preferentially used

Both calculation methods assumed that all habitats identified in the current baseline would remain unchanged in the future baseline. However, this assumption does not hold true for certain habitat types, such as commercial agroforestry areas. Consequently, the approach to estimating potential habitat suitability was further developed, as detailed below.

2.3.2 Future Habitat Suitability

Commercial agroforestry habitats within the Site will undergo changes throughout the Project's 30-year lifespan[12] due to ongoing forestry management practices. Consequently, the future baseline will vary annually, reflecting the position of each land folio within its respective forestry cycle. To account for this dynamic, we utilized forestry age data and predicted felling dates provided by FEI to estimate the annual availability of pre-thicket conifer plantation habitat, which is potentially suitable for foraging hen harriers (see Section 3.1). These yearly values were then averaged to determine the overall extent of potentially suitable foraging habitat for hen harrier across the duration of the Project.

The process included the following assumptions:

- Only commercial forestry habitats will change with other habitats remaining in current baseline conditions;
- Wind farm operation will start in 2027 and cease in 2057;
- Forestry plantations will remain at pre-thicket stage for the first ten years after planting;

[12] This report assessed projected habitat availability for breeding hen harrier over a 30-year operational lifespan, reflecting the Project parameters available at the time of assessment. The final EIAR adopts a 35-year operational lifespan. The assessment incorporates forestry rotation cycles and calculates the mean annual availability of suitable foraging habitat over the assessment period. Habitat availability is therefore expressed as a long-term average rather than a point-in-time value. Extending the operational lifespan by a further five years would not appreciably alter the proportion of suitable foraging habitat available when expressed as a mean over multi-decadal timescales. Consequently, the findings and conclusions of this report remain valid and robust

- Forestry cycles are 45 years in duration (i.e. total period from planting to felling) unless alternative planting or felling dates were available; and
- Replanting will occur in the same year as felling.

The calculations were repeated using two distinct datasets of non-commercial forestry habitats as described in Section 2.3.1 above. This produced two estimates of potential future habitat loss: one referred to as the '*future habitat loss - simple'* scenario, representing the most precautionary estimate over the Project's lifespan, and the other as the '*future habitat loss - refined'* scenario. The former classified non-forestry habitats as a binary potentially 'suitable' or 'unsuitable' and the latter classified suitable non-forestry habitats as of 'lower' or 'higher' potential suitability, as outlined in Section 2.3.1. For the purposes of these calculations, pre-thicket forestry available over the lifespan of the Project has been classified as potentially 'suitable' and of 'higher' potential suitability.

Full details of these calculations are provided in Appendix C.

2.3.3 Functional Use of Habitats at Project Site

The calculations described above are based on established foraging habitat preferences for hen harrier as documented in the scientific and grey literature. A key limitation of this approach is its lack of consideration for site-specific foraging behaviour of the hen harrier population at the Site. It is possible that, despite apparent suitability, some habitats within 250 m of proposed turbines are not actively used for foraging, meaning that actual habitat loss may be overestimated.

To explore this further, functional habitat use was investigated using two complementary methods.

2.3.3.1 Territory Mapping Based on Foraging Flights

Foraging territories were mapped for each survey year by identifying the maximum extent of foraging activity recorded during bird surveys. This involved plotting all recorded flight lines in QGIS and generating a minimum convex hull to delineate foraging territory boundaries. Behavioural data from flight activity, hen harrier foraging and breeding raptor surveys were used to identify foraging flights where possible.

Due to limitations in the identification of individual birds, flight lines could not be assigned to specific pairs in most survey years, apart from the 2024 survey year. In years where a single recorded pair was present, all flight lines were attributed to that pair. In years with multiple pairs present, flight lines were treated as representing a collective territory.

Any potentially suitable foraging habitat within 250 m of turbines that fell outside these mapped foraging territories was considered not functionally used by foraging hen harrier. Habitat loss figures were calculated based on mapped foraging territories for each survey year. The average habitat loss across all survey years was also calculated. Habitats identified in Sections 2.3.1 and 2.3.2 were excluded from loss estimates if they lay outside these foraging territories.

This method was termed *'functional habitat loss – foraging territories'*.

2.3.3.2 Core Foraging Area Buffering

As explained earlier, two NEAs are proposed as part of compensatory measures for nesting hen harrier. The aim is that these two areas will be managed for the lifespan of the Project to encourage hen harrier to nest away from the turbines. A 2 km buffer was drawn around the two proposed NEAs, based on evidence that 90% of foraging flights by breeding hen harrier

occur within this range (Arroyo et al. (2005)[13]; Arroyo et al. (2006)[14]). Habitats outside this buffer were excluded from analysis, as they are unlikely to represent core foraging areas for birds using the NEAs.

This method was termed *'functional habitat loss – core foraging areas around NEAs'*.

2.4 Limitations

The habitat data were not collected with the specific purpose of identifying potentially suitable foraging habitat for hen harrier; therefore, fine-scale assessments were not possible.

The habitat loss calculations for forestry over the lifespan of the Project are based on Coillte's long-term felling estimates, which may be subject to change.

The estimates of hen harrier foraging territory sizes were predominantly based on data collected during flight activity surveys. As the primary purpose of such surveys was not to estimate foraging territory sizes, it is possible that foraging territories extended beyond the 2 km viewsheds used for the flight activity surveys. As such, the data may underestimate the full size of each foraging territory. This is not considered to represent a key constraint to this study however as viewshed coverage of the 250 m buffers surrounding each turbine was good, notwithstanding a few small gaps in coverage around turbines T3, T5 and T6.

[13] Arroyo, B.E. Leckie, F., Amar, A., Hamilton, J., McCluskie, A. & Redpath, S. (2005). Habitat use and range management on priority areas for hen harriers: 2004 report. CEH report for SNH.

[14] Arroyo, B.E. Leckie, F., & Redpath, S.M. (2006). Habitat use and range management on priority areas for hen harriers: final report. CEH report for SNH.

3.0 Results

3.1 Desk Study

Foraging Displacement Distances

The only peer-reviewed study to demonstrate statistically significant displacement effects on foraging hen harrier in relation to wind turbines is Pearce-Higgins et al. (2009)[15]. In this study, flight activity was analysed in 500 m distance bands, although results were presented in 250 m bands based on the mean transformed proximity to turbines, providing a finer spatial resolution. This relatively coarse resolution reflects the inherent locational uncertainties associated with mapping raptor flight paths.

Pearce-Higgins et al. (2009) reported statistically significant displacement of hen harrier, with avoidance *extending to at least 250 m from the turbines*. By extrapolating the effects of turbine proximity on the distribution of hen harrier, the authors also predicted a 52.5% reduction in flight activity within 500 m of turbines; however, they did not show a statistically significant reduction in flight activity within this distance band (i.e. within 500 m) relative to a control. Importantly, the study does not demonstrate complete displacement of hen harrier within either 250 m or 500 m from wind turbines.

It should also be noted that the Pearce-Higgins et al. study was undertaken on wind farms located in unenclosed upland habitats (moorland, rough grassland or blanket bog) and excluded forested and felled areas. In contrast, the Site is predominantly composed of conifer forest and felled forest, which are likely to screen open habitats from turbines, thereby reducing the potential extent of displacement (see Goodship and Furness[16] for further discussion on screening effects and displacement).

Taking both the statistically significant findings of Pearce-Higgins et al. (2009) and the habitat context of the Site into account, the use of a 250 m displacement distance is considered most appropriate for the Project and represents a reasonable 'worst-case' scenario, as it includes the unrealistic assumption of 100% displacement of foraging hen harrier within 250 m from turbines.

Other studies have also mentioned displacement for hen harrier in the context of wind turbines (e.g. Madders and Whitfield (2006)[17]; Garvin et al. (2011)[18]; Thelander et al. (2003)[19]; Madden and Porter (2007)[20]; Wilson et al., (2015)[21]). These have either not

[15] Pearce-Higgins, J.W., Stephen, L., Langston, R.H.W., Bainbridge, I.P. and Bullman, R. (2009), The distribution of breeding birds around upland wind farms. Journal of Applied Ecology, 46: 1323-1331. https://doi.org/10.1111/j.1365-2664.2009.01715.x

[16] Goodship, N.M. and Furness, R.W. 2022. Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. A report from MacArthur Green to NatureScot.

[17] Madders, M. & Whitfield, D. P. (2006) Upland raptors and the assessment of wind farm impacts. Ibis. 148: 43-56.

[18] Garvin, J. C., Jennelle, C. S., Drake, D. & Grodsky, S. M. (2011) Response of raptors to a windfarm. Journal of Applied Ecology 48: 199-209.

[19] Thelander, C. G., Smallwood, K. S. & Rugge, L. (2003) Bird risk behaviors and fatalities at the Altamont Pass Wind Resource Area. Period of Performance: March 1998 – December 2000. Golden, Colorado: National Renewable Energy Laboratory.

[20] Madden, B. & Porter, B. (2007) Do wind turbines displace Hen Harriers *Circus cyaneus* from foraging habitat? Preliminary results of a case study at the Derrybrien wind farm, County Galway. Irish Birds 8: 231-236

[21] Wilson, M., Fernández-Bellon, D., Irwin, S. & O'Halloran, J. (2015) The interactions between Hen Harriers and wind turbines: WINDHARRIER - Final Project Report. School of Biological Earth & Environmental Sciences (BEES), University College Cork

assessed displacement in a quantitative and statistical manner or have not reported a statistically significant effect.

It is worth also considering the results of the Irish Windharrier project[21] further as this is the most relevant of these studies within the Irish context. Particularly relevant is a journal article arising from this project written by Fernandez-Bellon et al. (2015)[22], which assessed breeding performance of hen harrier in Ireland in relation to wind farm development by analysing the breeding output of 84 nest locations at varying distances from wind farms. No statistically significant relationships were found between breeding parameters and distance to nearest wind turbine; however, non-statistically significant lower nest success rates were observed within 1 km of wind turbines. The authors stated that this putative relationship may be wholly or partly due to the influence of landscape elements, which may be linked to wind farm development (e.g. changes in land use following construction), or it could be due to other unrelated practices (e.g. agricultural intensification, afforestation or peat extraction). The Fernandez-Bellon et al. study did not specifically examine displacement of foraging hen harrier and while it is acknowledged that displacement from foraging habitats could potentially have contributed towards lower nest success rates, it is likely to have been just one of many different factors responsible.

Thus, there is no clear evidence that foraging hen harriers are displaced up to 1 km from operational wind turbines and the distances reported in Pearce-Higgins et al. represent the most conservative estimate of displacement of foraging hen harriers by wind turbines.

Regarding measurement methodology, Pearce-Higgins et al. does not specify whether displacement distances were measured from the turbine tower centre or bladed edge. However, the reference to "*locations of turbines*", strongly suggests that distances were measured from the tower centre. Measurement from blade tip would have required a number of assumptions to be made, which would have needed to be clearly set out within the paper. Furthermore, since the study did not base its analysis on distances to blade edge, it implies that proximity to the tower should therefore be used in displacement calculations.

Although the turbines in Pearce-Higgins et al. had hub heights ranging from 30 to 70 m, compared to the 101 – 110.5 m hubs proposed for the Project, the Pearce-Higgins et al. study found no evidence that hub height influenced displacement. Avoidance distances were modelled across a range of hub heights, indicating that the presence of the turbine itself is the primary factor, rather than its height.

Pearce-Higgins et al. did not assess avoidance of other infrastructure elements. However, they noted a minor avoidance of tracks, which were typically located adjacent to turbines. This suggests that any observed avoidance of tracks was likely a secondary effect of turbine avoidance.

In summary, a 250 m avoidance buffer from each turbine tower should be adopted as a conservative and ecologically sound estimate of displacement for foraging hen harriers within the Project area.

Foraging Habitat Preferences

The scientific literature shows that in Ireland, breeding hen harriers are closely linked to specific habitat types, which provide essential nesting and foraging grounds. Their population dynamics are strongly influenced by habitat quality and availability (Madders,

[22] Fernández-Bellon, D., Irwin, S., Wilson, M. and O'Halloran, M. (2015) Reproductive output of Hen Harriers *Circus cyaneus* in relation to wind turbine proximity. Irish Birds, 10(2), pp.143-150.

2003[23]; Arroyo et al., 2009[24]; Irwin et al, 2012[25]; Caravaggi et al., 2019[26]). Optimal habitat features that provide abundant prey, including small mammals and birds, are crucial for successful breeding (McClure et al., 2018[27]).

Specifically, the results of the desk study show that hen harriers prefer foraging habitats that provide dense cover for abundant prey, such as small mammals and birds, while also not being so dense as to make capture of prey impossible. The full results are shown in Table 3-1.

Table 3-1: Results of Desk Study – Foraging Habitat Preferences for Hen Harrier

Study	Study Location	Habitat Type	Used for Foraging	Suitability Category	Justification
Arroyo et al. 2009[24]	Scotland, UK	Heather / rough grassland mosaic	Yes	Higher	Heather to grass ratio of 2:3 preferentially used by hunting males and females
		Rough grassland	Yes	Lower	Weak, positive relationship
		Improved grassland	No	None	Avoided habitat type
		Dense heather	No	None	Avoided habitat type
Madders 2000[28]	Scotland, UK	Pre-thicket forestry	Yes	Higher	Marked preference for habitat type
		Heath / bog	Yes	Lower	Some level of use
		Acid grassland	Yes	Lower	Some level of use
		Neutral grassland	Yes	Lower	Some level of use
		Closed canopy forestry	No	None	Avoid habitat type
Madders 2003[23]	Scotland, UK	Heather / grass mosaics	Yes	Higher	Preference for habitat type
		Young forestry	Yes	Higher	Preference for habitat type
		Mature forestry	No	None	Avoided habitat type
	Orkney, UK	Unmanaged grassland	Yes	Higher	Preference for habitat (shown for males only)

[23] Madders, M. (2003) Hen Harrier *Circus cyaneus* foraging activity in relation to habitat and prey. Bird Study 50: 55-60.

[24] Arroyo, B., Amar, A., Leckie, F., Buchanan, G.M., Wilson, J. and Redpath, S. (2009). Hunting habitat selection by hen harriers on moorland: Implications for conservation management. Biological Conservation 142: 586-596.

[25] Irwin, S., Wilson, W., O'Donoghue, B., O'Mahony, B., Kelly, T., O'Halloran, J. (2012). Optimum scenarios for hen harrier conservation in Ireland; Final Report 2012. Prepared for the Department of Agriculture, Food and the Marine by the School of Biological, Earth and Environmental Sciences, University College Cork

[26] Caravaggi, A., Irwin, S., Lusby, J., Ruddock, M., Mee, A., Nagle, T., O'Toole, L., O'Neill, S. & O'Halloran, J., (2019). Anthropogenic pressures within the breeding range of the Hen Harrier *Circus cyaneus* in Ireland. Bird Study 66: 461-470

[27] McClure, C. J. W., Westrip, J.R.S., Johnson J. A., Schulwitz, S.E., Virani M.Z., Davies R., Symes A., Wheatley H., Thorstrom R., Amar A. & Buij R., (2018). State of the world's raptors: Distributions, threats, and conservation recommendations. Biological Conservation 227: 390– 402

[28] Madders, M. (2000) Habitat selection and foraging success of Hen Harrier *Circus Cyaneus* in West Scotland. Bird Study, 47:1, 32-40

Study	Study Location	Habitat Type	Used for Foraging	Suitability Category	Justification
Amar and Redpath 2005[29]		Managed grassland	No	None	Avoided habitat type (females only)
Amar et al. 2011[30]	Orkney, UK	Unmanaged grassland	Yes	Higher	Preference for habitat
Tapia et al. 2008[31]	Spain	Scrub / pasture mosaics in high, gently sloping areas with scare human presence	Yes	Higher	Preference for habitat
Wilson et al. 2006[32]	Ireland	Rough grassland	Yes	Higher	Preference for habitat
		Pre-thicket forestry	Yes	Higher	Preference for habitat
		Bogs	Yes	Lower	Some level of use
		Wet grassland	Yes	Lower	Some level of use
		Marginal agricultural habitats	Yes	Lower	Some level of use
		Dry grassland	No	None	Strongly avoided
		Areas at low elevation	No	None	Strongly avoided
		Improved agricultural grassland	No	None	Strongly avoided
		<30% of bog or rough grassland or young forest	No	None	Avoided, especially around nests
Wilson et al. 2010[33]	Ireland	Pre-thicket plantation (especially second rotation)	Yes	Higher	Preference for habitat type
		Closed canopy conifer plantation	No	None	Strongly avoided
		Heath / bog	Yes	Higher	Preference for habitat type
		Improved grassland	No	None	Avoid habitat
		Rough pasture (high intensity managed)	No	None	Avoid habitat

[29] Amar, A. and Redpath, S.M. (2005) Habitat use by Hen Harriers *Circus cyaneus* on Orkney: Implications of land-use change for this declining population. Ibis, 147: 37-47

[30] Amar, A., Davies, J., Meek, E., Williams, J., Knight, A. and Redpath, S. (2011) Long-term impact of change in Sheep *Ovis aries* densities on the breeding output of the Hen Harrier *Circus Cyaneus*. Journal of Applied Ecology, 48: 220-227

[31] Tapia L., Dominguez J. and Lado, L. R. (2008) Hunting habitat preferences of raptors in a mountainous area (Northwestern Spain). Polish Journal of Ecology, 56:2, 323-333.

[32] Wilson, M., Gittings, T., O'Halloran, J., Kelly, T. and Pithon J. (2006) The distribution of Hen Harriers in Ireland in relation to land use cover, particularly forest cover. Environment No. 6. Information note by Coford Connects, Forest Sector Development, Department of Food, Agriculture and the Marine, Johnstown Castle, Wexford.

[33] Wilson, M., Irwin, S., O'Donoghue, B., Kelly, T. and O'Halloran J. (2010) The use of forested landscapes by Hen Harriers in Ireland. Environment No. 10. Information note by Coford Connects,Forest Sector Development, Department of Food, Agriculture and the Marine, Johnstown Castle, Wexford.

Study	Study Location	Habitat Type	Used for Foraging	Suitability Category	Justification
Irwin et al. 2012[34]	Ireland	Pre-thicket forestry (second rotation)	Yes	Higher	Preference for this habitat type
		Low intensity managed grassland	Yes	Higher	Preference for this habitat type
		Field boundaries 3-4 m in width	Yes	Higher	Preference for this habitat type
		Unmanaged grassland	Yes	Lower	Some level of use
		Field boundaries <3 m or 7-8 m in width	No	None	Avoid habitat
		High intensity managed grassland	No	None	Avoid habitat
		Closed canopy forestry	No	None	Avoid habitat

[34] Irwin, S., Wilson, M., O'Donoghue, B., O'Mahony, B., Kelly, T. and O'Halloran, J. (2012) Optimum scenarios for Hen Harrier conservation in Ireland. Department of Agriculture, Food and Marine, Kildare Street, Dublin.

3.2 Field Survey

3.2.1 Habitat Types Present Within 250 m of Proposed Turbines

Habitats currently present within 250 m of each turbine are shown in Table 3-2 and illustrated in Figure 2, Appendix A.

The total area of habitat within 250 m of each turbine is 19.6 ha, which is equivalent to 274.4 ha across all 14 turbines. As the 250 m buffer overlapped slightly between turbines T7 and T8, and turbines T13 and T14, the total area is slightly less than 274.4 ha. In such cases, the area of overlap was bisected and the resulting halves apportioned to the relevant turbines.

Habitats have been broadly classified as being potentially suitable or unsuitable for foraging hen harrier, with potentially suitable habitats subsequently refined further and justified according to the results of the desk study presented in Section 3.1. Where there was any doubt, a precautionary approach was applied so that the highest suitability categorisation was given.

Table 3-2: Habitat Types Currently Present within 250 m of Each Turbine

Turbine No.	Fossitt Habitat Type (Code)	Dimension (area in ha or length in m)	Suitable (Yes / No)	Suitability Category (None, Lower, Higher)	Justification
T1	Upland blanket bog (PB2)	2.425	Yes	Higher	Shown to be a preferred habitat type in Ireland
	Conifer plantation (WD4) x wet heath (HH3) mosaic	2.716	Yes	Higher	Heath component shown to be a preferred habitat type in Ireland; mosaic typing suggests conifer component not currently post-thicket and therefore suitable, and preferred
	Conifer plantation (WD4) post-thicket	13.846	No	None	Shown to avoid the post-thicket habitat type
	Conifer plantation (WD4) pre-thicket	0.613	Yes	Higher	Shown to be a preferred habitat type in Ireland
T2	Wet grassland (GS4)	5.202	Yes	Lower	Shown to have some level of use
	Upland blanket bog (PB2)	0.402	Yes	Higher	Shown to be a preferred habitat type in Ireland
	Conifer plantation (WD4) post-thicket	7.974	No	None	Shown to avoid the post-thicket habitat type
	Conifer plantation (WD4) pre-thicket	6.019	Yes	Higher	Shown to be a preferred habitat type in Ireland
T3	Wet grassland (GS4)	7.154	Yes	Lower	Shown to have some level of use
	Upland blanket bog (PB2)	1.702	Yes	Higher	Shown to be a preferred habitat type in Ireland
	Upland blanket bog (PB2) x wet heath (HH3) mosaic	10.64	Yes	Higher	Both components shown to be preferred habitat types in Ireland
	Conifer plantation (WD4) post-thicket	0.104	No	None	Shown to avoid the post-thicket habitat type
T4	Upland blanket bog (PB2)	3.086	Yes	Higher	Shown to be a preferred habitat type in Ireland
	Upland blanket bog (PB2) x wet heath (HH3) mosaic	0.018	Yes	Higher	Both components shown to be preferred habitat types in Ireland

Turbine No.	Fossitt Habitat Type (Code)	Dimension (area in ha or length in m)	Suitable (Yes / No)	Suitability Category (None, Lower, Higher)	Justification
	Conifer plantation (WD4) post-thicket	10.967	No	None	Shown to avoid the post-thicket habitat type
	Conifer plantation (WD4) pre-thicket	5.529	Yes	Higher	Shown to be a preferred habitat type in Ireland
T5	Upland blanket bog (PB2)	1.335	Yes	Higher	Shown to be a preferred habitat type in Ireland
	Conifer plantation (WD4) post-thicket	17.33	No	None	Shown to avoid the post-thicket habitat type
	Buildings and artificial surfaces (BL3)	0.036	No	None	Artificial habitat type
	Scrub (WS1)	0.795	Yes	Lower	Scrub mosaics shown to be preferred habitat type in Spain; pure habitat type typically too dense for foraging, so some level of usage assumed here
	Spoil and bare ground (ED2)	0.104	No	None	Habitat type lacks vegetation cover for prey
T6	Wet grassland (GS4) x buildings and artificial surfaces (BL3) mosaic	0.222	Yes	Lower	Wet grassland component shown to have some level of use; other component an artificial habitat type
	Wet grassland (GS4)	1.847	Yes	Lower	Shown to have some level of use
	Upland blanket bog (PB2)	3.304	Yes	Higher	Shown to be a preferred habitat type in Ireland
	Conifer plantation (WD4) x scrub (WS1) mosaic	0.131	Yes	Higher	Scrub mosaics shown to be a preferred habitat type in Spain; mosaic typing suggests conifer component not currently post-thicket and therefore suitable, and preferred
	Conifer plantation (WD4) post-thicket	14.006	No	None	Shown to avoid the post-thicket habitat type
	Stone walls and other stone works (BL1)	0.004	No	None	Artificial habitat type

Turbine No.	Fossitt Habitat Type (Code)	Dimension (area in ha or length in m)	Suitable (Yes / No)	Suitability Category (None, Lower, Higher)	Justification
	Buildings and artificial surfaces (BL3)	0.086	No	None	Artificial habitat type
T7	Wet grassland (GS4)	19.136	Yes	Lower	Shown to have some level of use
	Buildings and artificial surfaces (BL3)	0.153	No	None	Artificial habitat type
	Non-marine caves (EU1)	0.009	No	None	Habitat type lacks vegetation cover for prey
T8	Wet grassland (GS4)	6.284	Yes	Lower	Shown to have some level of use
	Wet grassland (GS4) x dry humid acid grassland (GS3) mosaic	0.064	Yes	Lower	Both components shown to have some level of use
	Conifer plantation (WD4) post-thicket	12.809	No	None	Shown to avoid the post-thicket habitat type
	Spoil and bare ground (ED2)	0.001	No	None	Habitat type lacks vegetation cover for prey
T9	Wet grassland (GS4)	16.239	Yes	Lower	Shown to have some level of use
	Upland blanket bog (PB2)	0.224	Yes	Higher	Shown to be a preferred habitat type in Ireland
	Upland blanket bog (PB2) x wet grassland (GS4) mosaic	2.047	Yes	Higher	Bog component shown to be a preferred habitat type in Ireland; wet grassland shown to have some level of use
	Mixed broadleaved x conifer woodland (WD2)	0.524	No	None	Shown to avoid closed canopy habitat type
	Scrub (WS1)	0.482	Yes	Lower	Scrub mosaics shown to be preferred habitat type in Spain; pure habitat type typically too dense for foraging, so some level of usage assumed here
	Buildings and artificial surfaces (BL3)	0.084	No	None	Artificial habitat type
T10	Wet grassland (GS4)	0.46	Yes	Lower	Shown to have some level of use

Turbine No.	Fossitt Habitat Type (Code)	Dimension (area in ha or length in m)	Suitable (Yes / No)	Suitability Category (None, Lower, Higher)	Justification
	Wet grassland (GS4) x wet heath (HH3)	1.994	Yes	Higher	Heath component shown to be a preferred habitat type in Ireland; wet grassland shown to have some level of use
	Wet heath (HH3) x upland blanket bog (PB2)	0.682	Yes	Higher	Both components shown to be preferred habitat types in Ireland
	Wet heath (HH3) x lowland blanket bog (PB3)	<0.01	Yes	Higher	Both components shown to be preferred habitat types in Ireland
	Upland blanket bog (PB2) x wet grassland (GS4) mosaic	0.796	Yes	Higher	Bog component shown to be a preferred habitat type in Ireland; wet grassland shown to have some level of use
	Cutover bog (PB4) x upland blanket bog (PB2) mosaic	1.615	Yes	Higher	Intact bog component shown to be a preferred habitat type in Ireland; cutover bog shown to have some level of use
	Conifer plantation (WD4) post-thicket	14.103	No	None	Shown to avoid the post-thicket habitat type
	Scrub (WS1) x conifer plantation (WD4) mosaic	>0.01	Yes	Higher	Scrub mosaics shown to be a preferred habitat type in Spain; mosaic typing suggests conifer component not currently post-thicket and therefore suitable, and preferred
T11	Wet grassland (GS4)	4.399	Yes	Lower	Shown to have some level of use
	Conifer plantation (WD4) post-thicket	14.776	No	None	Shown to avoid the post-thicket habitat type
	Buildings and artificial surfaces (BL3)	0.425	No	None	Artificial habitat type
	Dry meadows and grassy verges (GS2) x buildings and artificial surfaces (BL3) mosaic	<0.01	No	None	Dry grassland component shown to be strongly avoided in Ireland, and other component artificial habitat type

Turbine No.	Fossitt Habitat Type (Code)	Dimension (area in ha or length in m)	Suitable (Yes / No)	Suitability Category (None, Lower, Higher)	Justification
T12	Mixed broadleaved woodland (WD1)	0.584	No	None	Shown to avoid closed canopy habitat type
	Conifer plantation (WD4) post-thicket	17.837	No	None	Shown to avoid the post-thicket habitat type
	Conifer plantation (WD4) x mixed broadleaved / conifer woodland (WD2) mosaic	0.829	No	None	Shown to avoid the post-thicket habitat type; mixed broadleaved / conifer component closed canopy, making it unsuitable for foraging harrier
	Dry meadows and grassy verges (GS2) x buildings and artificial surfaces (BL3) mosaic	0.35	No	None	Dry grassland component shown to be strongly avoided in Ireland, and other component artificial habitat type
T13	Wet grassland (GS4)	1.589	Yes	Lower	Shown to have some level of use
	Wet grassland (GS4) x scrub (WS1) mosaic	<0.01	Yes	Higher	Wet grassland component shown to have some use; scrub mosaics shown to be preferred habitat type in Spain
	Conifer plantation (WD4) post-thicket	17.221	No	None	Shown to avoid the post-thicket habitat type
	Recently-felled woodland (WS5)	<0.01	Yes	Lower	Not pre-thicket conifer plantation or would have been classified as conifer planation habitat type; assumed some level of use as can provide cover for prey
	Dry meadows and grassy verges (GS2)	<0.01	No	None	Shown to be strongly avoided in Ireland
T14	Conifer plantation (WD4) post-thicket	19.404	No	None	Shown to avoid the post-thicket habitat type
	Conifer plantation (WD4) x wet heath (HH3) mosaic	<0.01	Yes	Higher	Heath component shown to be a preferred habitat type in Ireland; mosaic typing suggests conifer component not currently post-thicket and therefore suitable, and preferred

3.2.2 Foraging Territories

Details of hen harrier flight lines recorded during bird surveys are shown in Table 3-3 below along with the dimensions of any foraging territories defined. It is acknowledged that in some instances, the extent of these territories may reflect the limits of survey coverage rather than their actual size (refer to Section 2.4 for further discussion). However, it is important to note that the current analysis does not focus on foraging territory size. Instead, the primary consideration is whether any part of the defined foraging territories falls within 250 m of individual turbine locations.

The number of hen harrier flight lines varied between years, as did the number and proportion of foraging flight lines vs. non-foraging flights.

Surveyors only assigned flight lines to pairs for the 2024 season, so for all other seasons, all flight lines were treated as one single collective territory.

Table 3-3: Details of Flight Lines Used to Define Foraging Territories

Survey Year	No. of Flight Lines Recorded	No. of Flight Lines Labelled as Foraging Flights	No. of Pairs Thought to be Present	No. of Defined Territories	Percentage of 250 m Buffer Area Around 14 Turbines Within Foraging Territories
2020	66	15	2	1 – treated as single collective territory	55.56%
2021	127	31	3 (one off-site)	1 – treated as single collective territory	89.26%
2022	84	29	1	1	100.00%
2023	310	126	2 (one off-site)	1 – treated as single collective territory	85.92%
2024	119	37	2 (one off-site)	2	81.11% (for both territories treated collectively)

Foraging territories are shown in Figure 3 in Appendix A. Between 55.56 – 100% of the 250 m buffer area around the 14 turbines lies within the foraging territories identified.

3.3 Calculations

3.3.1 Loss of Suitable Current and Future Foraging Habitat

The results of the current and future suitable foraging habitat loss calculations are shown in Table 3-4. When habitat loss is calculated for habitats that are potentially suitable currently, the total amount of loss is less than when future habitat potential suitability is accounted for due to ongoing forestry cycles by approximately one third.

When potentially suitable habitats are classified as ‘lower’ vs. ‘higher’ suitability, there are currently approximately double the amount of lower suitability habitats vs. higher suitability ones. When ongoing forestry cycles are accounted for, the proportion of higher suitability habitats available over the lifespan of the Project increases considerably.

Table 3-4: Results of Calculations of Potentially Suitable Foraging Habitat Loss

Calculation	Description	Total Predicted Loss of Potentially Suitable Foraging Habitats (ha)	Pros	Cons
Current Habitat Loss Simple	All habitats within 250 m of turbines that are currently potentially suitable for foraging hen harrier	• 109.10	• Precautionary estimate	• Ignores levels of suitability • Ignores future baseline • Ignores functional usage
Current Habitat Loss Refined	All habitats within 250 m of turbines that are currently potentially suitable for foraging hen harrier (lower vs. higher suitability)	• Higher suitability: 45.23 • Lower suitability: 63.87	• Considers levels of suitability	• Ignores future baseline • Ignores functional usage
Future Habitat Loss Simple	All habitats within 250 m of turbines potentially suitable for foraging hen harrier across lifespan of Project (mean)	• 140.00	• Precautionary estimate • Accounts for future baseline	• Ignores levels of suitability • Ignores functional usage
Future Habitat Loss Refined	All habitats within 250 m of turbines potentially suitable (lower vs. higher suitability) across lifespan of Project (mean)	• Higher suitability: 76.13 • Lower suitability: 63.87	• Accounts for future baseline • Considers levels of suitability	• Ignores functional usage

3.3.2 Functional Use of Habitats at Project Site

The initial habitat loss results given in Table 3-4 were then refined by functional usage, as described below.

3.3.2.1 Foraging Territory Mapping Based on Foraging Flights

The foraging territories described in Section 3.2.2 were used to clip suitable foraging habitats identified in Sections 2.3.1 and 2.3.2 for every survey year to exclude any potentially suitable foraging habitats within 250 m of turbines located outside of the foraging territories identified.

This was undertaken for every foraging territory for every survey year, with the resulting habitat loss figures averaged. The largest amount of habitat due to be lost across all territories and survey years analysed was also used to reflect a ‘worst case’ scenario (the 2022 foraging territory), and is illustrated in Figure 3.3, Appendix A.

3.3.2.2 Core Foraging Area Buffering around NEAs

The second approach was the ‘core foraging area buffering around NEAs’ approach, which involved clipping foraging habitats identified in Sections 2.3.1 and 2.3.2 to those within a 2 km buffer surrounding the proposed NEAs. The aim of the two NEAs is to encourage hen

harrier to breed away from turbines, and they will be managed for the lifespan of the Project. This 2 km buffer reflects the core foraging area given for breeding hen harrier in the literature.

This is illustrated in Figure 4, Appendix A, and the 2 km buffer around the NEAs comprises an area of 3,247.16 ha.

The only potentially suitable foraging habitats within 250 m of turbines that are located outside the 2 km buffer were 1.96 ha of wet grassland (GS4) and 3.209 ha of upland blanket bog (PB2) near turbine T3. All the other potential foraging habitats within 250 m of the turbine locations were within 2 km or less from the NEAs.

3.3.2.3 Comparison

The results of the two approaches used to assess functional habitat use by hen harrier are summarised in Table 3-5 below.

When the worst-case scenario was applied, assuming a single, large foraging territory encompassing the majority of the Site, all potentially suitable foraging habitats identified in Table 3-4 were considered functionally used by hen harrier. This scenario represents the maximum extent of effective habitat loss due to displacement.

However, when a mean value of effective habitat loss due to displacement was derived from all recorded foraging territories, or when the 'core foraging are buffering around NEAs' method was applied (based on a 2 km radius from assumed nesting locations), the estimated extent of effective habitat loss was reduced. In both cases, the predicted habitat loss was lower than estimates derived without accounting for functional habitat use, although the magnitude of this effect was relatively small.

These findings indicate that incorporating functional usage into habitat loss assessments can refine and, in some cases, reduce the estimated impact of displacement on hen harrier foraging habitats.

Table 3-5: Results of Calculations of Potentially Suitable Foraging Habitat Loss Refined by Functional Usage

Calculation	Description	Total Predicted Loss of Potentially Suitable Foraging Habitats (ha)	Habitat Loss Refined by Functional Usage	
			Foraging Territories	Core Foraging Areas around NEAs
Current Habitat Loss Simple	All habitats within 250 m of turbines currently potentially suitable	109.10	• Max: 109.10 • Mean: 79.07	• 103.93
Current Habitat Loss Refined	All habitats within 250 m of turbines currently potentially suitable (lower vs. higher)	• Higher suitability: 45.23 • Lower suitability: 63.87	• Higher suitability max: 45.23 • Higher suitability mean: 23.97 • Lower suitability max: 63.87 • Lower suitability	• Higher suitability: 42.02 • Lower suitability: 61.91

Calculation	Description	Total Predicted Loss of Potentially Suitable Foraging Habitats (ha)	Habitat Loss Refined by Functional Usage	
			Foraging Territories	Core Foraging Areas around NEAs
			mean: 55.10	
Future Habitat Loss Simple	All habitats within 250 m of turbines potentially suitable across lifespan of Project (mean)	140.00	• Max: 140.00 • Mean: 133.47	• 134.83
Future Habitat Loss Refined	All habitats within 250 m of turbines potentially suitable (lower vs. higher) across lifespan of Project (mean)	• Higher suitability: 76.13 • Lower suitability: 63.87	• Higher suitability max: 76.13 • Higher suitability mean: 58.38 • Lower suitability max: 63.87 • Lower suitability mean: 55.10	• Higher suitability: 72.92 • Lower suitability: 61.91

4.0 Discussion and Conclusions

Potentially suitable hen harrier foraging habitats within the Site were identified through a combination of desk-based analysis and field surveys. Most habitats currently assessed as potentially suitable are open habitat types, whereas most forestry habitats are presently unsuitable due to closed canopy conditions that inhibit understory hunting by hen harriers.

To quantify potential habitat loss due to displacement, we undertook a detailed review of the scientific literature to inform our methodology. Based on this approach, approximately 109 hectares of currently potentially suitable foraging habitat are located within 250 metres of proposed turbine locations so may effectively be lost due to displacement. Of this total, roughly two-fifths comprises habitat types of higher potential suitability for hen harrier foraging, while the remaining three-fifths are of lower potential suitability.

This initial estimate does not account for changes in habitat suitability over time due to forestry cycles. When future habitat conditions are considered and specifically the potential for forestry habitats to become suitable as canopy structures change, the estimated area of potentially suitable foraging habitat affected by displacement over the lifespan of the wind farm increases to approximately 140 hectares. Within this revised figure, over half of the area comprises habitat types that are either currently of higher suitability or are expected to become so in the future.

These calculations are based solely on habitat type and do not incorporate functional usage of the Site by hen harriers. To address this, we applied two complementary approaches to explore functional habitat use:

1. Foraging Territory Mapping Based on Foraging Flights

Hen harrier flight activity and other survey data collected over five years were used to delineate foraging territories. Foraging territory size and location varied annually. When

functional usage was considered, the estimated habitat loss ranged from approximately 80 hectares (based on current potential suitability) to 133 hectares (based on future potential suitability of habitats averaged over the lifespan of the wind farm). These figures represent only minor reductions (c. 30 ha and 7 ha, respectively) compared to estimates based solely on habitat type. Under a worst-case scenario, where a single large foraging territory encompassed all of the turbine buffers in 2022, no reduction in predicted habitat loss was observed.

2. Core Foraging Area Around Proposed Nesting Enhancement Areas

This method assumes nesting will occur within designated NEAs, with most foraging activity taking place within a 2 km radius, as supported by literature. The aim of the two proposed NEAs is to encourage hen harrier to nest away from turbines, and they will be managed for the lifespan of the Project. This ‘core foraging area around proposed NEAs’ approach resulted in a minor reduction in predicted habitat loss (c. 6 ha) compared to the habitat-only assessment.

Both of the other methods have limitations. The foraging territory mapping approach does not account for future shifts in hen harrier activity due to forestry dynamics or changes in nesting locations, particularly given the intention to encourage nesting away from turbines via the NEAs. It also assumes uniform suitability across all habitats where foraging was observed, which may not reflect actual habitat preferences.

Similarly, the core foraging area method assumes exclusive use of NEAs for nesting and a fixed 2 km foraging radius, despite literature and survey data indicating that some foraging flights exceed this distance. This could lead to underestimation of habitat usage across the Site.

These functional assessments do not provide definitive predictions but serve to contextualize the initial habitat loss estimates (Sections 2.3.1 and 2.3.2). Our analysis suggests that any difference in habitat loss estimates depending on whether functional usage is considered or not, is likely to be relatively small. Consequently, the activity-based assessment of functional usage supports the habitat suitability-based findings.

In conclusion, the most precautionary estimate of effective foraging habitat loss due to displacement is 140 hectares, based on the ‘future habitat loss simple’ scenario. Adopting a precautionary approach, this figure should therefore form the basis for compensation measures. Where feasible, compensatory habitats should be targeted to reflect the proportional loss of higher (c.76 ha) versus lower (c.64 ha) potentially suitability habitats.

Appendix A Figures

Hen Harrier Foraging Habitat Loss Report

Lissinagroagh Wind Farm

FuturEnergy Ireland

SLR Project No.: 501.065072.00001

10 February 2026

589000 590000 591000 592000 593000 594000 595000

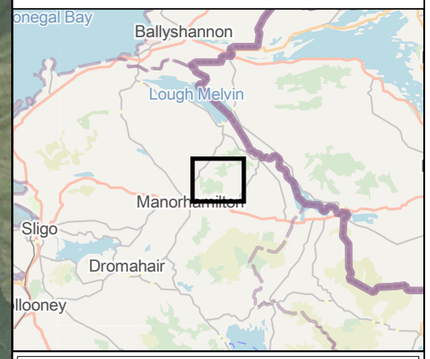
845000 844000 843000 842000

T11 T9 T8 T10 T6 T7 T5 T4 T12 T2 T3 T1 T13 T14

N

LEGEND

- Site Boundary
- Turbine Base
- Nesting Enhancement Area
- GIS Compound
- Borrow Pit
- Substation
- Cut - Fill Area
- Hardstand
- Oversail Area
- Turning Bay
- Internal Road
- Internal Haul Road
- Met Mast Location



0 0.5 1

Kilometres

Ireland FutureEnergy

SLR

LISSINAGROAGH WIND FARM

HEN HARRIER FORAGING HABITAT LOSS REPORT

PROJECT SITE

FIGURE 1

Scale	Date
1:20,000 @ A3	OCTOBER 2025

501.065072.00001.0006.0 Project Site

Aerial imagery (2019):
Maxar, Microsoft, Map data © OpenStreetMap contributors, Microsoft, Facebook, Inc. and its affiliates, Esri Community Maps contributors, Map layer by Esri

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589000 590000 591000 592000 593000 594000 595000

845000 844000 843000 842000

T11 T9 T8 T10 T6 T7 T5 T4 T12 T2 T3 T1 T13 T14

62151C 62152U 62150H 62149O 62148T 62147B 62146G 62145L 62129D 62128I 62198M 62132J 62127N 62130T 62122P 62123K 62136M 62207S 62137H 62219C 62222I

N

LEGEND

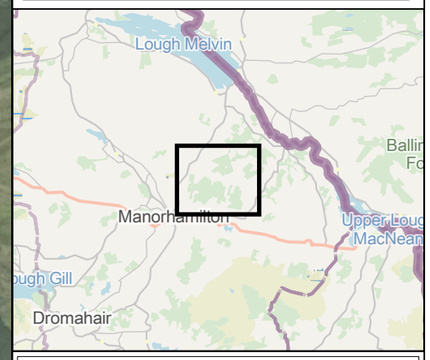
- Site Boundary
- Turbine Base
- Turbine Location 250 m Buffer
- Coillte Forestry Habitat Data

Tobin Fossitt Habitat Data

Fossit Habitat Type

- BL1 - Stone walls and other stone work
- BL3 - Buildings and Artifical Surfaces
- ED2 - Spoil and Bare Ground
- EU1 - Non-Marine Caves
- GS2 - Dry Meadows & Grassy Verges
- GS4 - Wet Grassland
- HH3 - Wet heath
- PB2 - Upland blanket bog
- WD1 - Mixed Broadleaved Woodland
- WD2 - Mixed Broadleaved/Conifer Woodland
- WD4 - Conifer Plantation
- WS1 - Scrub
- WS5 - Recently Felled Woodland

Note: All Coillte forestry habitat data is equivalent to WD4 – Conifer Plantation



0 500 1,000

Metres

501.065072.00001.0007.0 Habitats Within 250 m of Turbines

Ireland FuturEnergy

SLR

LISSINAGROAGH WIND FARM

HEN HARRIER FORAGING HABITAT LOSS REPORT

HABITATS CURRENTLY PRESENT WITHIN 250 M OF TURBINES

FIGURE 2.1

Scale 1:20,000 @ A3

Date OCTOBER 2025

Aerial imagery (2019):
Maxar, Microsoft, Map data © OpenStreetMap contributors, Microsoft, Facebook, Inc. and its affiliates, Esri Community Maps contributors, Map layer by Esri
Forestry Habitat Data provided by Coilte Forest. Fossitt Habitat Data provided by TOBIN.

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591000

592000

843000

842000

N

147B

T5

T4

T12

T2

T3

T1

62128I

62129D

62130T

62122P

62123K

62198M

62127N

62132J

0 200 400

Metres

LEGEND

Site Boundary

Turbine Base

Turbine Location 250 m Buffer

Coillte Forestry Habitat Data

Tobin Fossitt Habitat Data

Fossit Habitat Type

BL3 - Buildings and Artifical Surfaces

ED2 - Spoil and Bare Ground

EU1 - Non-Marine Caves

GS2 - Dry Meadows & Grassy Verges

GS4 - Wet Grassland

HH3 - Wet heath

PB2 - Upland blanket bog

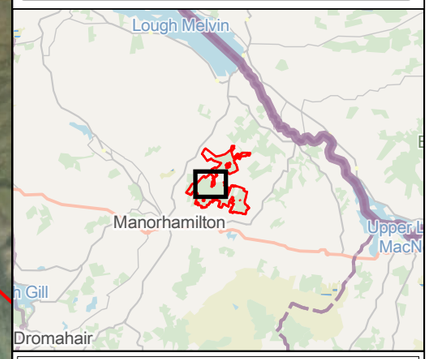
WD1 - Mixed Broadleaved Woodland

WD2 - Mixed Broadleaved/Conifer Woodland

WD4 - Conifer Plantation

WS1 - Scrub

Note: All Coillte forestry habitat data is equivalent to WD4 – Conifer Plantation



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LISSINAGROAGH WIND FARM

HEN HARRIER FORAGING HABITAT LOSS REPORT

HABITATS CURRENTLY PRESENT WITHIN 250 M OF TURBINES

FIGURE 2.2

Scale 1:6,500 @ A3

Date OCTOBER 2025

501.065072.00001.0007.0 Habitats Within 250 m of Turbines

Aerial imagery (2019):
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Forestry Habitat Data provided by Coilte Forest. Fossitt Habitat Data provided by TOBIN.

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LEGEND

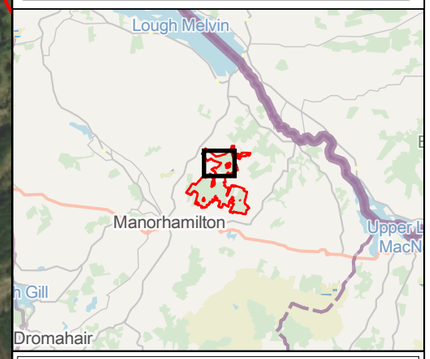
- Site Boundary
- Turbine Base
- Turbine Location 250 m Buffer
- Coillte Forestry Habitat Data

Tobin Fossitt Habitat Data

Fossit Habitat Type

- BL1 - Stone walls and other stone work
- BL3 - Buildings and Artifical Surfaces
- ED2 - Spoil and Bare Ground
- GS4 - Wet Grassland
- PB2 - Upland blanket bog
- WD2 - Mixed Broadleaved/Conifer Woodland
- WD4 - Conifer Plantation
- WS1 - Scrub

Note: All Coillte forestry habitat data is equivalent to WD4 – Conifer Plantation



FuturEnergy Ireland

SLR

LISSINAGROAGH WIND FARM

HEN HARRIER FORAGING HABITAT LOSS REPORT

HABITATS CURRENTLY PRESENT WITHIN 250 M OF TURBINES

FIGURE 2.3

Scale	Date
1:6,500 @ A3	OCTOBER 2025

501.065072.00001.0007.0 Habitats Within 250 m of Turbines

Aerial imagery (2019):
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Forestry Habitat Data provided by Coilte Forest. Fossitt Habitat Data provided by TOBIN.

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593000

594000

841000

501.065072.00001.0007.0 Habitats Within 250 m of Turbines

N

62136M
62136M
62136M
62136M
T13
62207S
62137H
62137H
62137H
62137H
62136M
62137H
T14
62137H
62219C
62219C
62219C
62222I
62219C

0 200 400

Metres

LEGEND

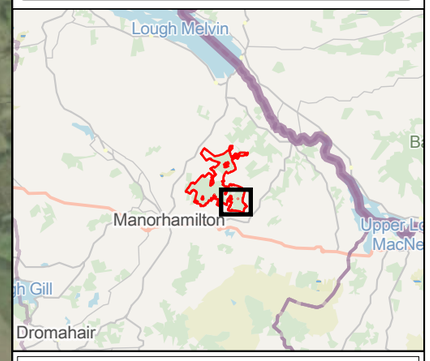
- Site Boundary
- Turbine Base
- Turbine Location 250 m Buffer
- Coillte Forestry Habitat Data

Tobin Fossitt Habitat Data

Fossit Habitat Type

- GS2 - Dry Meadows & Grassy Verges
- GS4 - Wet Grassland
- WD4 - Conifer Plantation
- WS5 - Recently Felled Woodland

Note: All Coillte forestry habitat data is equivalent to WD4 – Conifer Plantation



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LISSINAGROAGH WIND FARM

HEN HARRIER FORAGING HABITAT LOSS REPORT

HABITATS CURRENTLY PRESENT WITHIN 250 M OF TURBINES

FIGURE 2.4

Scale 1:6,500 @ A3

Date OCTOBER 2025

Aerial imagery (2019):
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Forestry Habitat Data provided by Coilte Forest. Fossitt Habitat Data provided by TOBIN.

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588000 590000 592000 594000 596000 598000

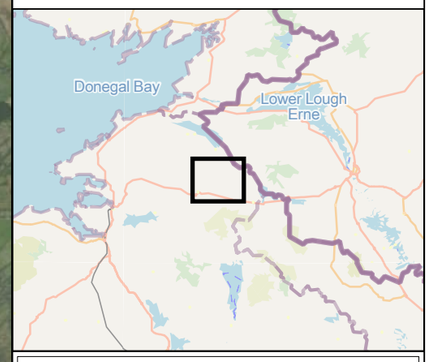
846000
844000
842000

N

LEGEND

- Site Boundary
- Turbine Base
- Turbine Location 250 m Buffer
- Foraging Territory

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13 T14



0 500 1,000
Metres

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LISSINAGROAGH WIND FARM

HEN HARRIER FORAGING HABITAT LOSS REPORT

HEN HARRIER FORAGING TERRITORIES - 2020

FIGURE 3.1

Scale 1:35,000 @ A3

Date OCTOBER 2025

501.065072.00001.0008.0 Hen Harrier Foraging Territories

Aerial imagery (2019):
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588000 590000 592000 594000 596000 598000

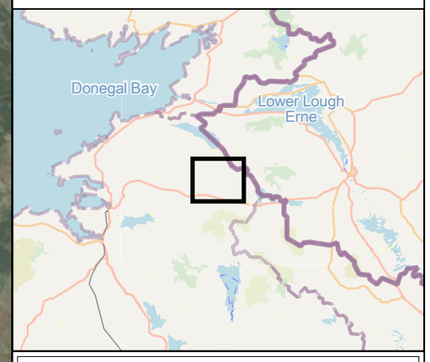
846000 844000 842000

N

LEGEND

- Site Boundary
- Turbine Base
- Turbine Location 250 m Buffer
- Foraging Territory

T11 T9 T8 T10 T6 T7 T5 T4 T12 T2 T3 T1 T13 T14



0 500 1,000
Metres

501.065072.00001.0008.0 Hen Harrier Foraging Territories

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HEN HARRIER FORAGING HABITAT LOSS REPORT

HEN HARRIER FORAGING TERRITORIES - 2021

FIGURE 3.2

Scale 1:35,000 @ A3

Date OCTOBER 2025

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588000 590000 592000 594000 596000 598000

846000

844000

842000

T11 T9 T8 T10 T6 T7 T5 T4 T12 T2 T3 T1 T13 T14

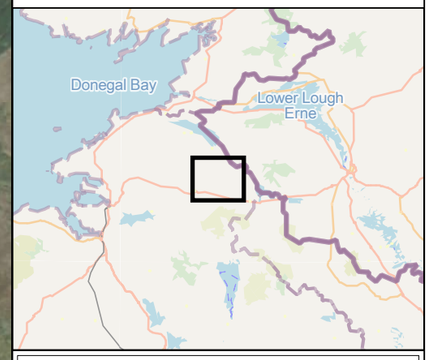
N

0 500 1,000

Metres

LEGEND

- Site Boundary
- Turbine Base
- Turbine Location 250 m Buffer
- Foraging Territory



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LISSINAGROAGH WIND FARM

HEN HARRIER FORAGING HABITAT LOSS REPORT

HEN HARRIER FORAGING TERRITORIES - 2022

FIGURE 3.3

Scale 1:35,000 @ A3

Date OCTOBER 2025

501.065072.00001.0008.0 Hen Harrier Foraging Territories

Aerial imagery (2019):
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586000 588000 590000 592000 594000 596000

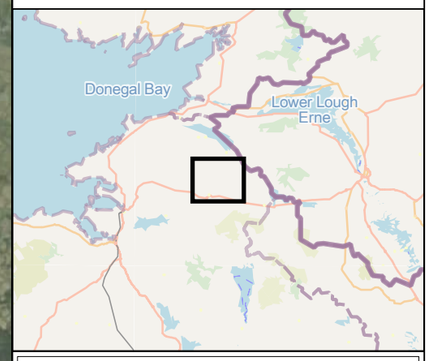
848000 846000 844000 842000

N

LEGEND

- Site Boundary
- Turbine Base
- Turbine Location 250 m Buffer
- Foraging Territory

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13 T14



0 500 1,000

Metres

501.065072.00001.0008.0 Hen Harrier Foraging Territories

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HEN HARRIER FORAGING HABITAT LOSS REPORT

HEN HARRIER FORAGING TERRITORIES - 2023

FIGURE 3.4

Scale 1:35,000 @ A3

Date OCTOBER 2025

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588000 590000 592000 594000 596000

848000 846000 844000 842000

T11 T9 T8 T10 T6 T7 T5 T4 T12 T2 T3 T1 T13 T14

Northern Pair and Southern Pair Territories

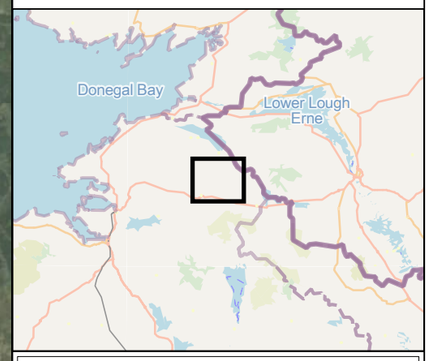
N

0 500 1,000

Metres

LEGEND

- Site Boundary
- Turbine Base
- Turbine Location 250 m Buffer
- Foraging Territory



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LISSINAGROAGH WIND FARM

HEN HARRIER FORAGING HABITAT LOSS REPORT

HEN HARRIER FORAGING TERRITORIES - 2024

FIGURE 3.5

Scale 1:35,000 @ A3

Date OCTOBER 2025

501.065072.00001.0008.0 Hen Harrier Foraging Territories

Aerial imagery (2019):
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588000 590000 592000 594000 596000

846000 844000 842000

N

T11 T9 T8 T10 T6 T7 T5 T4 T12 T2 T3 T1 T13 T14

62152U 62150H 62151C 62149O 62148T 62146G 62147B 62145L 62129D 62128I 62130T 62198M 62132J 62123K 62127N 62122P 62136M 62207S 62137H 62222I 62219C

0 1 2

Kilometres

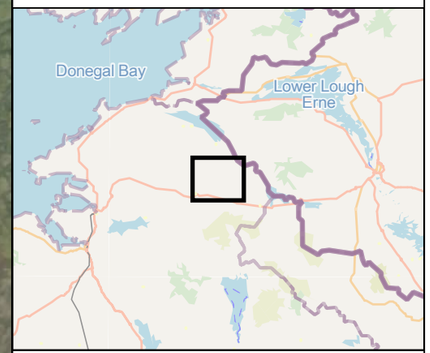
LEGEND

- Site Boundary
- Turbine Base
- Turbine Location 250 m Buffer
- Nesting Enhancement Area
- Core Foraging Area around Nesting Enhancement Areas
- Coillte Forestry Habitat Data

Tobin Fossitt Habitat Data

Fossit Habitat Type

- BL1 - Stone walls and other stone work
- BL3 - Buildings and Artifical Surfaces
- ED2 - Spoil and Bare Ground
- EU1 - Non-Marine Caves
- GS2 - Dry Meadows & Grassy Verges
- GS4 - Wet Grassland
- HH3 - Wet heath
- PB2 - Upland blanket bog
- WD1 - Mixed Broadleaved Woodland
- WD2 - Mixed Broadleaved/Conifer Woodland
- WD4 - Conifer Plantation
- WS1 - Scrub
- WS5 - Recently Felled Woodland



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LISSINAGROAGH WIND FARM

HEN HARRIER FORAGING HABITAT LOSS REPORT

FUNCTIONAL HABITAT LOSS - CORE FORAGING AREAS

FIGURE 4

Scale 1:30,000 @ A3

Date OCTOBER 2025

501.065072.00001.0010.0 Functional Habitat Loss Core Foraging

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Appendix B Literature Review Screening Process

Hen Harrier Foraging Habitat Loss Report

Lissinagroagh Wind Farm

FuturEnergy Ireland

SLR Project No.: 501.065072.00001

10 February 2026

Table A-1: Literature Review Screening

Article	Country	Abstract Screening	Full Text Screening	Reason for Exclusion
Arroyo, B., Amar, A., Leckie, F., Buchanan, G.M., Wilson, J.D. and Redpath, S., 2009. Hunting habitat selection by hen harriers on moorland: implications for conservation management. Biological conservation, 142(3), pp.586-596.	Scotland	Include	Include	-
Madders, M., 2000. Habitat selection and foraging success of Hen Harriers *Circus cyaneus* in west Scotland. Bird Study, 47(1), pp.32-40.	Scotland	Include	Include	-
Arroyo, B., Leckie, F., Amar, A., McCluskie, A. and Redpath, S., 2014. Ranging behaviour of Hen Harriers breeding in special protection areas in Scotland. Bird Study, 61(1), pp.48-55.	Scotland	Include	Exclude	Discussed home range, not habitats
Madders, M., 2003. Hen Harrier *Circus cyaneus* foraging activity in relation to habitat and prey. Bird study, 50(1), pp.55-60.	Scotland	Include	Include	-
Guixé, D. and Arroyo, B., 2011. Appropriateness of Special Protection Areas for wide-ranging species: the importance of scale and protecting foraging, not just nesting habitats. Animal Conservation, 14(4), pp.391-399.	-	Exclude	-	Discussed Montagu's harrier not hen harrier
Caravaggi, A., Irwin, S., Lusby, J., Ruddock, M., Mee, A., Nagle, T., O'Toole, L., O'Neill, S. and O'Halloran, J., 2019. Anthropogenic pressures within the breeding range of the Hen Harrier *Circus cyaneus* in Ireland. Bird Study, 66(4), pp.461-470.	Ireland	Include	Exclude	Discussed anthropogenic impacts, not habitats
Redpath, S., Amar, A., Madders, M., Leckie, F. and Thirgood, S., 2002. Hen harrier foraging success in relation to land use in Scotland. Animal Conservation, 5(2), pp.113-118.	Scotland	Include	Exclude	Discussed foraging success, not habitats
Wilson, M.W., Irwin, S., Norriss, D.W., Newton, S.F., Collins, K., Kelly, T.C. and O'Halloran, J., 2009. The importance of pre-thicket conifer plantations for nesting Hen Harriers *Circus cyaneus* in Ireland. Ibis, 151(2), pp.332-343.	Ireland	Include	Exclude	Discussed nest location, not foraging habitat
Amar, A. and Redpath, S.M., 2005. Habitat use by Hen Harriers *Circus cyaneus* on Orkney: implications of land-use change for this declining population. Ibis, 147(1), pp.37-47.	Scotland	Include	Include	-

Article	Country	Abstract Screening	Full Text Screening	Reason for Exclusion
Amar, A., Davies, J., Meek, E., Williams, J., Knight, A. and Redpath, S., 2011. Long-term impact of changes in sheep *Ovis aries* densities on the breeding output of the hen harrier *Circus cyaneus*. Journal of Applied Ecology, 48(1), pp.220-227.	Scotland	Include	Include	-
Mirski, P., Krupiński, D., Szulak, K. and Żmihorski, M., 2016. Seasonal and spatial variation of the Montagu's Harrier's *Circus pygargus* diet in Eastern Poland. Bird Study, 63(2), pp.165-171.	Poland	Exclude	-	Discussed Montagu's harrier not hen harrier
Thirgood, S.J., Redpath, S.M. and Graham, I.M., 2003. What determines the foraging distribution of raptors on heather moorland?. Oikos, 100(1), pp.15-24.	Scotland	Include	Exclude	Did not go into detail on foraging habitat types
Liminana, R., Arroyo, B.E., Surroca, M., Urios, V. and Reig-Ferrer, A., 2011. Influence of habitat on nest location and reproductive output of Montagu's Harriers breeding in natural vegetation. Journal of Ornithology, 152(3), pp.557-565.	Spain	Exclude	-	Discussed Montagu's harrier not hen harrier
O'Donoghue, B.G., 2020. Hen Harrier *Circus cyaneus* ecology and conservation during the non-breeding season in Ireland. Bird Study, 67(3), pp.344-359.	Ireland	Include	Exclude	Discussed roosting habitats only
Vukovich, M. and Ritchison, G., 2008. Foraging behavior of Short-eared Owls and Northern Harriers on a reclaimed surface mine in Kentucky. Southeastern Naturalist, 7(1), pp.1-10.	USA	Exclude	-	Discussed northern harrier not hen harrier
Massey, B.H., Griffin, C.R. and McGarigal, K., 2009. Habitat use by foraging northern harriers on Nantucket Island, Massachusetts. The Wilson Journal of Ornithology, pp.765-769.	USA	Exclude	-	Discussed northern harrier not hen harrier
Clarke, R., Combridge, M. and Combridge, P., 1997. A comparison of the feeding ecology of wintering Hen Harriers *Circus cyaneus* centred on two heathland areas in England. Ibis, 139(1), pp.4-18.	England	Include	Exclude	Discussed wintering habitat use
Amar, A., Arroyo, B., Redpath, S. and Thirgood, S., 2004. Habitat predicts losses of red grouse to individual hen harriers. Journal of Applied Ecology, 41(2), pp.305-314.	Scotland	Include	Exclude	Discussed heather cover vs red grouse deliveries

Article	Country	Abstract Screening	Full Text Screening	Reason for Exclusion
Bobola, E., Goutner, V. and Liordos, V., 2018. Foraging habitat selection and differentiation among coexisting raptors across an estuarine landscape (Evros Delta, northern Greece). Estuarine, Coastal and Shelf Science, 213, pp.108-114.	Greece	Include	Exclude	Discussed raptors at a road network; habitats for hen harrier not relevant in the Irish context
Hayhow, D.B., Eaton, M.A., Bladwell, S., Etheridge, B., Ewing, S.R., Ruddock, M., Saunders, R., Sharpe, C., Sim, I.M. and Stevenson, A., 2013. The status of the Hen Harrier, *Circus cyaneus*, in the UK and Isle of Man in 2010. Bird Study, 60(4), pp.446-458.	UK	Exclude	-	Did not analyse habitats
Tapia, L., Dominguez, J. and Rodriguez, L., 2008. Hunting habitat preferences of raptors in a mountainous area (Northwestern Spain). Polish Journal of Ecology, 56(2), pp.323-333.	Spain	Include	Include	-
Littlefield, C.D. and Johnson, D.H., 2005. Habitat preferences of migrant and wintering Northern Harriers in northwestern Texas. The Southwestern Naturalist, 50(4), pp.448-452.	USA	Exclude	-	Discussed northern harrier not hen harrier
Curtis, O., Simmons, R.E. and Jenkins, A.R., 2004. Black Harrier *Circus maurus* of the Fynbos biome, South Africa: a threatened specialist or an adaptable survivor?. Bird Conservation International, 14(4), pp.233-245.	South Africa	Exclude	-	Discussed black harrier not hen harrier
Kitowski, I., Jakubas, D., Mirski, P., Pitucha, G. and Markowska, K., 2021. Changes in the Montagu's Harrier *Circus pygargus* diet in Eastern Poland across decades promote insects and reptilians, but not birds and rodents. Ecology and evolution, 11(10), pp.5265-5280.	Poland	Exclude	-	Discussed Montagu's harrier not hen harrier
Terraube, J. and Arroyo, B., 2011. Factors influencing diet variation in a generalist predator across its range distribution. Biodiversity and Conservation, 20(10), pp.2111-2131.	-	Exclude	-	Discussed Montagu's harrier not hen harrier
Williams, C.K., Applegate, R.D., Lutz, R.S. and Rusch, D.H., 2000. A comparison of raptor densities and habitat use in Kansas cropland and rangeland ecosystems.	USA	Exclude	-	Discussed northern harrier not hen harrier
Bright, J., Langston, R., Bullman, R., Evans, R., Gardner, S. and Pearce-Higgins, J., 2008. Map of bird sensitivities to wind farms in Scotland: a tool to aid planning and conservation. Biological Conservation, 141(9), pp.2342-2356.	Scotland	Exclude	-	Did not analyse habitats

Article	Country	Abstract Screening	Full Text Screening	Reason for Exclusion
Mustin, K., Arroyo, B., Beja, P., Newey, S., Irivine, R.J., Kestler, J. and Redpath, S.M., 2018. Consequences of game bird management for non-game species in Europe. Journal of Applied Ecology, 55(5), pp.2285-2295.	Europe	Exclude	-	Discussed game bird management
Amar, A., Court, I.R., Davison, M., Downing, S., Grimshaw, T., Pickford, T. and Raw, D., 2012. Linking nest histories, remotely sensed land use data and wildlife crime records to explore the impact of grouse moor management on peregrine falcon populations. Biological Conservation, 145(1), pp.86-94.	Scotland	Exclude	-	Discussed peregrine not hen harrier
Calladine, J., Critchley, C.N.R., Baker, D., Towers, J. and Thiel, A., 2014. Conservation management of moorland: a case study of the effectiveness of a combined suite of management prescriptions which aim to enhance breeding bird populations. Bird Study, 61(1), pp.56-72.	Scotland	Exclude	-	Not related to hen harrier
Francksen, R.M., Whittingham, M.J., Ludwig, S.C., Roos, S. and Baines, D., 2017. Numerical and functional responses of Common Buzzards *Buteo buteo* to prey abundance on a Scottish grouse moor. Ibis, 159(3), pp.541-553.	Scotland	Exclude	-	Discussed buzzard not hen harrier
Peters, K.A. and Otis, D.L., 2005. Using the risk-disturbance hypothesis to assess the relative effects of human disturbance and predation risk on foraging American Oystercatchers. The Condor, 107(3), pp.716-725.	USA	Exclude	-	Discussed American oystercatcher not hen harrier
Thirgood, S. and Redpath, S., 2008. Hen harriers and red grouse: science, politics and human–wildlife conflict. Journal of Applied Ecology, 45(5), pp.1550-1554.	UK	Exclude	-	Did not analyse habitats
Wolff, J.O., Fox, T., Skillen, R.R. and Wang, G., 1999. The effects of supplemental perch sites on avian predation and demography of vole populations. Canadian Journal of Zoology, 77(4), pp.535-541.	USA	Exclude	-	Discussed voles/northern harrier
Meunier, F.D., Verheyden, C. and Jouventin, P., 2000. Use of roadsides by diurnal raptors in agricultural landscapes. Biological Conservation, 92(3), pp.291-298.	France	Exclude	-	Discussed raptors and roads generally only
Schueck, L.S., Marzluff, J.M. and Steenhof, K., 2001. Influence of military activities on raptor abundance and behavior. The Condor, 103(3), pp.606-615.	USA	Exclude	-	Discussed military activity and raptors

Article	Country	Abstract Screening	Full Text Screening	Reason for Exclusion
Estrada, A., Delibes-Mateos, M., Caro, J., Viñuela, J., Díaz-Fernández, S., Casas, F. and Arroyo, B., 2015. Does small-game management benefit steppe birds of conservation concern? A field study in central S pain. Animal Conservation, 18(6), pp.567-575.	Spain	Exclude	-	Discussed red legged partridge not hen harrier
Atuo, F.A. and O'Connell, T.J., 2017. The landscape of fear as an emergent property of heterogeneity: Contrasting patterns of predation risk in grassland ecosystems. Ecology and Evolution, 7(13), pp.4782-4793.	USA	Exclude	-	Discussed prey behaviour patterns
Smart, J. and Amar, A., 2018. Diversionary feeding as a means of reducing raptor predation at seabird breeding colonies. Journal for Nature Conservation, 46, pp.48-55.	Scotland	Exclude	-	Discussed seabirds not hen harrier
Wilson, M., Gittings, T., O'Halloran, J., Kelly, T. and Pithon, J., 2006. The distribution of Hen Harriers in Ireland in relation to land use cover, particularly forest cover. COFORD Connects Note, Dublin.	Ireland	Include	Include	-
Wilson, M., Irwin, S., O'Donoghue, B., Kelly, T. and O'Halloran, J., 2010. The use of forested landscapes by Hen Harriers in Ireland. COFORD: Dublin, Ireland.	Ireland	Include	Include	-
Irwin, S., Wilson, M., O'Donoghue, B., O'Mahony, B., Kelly, T. and O'Halloran, J., 2012. Optimum scenarios for Hen Harrier conservation in Ireland. Cork: Department of Agriculture, Food and the Marine by the School of Biological, Earth and Environmental Sciences, University College Cork.	Ireland	Include	Include	-
Wilson, M.W., O'Donoghue, B., O'Mahony, B., Cullen, C., O'Donoghue, T., Oliver, G., Ryan, B., Troake, P., Irwin, S., Kelly, T.C. and Rotella, J.J., 2012. Mismatches between breeding success and habitat preferences in Hen Harriers *Circus cyaneus* breeding in forested landscapes. Ibis, 154(3), pp.578-589.	Ireland	Include	Exclude	Discussed nesting success in forestry
Caravaggi, A., Irwin, S., Lusby, J., Ruddock, M., O'Toole, L., Mee, A., Nagle, T., O'Neill, S., Tierney, D., McCarthy, A. and O'Halloran, J., 2019. Factors influencing Hen Harrier *Circus cyaneus* territory site selection and breeding success. Bird Study, 66(3), pp.366-377.	Ireland	Include	Exclude	Discussed nest/territory selection, not foraging
Moran, P. and Wilson-Parr, R., 2015. Hen Harrier Special Protection Area (SPA) habitat mapping project 2014. National Parks and Wildlife Service.	Ireland	Include	Exclude	Discussed habitat classifications; did not define foraging habitats

Appendix C Data for Foraging Habitat Loss Calculations

Hen Harrier Foraging Habitat Loss Report

Lissinagroagh Wind Farm

FuturEnergy Ireland

SLR Project No.: 501.065072.00001

10 February 2026

C.1 Turbine 1

Table A-2: Habitat Data Used for Calculations – Turbine T1

Fossitt Habitat Type	Coillte Block	Forestry (Y if within Coillte dataset and N if non-woodland type in Tobin dataset)	Felling Year	Available	Currently Suitable?	Current Suitability Category	Suitable at some point in future?	Maximum suitability category at some point in future	Current area (ha)	Future area (ha)																														Mean area (ha)
										2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	
PB2 - Upland blanket bog		N		Yes	Yes	Higher	Yes	Higher	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425	2.425
WD4 - Conifer plantation x HH3 - Wet heath		Y	2046	Assumed to be part of 62152U-4 - 10y	Yes	Higher	Yes	Higher	2.716	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.716	2.716	2.716	2.716	2.716	2.716	2.716	2.716	2.716	2.716	2.716	0	0.905333333
WD4 - Conifer plantation		Y	2046	Assumed to be part of 62152U-4 - 10y	No	None	Yes	Higher	0.158	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0	0.052666667
CHF	62150H	Y	2039	10y	No	None	Yes	Higher	3.82	0	0	0	0	0	0	0	0	0	0	0	0	0	3.82	3.82	3.82	3.82	3.82	3.82	3.82	3.82	3.82	0	0	0	0	0	0	0	0	0	1.273333333
CHF	62150H	Y	2047	10y	No	None	Yes	Higher	0.687	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.687	0.687	0.687	0.687	0.687	0.687	0.687	0.687	0.687	0.687	0.687	0.687	0.229
CHF	62150H	Y	2046	10y	No	None	Yes	Higher	0.411	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.411	0.411	0.411	0.411	0.411	0.411	0.411	0.411	0.411	0.411	0.411	0	0.137
CHF	62152U	Y	2047	10y	No	None	Yes	Higher	2.454	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.454	2.454	2.454	2.454	2.454	2.454	2.454	2.454	2.454	2.454	2.454	0.818
CHF	62152U	Y	2042	10y	No	None	Yes	Higher	0.514	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.514	0.514	0.514	0.514	0.514	0.514	0.514	0.514	0.514	0.514	0	0	0	0	0	0.171333333
CHF	62152U	Y	2046	10y	No	None	Yes	Higher	4.606	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.606	4.606	4.606	4.606	4.606	4.606	4.606	4.606	4.606	4.606	4.606	0	1.535333333
FELLED	62152U	Y	2069	10y	No	None	Yes	Higher	0.466	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHF	62149O	Y	2047	10y	No	None	Yes	Higher	0.002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.000666667
CHF	62149O	Y	2053	10y	No	None	Yes	Higher	0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0.7	0.7	0.7	0.7	0.09333333
CHF	62150H	Y	2062	10y	No	None	Yes	Higher	0.613	0.613	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02043
CHF	62151C	Y	2042	10y	No	None	Yes	Higher	0.028	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0	0	0	0	0	0.009333333

C.2 Turbine 2

Table A-3: Habitat Data Used for Calculations – Turbine T2

Fossitt Habitat Type	Coillte Block	Forestry (Y if within Coillte dataset and N if non-woodland type in Tobin dataset)	Felling Year	Available	Currently Suitable?	Current Suitability Category	Suitable at some point in future?	Maximum suitability category at some point in future	Current area (ha)	Future area (ha)																														Mean area (ha)
										2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	
GS4 - Wet grassland		N		Yes	Yes	Lower	Yes	Lower	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202	5.202
PB2 - Upland blanket bog		N		Yes	Yes	Higher	Yes	Higher	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.402
WD4 - Conifer plantation		Y	2056	Assumed to be part of 62151C-8 and	No	None	Yes	Higher	1.131	1.131	1.131	1.131	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.131	0.1131

Fossitt Habitat Type	Coillte Block	Forestry (Y if within Coillte dataset and N if non-woodland type in Tobin dataset)	Felling Year	Available	Currently Suitable?	Current Suitability Category	Suitable at some point in future?	Maximum suitability category at some point in future	Current area (ha)	Future area (ha)																																Mean area (ha)
										2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	
				62152U-19 - 10y																																						
CHF	62151C	Y	2042	10y	No	None	Yes	Higher	1.351	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.351	1.351	1.351	1.351	1.351	1.351	1.351	1.351	1.351	0	0	0	0	0	0.450333333
CHF	62151C	Y	2038	10y	No	None	Yes	Higher	6.47	0	0	0	0	0	0	0	0	0	0	0	6.47	6.47	6.47	6.47	6.47	6.47	6.47	6.47	6.47	6.47	0	0	0	0	0	0	0	0	0	2.156666667
CHF	62151C	Y	2056	10y	No	None	Yes	Higher	3.173	3.173	3.173	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.173	0.3173
CHF	62151C	Y	2032	10y	No	None	Yes	Higher	0.156	0	0	0	0	0	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.052
CHF	62152U	Y	2056	10y	No	None	Yes	Higher	1.715	1.715	1.715	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.715	0.1715

C.3 Turbine 3

Table A-4: Habitat Data Used for Calculations – Turbine T3

Fossitt Habitat Type	Coillte Block	Forestry (Y if within Coillte dataset and N if non-woodland type in Tobin dataset)	Felling Year	Available	Currently Suitable?	Current Suitability Category	Suitable at some point in future?	Maximum suitability category at some point in future	Current area (ha)	Future area (ha)																																Mean area (ha)
										2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	
GS4 - Wet grassland		N		Yes	Yes	Lower	Yes	Lower	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154	7.154
PB2 - Upland blanket bog x HH3 - Wet heath		N		Yes	Yes	Higher	Yes	Higher	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64
PB2 - Upland blanket bog		N		Yes	Yes	Higher	Yes	Higher	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702	1.702
WD4 - Conifer plantation		Y	2038	Assumed to be part of 62151C-1 - 10y	No	None	Yes	Higher	0.011	0	0	0	0	0	0	0	0	0	0	0	0	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0	0	0	0	0	0	0	0	0	0.003666667
CHF	62151C	Y	2038	10y	No	None	Yes	Higher	0.093	0	0	0	0	0	0	0	0	0	0	0	0	0.093	0.093	0.093	0.093	0.093	0.093	0.093	0.093	0.093	0.093	0	0	0	0	0	0	0	0	0	0.031

C.4 Turbine 4

Table A-5: Habitat Data Used for Calculations – Turbine T4

Fossitt Habitat Type	Coillte Block	Forestry (Y if within Coillte dataset and N if non-woodland type in Tobin dataset)	Felling Year	Available	Currently Suitable?	Current Suitability Category	Suitable at some point in future?	Maximum suitability category at some point in future	Current area (ha)	Future area (ha)																																Mean area (ha)
										2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	
PB2 - Upland blanket bog x HH3 -		N		Yes	Yes	Higher	Yes	Higher	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018

Fossitt Habitat Type	Coillte Block	Forestry (Y if within Coillte dataset and N if non-woodland type in Tobin dataset)	Felling Year	Available	Currently Suitable?	Current Suitability Category	Suitable at some point in future?	Maximum suitability category at some point in future	Current area (ha)	Future area (ha)																													Mean area (ha)
										2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	
Wet heath																																								
PB2 - Upland blanket bog		N		Yes	Yes	Higher	Yes	Higher	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086	3.086
WD4 - Conifer plantation		Y	2062	No	No	None	No	None	3.596	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHF	62146G	Y	2047	10y	No	None	Yes	Higher	3.436	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.436	3.436	3.436	3.436	3.436	3.436	3.436	3.436	3.436	3.436	1.145333333
CHF	62148T	Y	2038	10y	No	None	Yes	Higher	0.108	0	0	0	0	0	0	0	0	0	0	0	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0	0	0	0	0	0	0	0	0	0.036
CHF	62149O	Y	2047	10y	No	None	Yes	Higher	0.053	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.017666667
CHF	62149O	Y	2053	10y	No	None	Yes	Higher	3.417	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.417	3.417	3.417	3.417	0.4556
CHF	62150H	Y	2062	10y	No	None	Yes	Higher	0.278	0.278	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00927
CHF	62146G	Y	2032	10y	No	None	Yes	Higher	0.357	0	0	0	0	0	0.357	0.357	0.357	0.357	0.357	0.357	0.357	0.357	0.357	0.357	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.119
CHF	62149O	Y	2062	10y	No	None	Yes	Higher	5.251	5.251	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.17503

C.5 Turbine 5

Table A-6: Habitat Data Used for Calculations – Turbine T5

Fossitt Habitat Type	Coillte Block	Forestry (Y if within Coillte dataset and N if non-woodland type in Tobin dataset)	Felling Year	Available	Currently Suitable?	Current Suitability Category	Suitable at some point in future?	Maximum suitability category at some point in future	Current area (ha)	Future area (ha)																													Mean area (ha)
										2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	
PB2 - Upland blanket bog		N		Yes	Yes	Higher	Yes	Higher	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335
WD4 - Conifer plantation		Y	2047	Assumed to be part of 62146G-6 - 10 y	No	None	Yes	Higher	0.322	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.322	0.322	0.322	0.322	0.322	0.322	0.322	0.322	0.322	0.322	0.107333333
WS1 - Scrub		Y		Yes	Yes	Lower	Yes	Lower	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795	0.795
BL3 - Buildings and artificial surfaces		N		No	No	None	No	None	0.036	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ED2 - Spoil and bare ground		N		No	No	None	No	None	0.104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHF	62147B	Y	2045	10y	No	None	Yes	Higher	4.343	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.343	4.343	4.343	4.343	4.343	4.343	4.343	4.343	4.343	0	0	1.447666667
CHF	62145L	Y	2052	10y	No	None	Yes	Higher	5.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.08	5.08	5.08	5.08	5.08	0.846666667
CHF	62145L	Y	2046	10y	No	None	Yes	Higher	3.416	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.416	3.416	3.416	3.416	3.416	3.416	3.416	3.416	3.416	0	1.138666667
CHF	62146G	Y	2043	10y	No	None	Yes	Higher	0.012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0	0	0	0	0.004
CHF	62146G	Y	2047	10y	No	None	Yes	Higher	4.157	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.157	4.157	4.157	4.157	4.157	4.157	4.157	4.157	4.157	4.157	1.385666667

C.6 Turbine 6

Table A-7: Habitat Data Used for Calculations – Turbine T6

Fossitt Habitat Type	Coillte Block	Forestry (Y if within Coillte dataset and N if non-woodland type in Tobin dataset)	Felling Year	Available	Currently Suitable?	Current Suitability Category	Suitable at some point in future?	Maximum suitability category at some point in future	Current area (ha)	Future area (ha)																																Mean area (ha)
										2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	
GS4 - Wet grassland x BL3 - Buildings and artificial surfaces		N		Yes	Yes	Lower	Yes	Lower	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222	0.222
GS4 - Wet grassland		N		Yes	Yes	Lower	Yes	Lower	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847	1.847
PB2 - Upland blanket bog		N		Yes	Yes	Higher	Yes	Higher	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304	3.304
WD4 - Conifer plantation x WS1 - Scrub		Y	2044	Assumed to be part of 62148T-1-10y	Yes	Higher	Yes	Higher	0.131	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.131	0.131	0.131	0.131	0.131	0.131	0.131	0.131	0.131	0.131	0	0	0	0.043666667
WD4 - Conifer plantation		Y	2044	Assumed to be part of 62148T-1-10y	No	None	Yes	Higher	0.579	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.579	0.579	0.579	0.579	0.579	0.579	0.579	0.579	0.579	0.579	0	0	0	0.193
BL1 - Stone walls and other stone work_		N		No	No	None	No	None	0.004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BL3 - Buildings and artificial surfaces		N		No	No	None	No	None	0.086	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHF	62148T	Y	2044	10y	No	None	Yes	Higher	8.478	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.478	8.478	8.478	8.478	8.478	8.478	8.478	8.478	8.478	8.478	0	0	0	2.826
CHF	62148T	Y	2048	10y	No	None	Yes	Higher	2.956	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.956	2.956	2.956	2.956	2.956	2.956	2.956	2.956	2.956	0.8868
CHF	62147B	Y	2045	10y	No	None	Yes	Higher	1.993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.993	1.993	1.993	1.993	1.993	1.993	1.993	1.993	1.993	1.993	0	0	0.664333333

C.7 Turbine 7

Table A-8: Habitat Data Used for Calculations – Turbine T7

Fossitt Habitat Type	Coillte Block	Forestry (Y if within Coillte dataset and N if non-woodland type in Tobin dataset)	Felling Year	Available	Currently Suitable?	Current Suitability Category	Suitable at some point in future?	Maximum suitability category at some point in future	Current area (ha)	Future area (ha)																																Mean area (ha)
										2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	
GS4 - Wet grassland		N		Yes	Yes	Lower	Yes	Lower	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136	19.136
BL3 - Buildings and		N		No	No	None	No	None	0.153	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Fossitt Habitat Type	Coillte Block	Forestry (Y if within Coillte dataset and N if non-woodland type in Tobin dataset)	Felling Year	Available	Currently Suitable?	Current Suitability Category	Suitable at some point in future?	Maximum suitability category at some point in future	Current area (ha)	Future area (ha)																																Mean area (ha)
										2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	
artificial surfaces																																									
EU1 - Non-Marine Caves		N		No	No	None	No	None	0.009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

C.8 Turbine 8

Table A-9: Habitat Data Used for Calculations – Turbine T8

Fossitt Habitat Type	Coillte Block	Forestry (Y if within Coillte dataset and N if non-woodland type in Tobin dataset)	Felling Year	Available	Currently Suitable?	Current Suitability Category	Suitable at some point in future?	Maximum suitability category at some point in future	Current area (ha)	Future area (ha)																																Mean area (ha)
										2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	
GS4 - Wet grassland_GS3 x Dry humid acid grassland		N		Yes	Yes	Lower	Yes	Lower	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064
GS4 - Wet grassland		N		Yes	Yes	Lower	Yes	Lower	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284	6.284
WD4 - Conifer plantation		Y	2026	Assumed to be part of 62198M-10 - 10 y	No	None	Yes	Higher	0.436	0.436	0.436	0.436	0.436	0.436	0.436	0.436	0.436	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.116266667
ED2 - Spoil and bare ground		N		No	No	None	No	None	0.001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHF	62132J	Y	2046	10y	No	None	Yes	Higher	0.527	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.527	0.527	0.527	0.527	0.527	0.527	0.527	0.527	0.527	0.527	0.527	0	0.175666667
CHF	62198M	Y	2026	10y	No	None	Yes	Higher	7.906	7.906	7.906	7.906	7.906	7.906	7.906	7.906	7.906	7.906	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.3718
CHF	62198M	Y	2029	10y	No	None	Yes	Higher	1.833	0	0	1.833	1.833	1.833	1.833	1.833	1.833	1.833	1.833	1.833	1.833	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.611
CHF	62198M	Y	2054	10y	No	None	Yes	Higher	2.107	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.107	2.107	2.107	0.2107

C.9 Turbine 9

Table A-10: Habitat Data Used for Calculations – Turbine T9

Fossitt Habitat Type	Coillte Block	Forestry (Y if within Coillte dataset and N if non-woodland type in Tobin dataset)	Felling Year	Available	Currently Suitable?	Current Suitability Category	Suitable at some point in future?	Maximum suitability category at some point in future	Current area (ha)	Future area (ha)																																Mean area (ha)
										2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	
GS4 - Wet grassland		N		Yes	Yes	Lower	Yes	Lower	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239	16.239
PB2 - Upland blanket bog x GS4 - Wet grassland		N		Yes	Yes	Higher	Yes	Higher	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047

Fossitt Habitat Type	Coillte Block	Forestry (Y if within Coillte dataset and N if non-woodland type in Tobin dataset)	Felling Year	Available	Currently Suitable?	Current Suitability Category	Suitable at some point in future?	Maximum suitability category at some point in future	Current area (ha)	Future area (ha)																																Mean area (ha)
										2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	
PB2 - Upland blanket bog		N		Yes	Yes	Higher	Yes	Higher	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
WD2 - Mixed broadleaved / conifer woodland		Y		Won't be felled as not forestry	No	None	No	None	0.524	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WS1 – Scrub		N		Yes	Yes	Lower	Yes	Lower	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482
BL3 - Buildings and artificial surfaces		N		No	No	None	No	None	0.007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BL3 - Buildings and artificial surfaces		N		No	No	None	No	None	0.077	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

C.10 Turbine 10

Table A-11: Habitat Data Used for Calculations – Turbine T10

Fossitt Habitat Type	Coillte Block	Forestry (Y if within Coillte dataset and N if non-woodland type in Tobin dataset)	Felling Year	Available	Currently Suitable?	Current Suitability Category	Suitable at some point in future?	Maximum suitability category at some point in future	Current area (ha)	Future area (ha)																																Mean area (ha)
										2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	
GS4 - Wet grassland x HH3 - Wet heath		N		Yes	Yes	Higher	Yes	Higher	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944	1.944
GS4 - Wet grassland		N		Yes	Yes	Lower	Yes	Lower	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
HH3 - Wet heath x PB2 - Upland blanket bog		N		Yes	Yes	Higher	Yes	Higher	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682
HH3 - Wet heath x PB3 - Lowland blanket bog		N		Yes	Yes	Higher	Yes	Higher	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PB2 - Upland blanket bog x GS4 - Wet grassland		N		Yes	Yes	Higher	Yes	Higher	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796
PB4 - Cutover bog x PB2 - Upland blanket bog		N		Yes	Yes	Higher	Yes	Higher	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615
WD4 - Conifer plantation		Y	2029	Assumed to be part of 62198M-10 - 10y	No	None	Yes	Higher	0.091	0	0	0.091	0.091	0.091	0.091	0.091	0.091	0.091	0.091	0.091	0.091	0.091	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.030333333

Fossitt Habitat Type	Coillte Block	Forestry (Y if within Coillte dataset and N if non-woodland type in Tobin dataset)	Felling Year	Available	Currently Suitable?	Current Suitability Category	Suitable at some point in future?	Maximum suitability category at some point in future	Current area (ha)	Future area (ha)																														Mean area (ha)
										2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	
WS1 – Scrub x WD4 - Conifer plantation		N		Yes	Yes	Higher	Yes	Higher	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHF	62129D	Y	2052	10y	No	None	Yes	Higher	1.634	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.634	1.634	1.634	1.634	1.634	0.272333333
CHF	62128I	Y	2031	10y	No	None	Yes	Higher	5.579	0	0	0	0	5.579	5.579	5.579	5.579	5.579	5.579	5.579	5.579	5.579	5.579	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.859666667
CHF	62127N	Y	2048	10y	No	None	Yes	Higher	1.443	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.443	1.443	1.443	1.443	1.443	1.443	1.443	1.443	1.443	0.4329
CHF	62128I	Y	2042	10y	No	None	Yes	Higher	4.823	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.823	4.823	4.823	4.823	4.823	4.823	4.823	4.823	4.823	4.823	0	0	0	0	0	1.607666667
CHF	62198M	Y	2029	10y	No	None	Yes	Higher	0.533	0	0	0.533	0.533	0.533	0.533	0.533	0.533	0.533	0.533	0.533	0.533	0.533	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.177666667

C.11 Turbine 11

Table A-12: Habitat Data Used for Calculations – Turbine T11

Fossitt Habitat Type	Coillte Block	Forestry (Y if within Coillte dataset and N if non-woodland type in Tobin dataset)	Felling Year	Available	Currently Suitable?	Current Suitability Category	Suitable at some point in future?	Maximum suitability category at some point in future	Current area (ha)	Future area (ha)																														Mean area (ha)
										2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	
GS4 - Wet grassland		N		Yes	Yes	Lower	Yes	Lower	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399	4.399
WD4 - Conifer plantation		Y	2043	Assumed to be part of 62130T-6 - 10 y	No	None	Yes	Higher	0.389	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0	0	0	0	0.129666667
BL3 – Buildings and artificial surfaces		N		No	No	None	No	None	0.425	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GS2 - Dry meadows and grassy verges x BL3 - Buildings and artificial surfaces		N		No	No	None	No	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MHF	62129D	Y	2038	10y	No	None	Yes	Higher	2.318	0	0	0	0	0	0	0	0	0	0	0	2.318	2.318	2.318	2.318	2.318	2.318	2.318	2.318	2.318	2.318	0	0	0	0	0	0	0	0	0	0.772666667
CHF	62129D	Y	2052	10y	No	None	Yes	Higher	5.184	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.184	5.184	5.184	5.184	5.184	0.864
CHF	62128I	Y	2031	10y	No	None	Yes	Higher	3.477	0	0	0	0	3.477	3.477	3.477	3.477	3.477	3.477	3.477	3.477	3.477	3.477	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.159
CHF	62130T	Y	2043	10y	No	None	Yes	Higher	3.408	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.408	3.408	3.408	3.408	3.408	3.408	3.408	3.408	3.408	3.408	3.408	3.408	3.408	1.136

C.12 Turbine 12

Table A-13: Habitat Data Used for Calculations – Turbine T12

Fossitt Habitat Type	Coillte Block	Forestry (Y if within Coillte dataset and N if non-woodland type in Tobin dataset)	Felling Year	Available	Currently Suitable?	Current Suitability Category	Suitable at some point in future?	Maximum suitability category at some point in future	Current area (ha)	Future area (ha)																																Mean area (ha)
										2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	
WD1 - (Mixed) broadleaved woodland		Y	2043	Assumed to be part of 62130T-6 - 10y	No	None	Yes	Higher	0.584	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.584	0.584	0.584	0.584	0.584	0.584	0.584	0.584	0.584	0.584	0	0	0	0	0.194666667
WD4 - Conifer plantation x WD2 - Mixed broadleaved/ conifer woodland		Y	2045	Assumed to be part of 62123K-1 - 10y	No	None	Yes	Higher	0.829	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.829	0.829	0.829	0.829	0.829	0.829	0.829	0.829	0.829	0.829	0	0	0.276333333
WD4 - Conifer plantation		Y	2057	No	No	None	No	None	0.163	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GS2 - Dry meadows and grassy verges x BL3 Buildings and artificial surfaces		N		No	No	None	No	None	0.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHF	62122P	Y	2037	10y	No	None	Yes	Higher	2.311	0	0	0	0	0	0	0	0	0	0	0	2.311	2.311	2.311	2.311	2.311	2.311	2.311	2.311	2.311	0	0	0	0	0	0	0	0	0	0	0.770333333
FELLED	62122P	Y	2069	10y	No	None	Yes	Higher	0.752	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHF	62122P	Y	2025	10y	No	None	Yes	Higher	2.305	2.305	2.305	2.305	2.305	2.305	2.305	2.305	2.305	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.614666667
CHF	62123K	Y	2045	10y	No	None	Yes	Higher	3.776	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.776	3.776	3.776	3.776	3.776	3.776	3.776	3.776	3.776	3.776	0	0	1.258666667
CHF	62123K	Y	2040	10y	No	None	Yes	Higher	0.737	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.737	0.737	0.737	0.737	0.737	0.737	0.737	0.737	0.737	0.737	0	0	0	0	0	0	0.245666667
CHF	62123K	Y	2031	10y	No	None	Yes	Higher	0.245	0	0	0	0	0.245	0.245	0.245	0.245	0.245	0.245	0.245	0.245	0.245	0.245	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.081666667
CHF	62130T	Y	2057	10y	No	None	Yes	Higher	6.726	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHF	62130T	Y	2043	10y	No	None	Yes	Higher	0.822	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.822	0.822	0.822	0.822	0.822	0.822	0.822	0.822	0.822	0.822	0	0	0	0	0.274

C.13 Turbine 13

Table A-14: Habitat Data Used for Calculations – Turbine T13

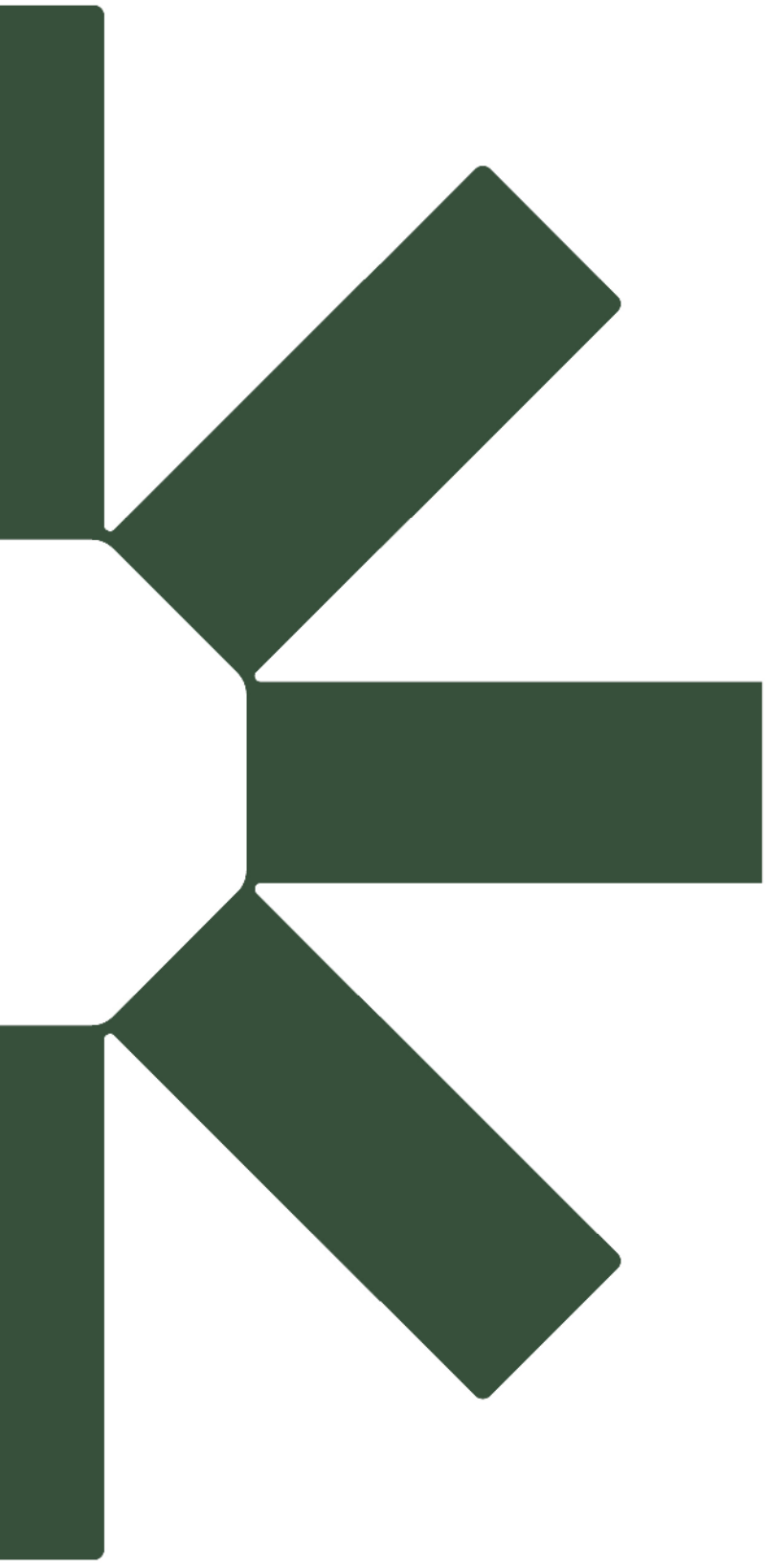
Fossitt Habitat Type	Coillte Block	Forestry (Y if within Coillte dataset and N if non-woodland type in Tobin dataset)	Felling Year	Available	Currently Suitable?	Current Suitability Category	Suitable at some point in future?	Maximum suitability category at some point in future	Current area (ha)	Future area (ha)																																Mean area (ha)
										2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	
GS4 - Wet grassland x WS1_Scrub		N		Yes	Yes	Higher	Yes	Higher	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GS4 - Wet grassland		N		Yes	Yes	Lower	Yes	Lower	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589	1.589
WD4 - Conifer plantation		Y	2046	Assumed to be part of 62136M-1 - 10y	No	None	Yes	Higher	0.008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0	0.002666667

Fossitt Habitat Type	Coillte Block	Forestry (Y if within Coillte dataset and N if non-woodland type in Tobin dataset)	Felling Year	Available	Currently Suitable?	Current Suitability Category	Suitable at some point in future?	Maximum suitability category at some point in future	Current area (ha)	Future area (ha)																														Mean area (ha)
										2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	
WS5 - Recently felled woodland		Y		No as too small	Yes	Lower	Yes	Higher	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GS2 - Dry meadows and grassy verges		N		No	No	None	No	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHF	62136M	Y	2046	10y	No	None	Yes	Higher	7.382	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.382	7.382	7.382	7.382	7.382	7.382	7.382	7.382	7.382	7.382	0	2.460666667
CHF	62136M	Y	2042	10y	No	None	Yes	Higher	0.086	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0	0	0	0	0	0.028666667
CHF	62136M	Y	2048	10y	No	None	Yes	Higher	0.153	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.153	0.153	0.153	0.153	0.153	0.153	0.153	0.153	0.153	0.0459
CHF	62136M	Y	2036	10y	No	None	Yes	Higher	5.68	0	0	0	0	0	0	0	0	0	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.68	0	0	0	0	0	0	0	0	0	0	0	1.893333333
FELLED	62136M	Y	2069	10y	No	None	Yes	Higher	1.932	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHF	62207S	Y	2069	10y	No	None	Yes	Higher	1.98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

C.14 Turbine 14

Table A-15: Habitat Data Used for Calculations – Turbine T14

Fossitt Habitat Type	Coillte Block	Forestry (Y if within Coillte dataset and N if non-woodland type in Tobin dataset)	Felling Year	Available	Currently Suitable?	Current Suitability Category	Suitable at some point in future?	Maximum suitability category at some point in future	Current area (ha)	Future area (ha)																														Mean area (ha)
										2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	
WD4 - Conifer plantation x HH3 - Wet heath		Y		No as too small	Yes	Higher	No	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WD4 - Conifer plantation		Y		No as too small	No	None	No	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHF	62137H	Y	2037	10y	No	None	Yes	Higher	5.708	0	0	0	0	0	0	0	0	0	0	5.708	5.708	5.708	5.708	5.708	5.708	5.708	5.708	5.708	0	0	0	0	0	0	0	0	0	0	0	1.902666667
CHF	62137H	Y	2043	10y	No	None	Yes	Higher	1.04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	0	0	0	0	0.346666667
CHF	62137H	Y	2034	10y	No	None	Yes	Higher	5.963	0	0	0	0	0	0	0	5.963	5.963	5.963	5.963	5.963	5.963	5.963	5.963	5.963	5.963	0	0	0	0	0	0	0	0	0	0	0	0	0	1.987666667
CHF	62137H	Y	2041	10y	No	None	Yes	Higher	3.92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	0	0	0	0	0	0	1.306666667
CHF	62219C	Y	2060	10y	No	None	Yes	Higher	1.864	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHF	62219C	Y	2031	10y	No	None	Yes	Higher	0.063	0	0	0	0	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.021
CHF	62219C	Y	2040	10y	No	None	Yes	Higher	0.462	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.462	0.462	0.462	0.462	0.462	0.462	0.462	0.462	0.462	0.462	0	0	0	0	0	0	0.154
CHF	62219C	Y	2039	10y	No	None	Yes	Higher	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHF	62222I	Y	2051	10y	No	None	Yes	Higher	0.384	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.384	0.384	0.384	0.384	0.384	0.384	0.384	0.0768



Making Sustainability Happen

Appendix 6-13

Outline Biodiversity Management Plan

Outline Biodiversity Management Plan

Lissinagroagh Wind Farm

FutureEnergy Ireland

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SLR Project No.: 501.065072.00001

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Draft 3	25 March 2026	Jonathon Dunn, Meadhbh Costigan	Kieran O'Malley	Kieran O'Malley
	Click to enter a date.			
	Click to enter a date.			

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Executive Summary

This Outline Biodiversity Management Plan (OBMP) sets out FutureEnergy Ireland's strategy to deliver all ecological compensation and enhancement measures required to address the predicted residual impacts of the proposed Lissinagroagh Wind Farm in County Leitrim. Prepared jointly by SLR Environmental Consulting (Ireland) Ltd and TOBIN, the plan provides a long-term, evidence-based framework to compensate for effects on the nationally important breeding hen harrier population, key upland and grassland habitats, marsh fritillary, bats, and linear landscape features such as hedgerows and treelines. The OBMP is designed to operate for the full 35-year lifespan of the wind farm. Following consent, the plan will be refined into a detailed Biodiversity Management Plan (BMP) in agreement with the planning authority and NPWS to address any specific requirements attached to the permission, ensuring the delivery of the committed biodiversity management actions and associated long-term benefits.

Hen harrier surveys undertaken between 2020 and 2025 confirm the presence of one to two breeding pairs in and around the site, with variable nesting success but consistent territorial use. As operational turbines have the potential to cause disturbance and effective displacement of both nesting and foraging birds, the OBMP adopts a precautionary approach by providing compensation sufficient for two breeding pairs. Central to this strategy is the establishment of two large Nesting Enhancement Areas (NEAs), totalling 54.15 hectares, located more than 750 metres from all turbines and positioned close to historical nesting locations. These areas will be created through the felling of low-yield conifer plantation and restoration of heather and scrub habitats known to support successful nesting in Ireland. Unlike the shifting suitability of commercial forestry, NEAs provide fixed, long-term nesting opportunities secured for the life of the Proposed Project.

To compensate for an estimated 140 hectares of foraging habitat predicted to be effectively lost through turbine-related displacement, the OBMP secures 164.25 hectares of enhancement lands across agricultural, peatland and mixed habitats, all situated within 2 kilometres of at least one NEA. Combined with the NEAs themselves, a total of 218.4 hectares will be managed to provide high-quality, structurally diverse foraging habitat. Habitat improvements will be delivered through tailored measures including revised grazing regimes, rush control, hedgerow restoration, scrub management, fertiliser reduction, peatland rewetting, and invasive species control. These actions draw on proven methodologies from national agri-environment schemes and the Hen Harrier Project, ensuring that enhancements are both deliverable and ecologically effective.

In addition to measures for hen harrier, the OBMP provides compensation for other important ecological features identified in the EIAR. This includes the restoration of 5.4 hectares of upland blanket bog and wet heath, management of 2 hectares of wet grassland to support marsh fritillary, planting of 4.9 hectares of mixed broadleaved woodland to replace bat foraging habitat lost within the wind farm site and turbine delivery route, and creation of 1.5 kilometres of new hedgerows and treelines. Many of these measures exceed a 1:1 restoration ratio, recognising the uncertainties inherent in habitat creation and the need to deliver net ecological benefit. Restoration targets are aligned with national Annex I habitat condition criteria and the species-specific requirements of marsh fritillary, ensuring that compensation is functionally equivalent to what is lost.

The OBMP also sets out clear roles and responsibilities for the developer, specialist ecological teams, landowners, and statutory consultees. Enhancement lands are secured through legal agreements, ensuring management control for the duration of the Proposed Project. A comprehensive monitoring programme, including breeding raptor surveys, vantage point observations, carcass searches, habitat condition assessments and regular Farm Plan audits, will track the success of all measures and enable adaptive management.

Where required, further mitigation such as turbine curtailment or automated detection-based shutdown systems may be implemented to avoid unexpected impacts.

Overall, the OBMP provides a robust, long-term and enforceable framework to ensure that the ecological effects of the Lissinagroagh Wind Farm are fully compensated and that significant biodiversity enhancements are delivered at a landscape scale. Its approach follows best-practice guidance, reflects current scientific evidence, and is supported by detailed landowner agreements and monitoring commitments that will be maintained throughout the operational life of the Proposed Project.

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Appendix D Lissinagroagh Biodiversity Exhibit

1.0 Introduction

This outline biodiversity management plan ("OBMP") has been prepared by SLR Environmental Consulting (Ireland) Ltd ("SLR") and TOBIN on behalf of FuturEnergy Ireland ("FEI") to support the delivery of all the compensation and enhancement measures referred to in the Biodiversity Chapter (Chapter 5) and Ornithology Chapter (Chapter 6) of the Lissinagroagh Wind Farm (hereafter "the Proposed Project") Environmental Impact Assessment Report ("EIAR").

The OBMP specifically covers proposed compensation and enhancement measures relating to the primary target species hen harrier *Circus cyaneus* as well as supporting habitats such as Upland blanket bog (PB2), Wet heath (HH3), and Wet grassland (GS4). In addition to supporting hen harrier, the restoration of the upland habitats will also compensate for likely significant effects on upland habitats consisting of: Upland blanket bog (PB2), Cutover bog (PB4), and Dry siliceous heath (HH1)/Dry humid acid grassland (GS3) mosaic. The management practices to be implemented within the enhancement lands will be of benefit to the secondary target species marsh fritillary *Euphydryas aurinia* to compensate for likely significant effects on this species.

Furthermore, the planting of native broadleaved woodland will compensate for the direct loss of habitat and provide alternative foraging habitat for bats compensating for likely significant effects on local bat populations. The planting of Hedgerows (WL1) and Treelines (WL2) will compensate for the direct loss of these habitats and improve connectivity within the landscape.

The OBMP represents a formal commitment by the Developer to implement these compensation measures in full. For details on wind farm layout, site characteristics, birds, habitats, protected species present, and predicted ecological and ornithological impacts reference should be made to the relevant sections of the EIAR for the Proposed Project.

1.1 Brief Description of the Site

The planning application site boundary (the "Site") is situated in north County Leitrim between the villages of Kiltyclogher to the north, and Manorhamilton to the southwest. The Site is located in close proximity to the Northern Ireland border in County Fermanagh which is approximately 3 km to the north.

The land use within the Survey Area for the proposed Wind Farm Site is primarily Conifer Plantation (WD4) (609ha), with expanses of Wet grassland (GS4) (132ha) used for rough grazing livestock as well as limited Upland blanket bog (PB2) (39ha).

Coillte forestry within the Site comprises of different stages of coniferous plantation forestry including recent clear-fell, second rotation, immature, semi-mature and mature forestry. The Site ranges in elevation from 170 to 380 m AOD. The management of land for red grouse *Lagopus lagopus* occurs nearby but outside the Site boundary.

There are a number of watercourses within the Site. These range from naturally occurring upland streams to modified drainage channels within forested areas at mid to lower elevations. The southeastern part of the Site is characterised by a number of spate watercourses, the majority of which have existing crossings in place as part of the existing forest road network.

1.2 Brief Description of the Proposed Project

The Proposed Project will consist of the installation of 14 wind turbines, a 110kV on-site substation, new entrances and access roads, upgraded access roads, cabling, compound areas, borrow pits, turbine delivery route works and other associated works.

The overall project will also include a 110kV grid connection which will export electricity generated on-site via an underground cable to the existing 110kV substation ESBN Srananagh substation in Co. Sligo. This element of the Proposed Project is being progressed under a separate planning application to An Coimisiún Pleanala ("ACP").

See Drawing 1 in Appendix A for further details.

1.3 Background

1.3.1 Hen Harrier

Bird surveys conducted between 2020 and 2025[1,2,3,4,5,6,7] have consistently recorded the presence of 1-2 nesting hen harrier within the Site and/or the surrounding area. These comprised a 'northern' and a 'southern' pair, with the southern pair showing greater consistency of site use. In addition, a third pair was recorded approximately 1.5 – 1.8 km northeast of the Site boundary in 2021 and 2024. Historical, pre-2020 surveys recorded successful nesting attempts by the 'southern' pair in 2018 and 2019 also.

The southern pair attempted to nest annually between 2020 and 2025, using a corridor approximately 2.5 km in length and shifting nest locations within this area between 2021-2024. The southern pair has not nested within the proposed wind farm site boundary for the last four years of survey. In contrast, the northern pair nested only in 2021, 2024 and 2025, with nest sites located within a few hundred metres of each other in 2021 and 2024. The northern pair has not nested within the proposed wind farm site boundary for the last four years of survey. In 2025, no exact nesting locations were identified for either northern or southern pair.

Nesting success has varied: the southern pair successfully fledged chicks in four out of five years, with an average productivity of at least 2.67 chicks per year when breeding was successful, or 1.6 chicks per year when unsuccessful breeding attempts were taken into account. The northern pair, however, failed to rear chicks in all survey years.

A third, off-site pair outside the survey area had confirmed breeding success in 2021, fledging at least two chicks. However, they were likely disturbed in 2022, which appears to have prevented successful breeding in subsequent years. A nesting attempt in 2024 also appears to have failed. A possible nest was suspected to be off-site and outside the survey area in 2025 to the east.

The Ornithology Chapter of the EIAR provides a detailed assessment of potential impacts on hen harrier and concludes that breeding hen harriers are likely to be disturbed by the Proposed Project, leading to potential displacement from nesting and foraging areas and possibly resulting in the effective loss of the species from the site. In the absence of mitigation, disturbance is predicted to occur during both construction and operational phases, particularly due to the presence of operating wind turbines.

[1] MKO (2025). Lissinagroagh Wind Farm, Co. Leitrim. Winter Season 2020-2021. MKO, Galway, Ireland.
[2] MKO (2025). Lissinagroagh Wind Farm, Co. Leitrim. Breeding Season 2021. MKO, Galway, Ireland.
[3] MKO (2023). Lissinagroagh Wind Farm, Co. Leitrim. Winter Bird Survey Report 2021/22. MKO, Galway, Ireland.
[4] MKO (2023). Lissinagroagh Wind Farm, Co. Leitrim. Breeding Bird Survey Report 2022. MKO, Galway, Ireland.
[5] MKO (2023). Lissinagroagh Wind Farm, Co. Leitrim. Breeding Bird Survey Report 2023. MKO, Galway, Ireland.
[6] MKO (2025). Lissinagroagh Wind Farm, Co. Leitrim. Breeding Bird Survey Report 2024. MKO, Galway, Ireland.
[7] MKO (2025). Lissinagroagh Wind Farm, Co. Leitrim. Breeding Bird Survey Report 2025. MKO, Galway, Ireland.

Current guidance[8] recommends a disturbance-free buffer of up to 750 m around nesting sites to avoid impacts. Foraging birds may also be displaced, though typically at shorter distances. The situation is further complicated by the species' tendency to nest in young second-rotation forestry, which becomes unsuitable as canopy closure progresses. Without targeted management, nest locations are likely to shift over the lifetime of the wind farm, with nesting hen harrier potentially impacted by both forestry cycles and operating wind turbines.

Given that a single breeding pair of hen harrier is considered of national importance[9], it is vital that appropriate mitigation and/or compensation measures are implemented to address potential impacts on this species.

1.3.2 Habitats and Secondary Target Species

Habitat surveys were conducted in 2020, 2021, 2024, and 2025 (EIAR Chapter 5 – Biodiversity, Table 5-2). Phase 1 habitat surveys were carried out within the Survey Area for the proposed Wind Farm Site and all habitats were classified according to Fossitt (2000) level 3. Phase 2 habitat surveys were carried out in upland habitats surrounding T3, T4 and T10 where four Annex I habitat types were identified. The Biodiversity Chapter of the EIAR provides a detailed descriptions of all habitats identified within the survey area of the proposed Wind Farm Site (EIAR Chapter 5 – Biodiversity, Section 5.4).

Appropriate compensation measures have been designed to off-set residual effects on important ecological features (IEFs), including habitats and species, as a result of the Proposed Project, and consist of the following (EIAR Chapter 5 – Biodiversity, Section 5.9):

- Management of 5.4ha of Upland blanket bog (PB2) and Wet heath (HH3) for biodiversity;
- Management of 2ha of Wet grassland (GS4) for marsh fritillary;
- Planting of 1.5km of Hedgerows (WL1)/Treelines (WL2) habitat for biodiversity; and
- Planting of 4.9ha of (Mixed) broadleaved woodland (WD1) to compensate for the loss of bat foraging habitat within the proposed Wind Farm Site and for the loss of habitat along the TDR.

1.4 Scope of this Document

The OBMP sets out the framework, including key aims, objectives and practical management measures that will be implemented, for the establishment and long-term management of land designated to compensate for residual adverse impacts on breeding hen harrier and other ecological features identified in the EIAR for the lifespan of the Proposed Project. The OBMP forms a commitment to deliver in full all mitigation and compensation measures set out in both chapters. For details on wind farm layout, site characteristics, birds, habitats, protected species present, and predicted ecological and ornithological impacts reference should be made to the relevant sections of the EIAR for the proposed project.

For hen harrier, in addition to compensation, several of the proposed measures are designed to deliver ecological enhancements. This includes the creation of additional nesting and foraging habitats beyond those previously available within the Site.

[8] Goodship, N.M. and Furness, R.W. 2022. Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. A report from MacArthur Green to NatureScot.

[9] Ruddock, M., Wilson-Parr, R., Lusby, J., Connolly, F., J. Bailey, & O'Toole, L. (2024). The 2022 National Survey of breeding Hen Harrier in Ireland. Report prepared by Irish Raptor Study Group (IRSG), BirdWatch Ireland (BWI), Golden Eagle Trust (GET) for National Parks & Wildlife Service (NPWS). Irish Wildlife Manuals, No. 147. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland

Similarly, the delivery ecological enhancements will be achieved over the long-term for habitats and species where the hectarage of supporting habitat which will be restored under the OBMP exceeds that which is to be lost as a result of the Proposed Project.

The scale of the measures proposed is also expected to generate wider biodiversity benefits, including the potential for colonisation by other species such as passerines, which should be attracted to the improved habitats over time.

This document should be read in conjunction with Chapter 5 Biodiversity and Chapter 6 Ornithology of the EIAR, along with the associated technical appendices. Details regarding the wind farm layout, site characteristics, baseline ecological data, and predicted impacts are presented within the relevant EIAR sections.

This document relates to measures which are intended to be in place throughout wind farm operation, noting that some of the measures included will first be implemented prior to wind farm operation commencing. Mitigation measures to be implemented solely during wind farm construction are beyond the scope of this document and are addressed separately in the Construction Environmental Management Plan ("CEMP").

This document constitutes an outline plan. A more detailed BMP will be prepared in agreement with the planning authority and NPWS to address any specific requirements attached to the permission guided by the principles and commitments set out herein.

1.5 Evidence of Technical Competence and Experience

The ornithological components of this report were written by Jonathon Dunn MCIEEM, PhD (Avian Ecology and Conservation), MA (Cantab.) (Natural Sciences – Zoology) and MSc (Ecology, Evolution and Conservation). Jonathon has extensive experience of designing and implementing baseline ecology surveys for over 20 wind farms in Ireland, along with impact assessment including EIAR, Ecological Impact Assessment (EcIA), AA screening and NIS.

Technical review of the ornithological components of this report was undertaken by Duncan Watson CEnv MCIEEM. He has over 26 years of experience working on wind farm planning applications in the UK and Ireland, having worked on over 90 such projects.

The ecological components of this report were co-authored by Ciara Byrne and Sinead O' Reilly. Meadhbh Costigan undertook the technical review of the biodiversity components of this report.

Ciara Byrne B.Sc. Wildlife biology, Ecologist with TOBIN. Ciara has three years consulting experience with Tobin. Ciara has authored AA screening, NIS, Invasive Species Management Plans (ISMP), Preliminary Ecological Assessment (PEA) and biodiversity chapters within Planning Environmental Considerations Report (PECRs).

Sinead O' Reilly, M. Res., Senior Ecologist with TOBIN. She is a qualified and experienced environmental consultant with thirteen years' post-graduate experience in freshwater sciences and environmental consultancy in Ireland. Sinead has a strong technical background as a freshwater ecologist and has extensive field experience in freshwater habitats and species across Ireland.

Meadhbh Costigan M.Sc. ACIEEM, Senior Ecologist with TOBIN. Meadhbh graduated from Trinity College Dublin with a B.A. (Hons) in Natural Science, reading Botany. She then received a M.Sc. in Botany from the University of Kent with training from the Royal Botanic Gardens, Kew. She has 5+ years' experience in consulting, primarily engaged in the preparation of impact assessments and biodiversity chapters for the renewable energy sector. Her work focusses on the identification of Annex I habitat types and the assessment of habitat condition. She applies the information she gathers in the field to provide guidance to clients on avoiding and mitigating adverse effects on natural habitats of community importance. She is an Associate member of Chartered Institute of Ecology and

Environmental Management (ACIEEM) and is an elected member of the CIEEM Irish Section Committee.

2.0 Overall Approach to the Development of Compensation and Enhancement Proposals

2.1 The Mitigation Hierarchy

A structured, step-by-step approach known as the 'mitigation hierarchy' has been implemented throughout the EIA process to avoid, reduce, and compensate for potential negative impacts on biodiversity resulting from the Proposed Project. This process is described further in the Biodiversity and Ornithology EIAR chapters and illustrated in Figure 1 below.

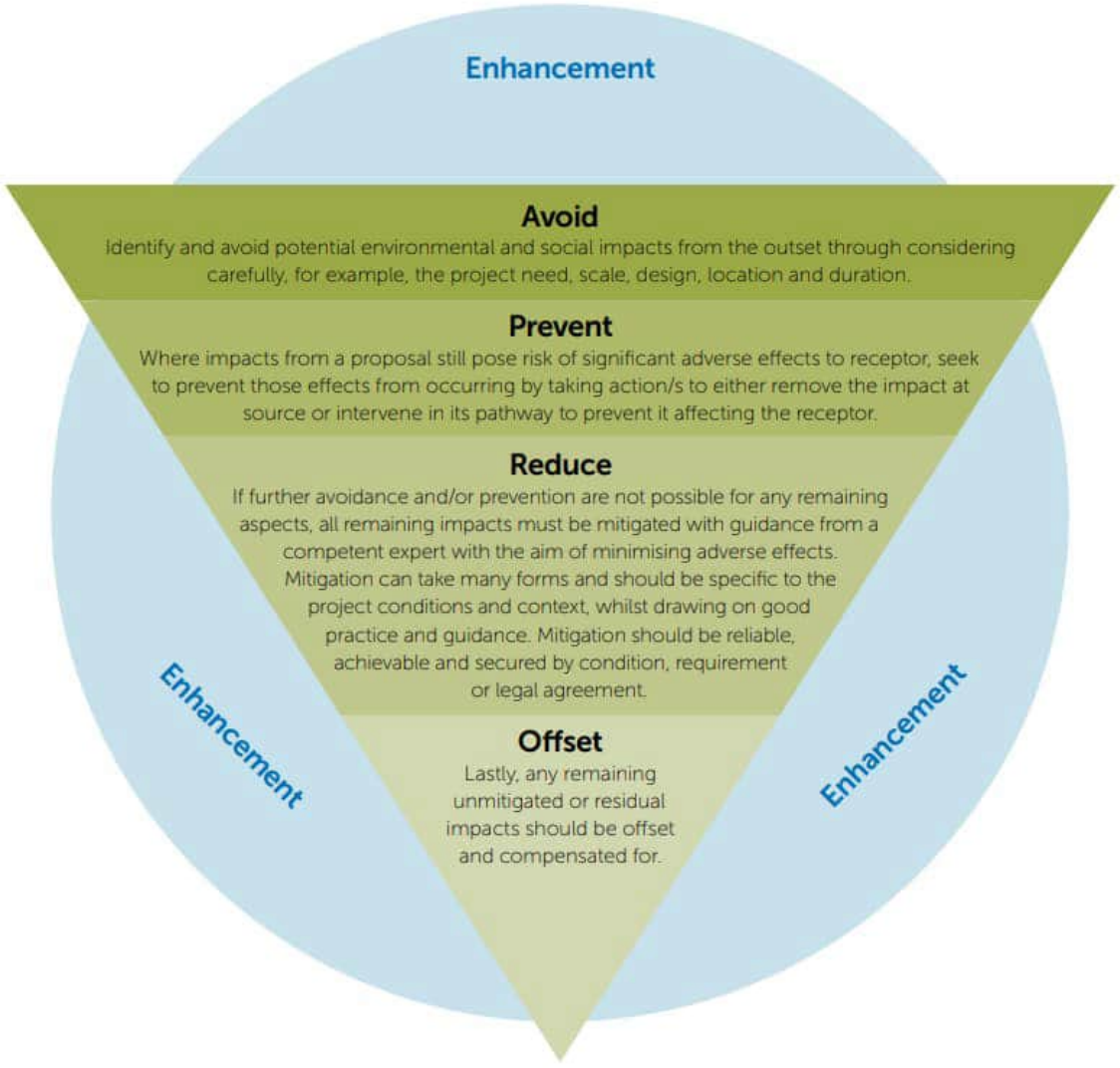

Figure 2-1: The Mitigation Hierarchy[10]

The mitigation hierarchy has guided the Proposed Project's design from the outset, with the primary aim of avoiding significant ecological effects wherever possible. Where avoidance was not feasible, efforts were made to minimise impacts through careful planning and design

[10] Figure reproduced from Beadle, Burgess, Callaghan, Howard, Knott, Riley, Walker et al. (2024) Institute of Environmental Management and Assessment (IEMA) Guidelines: Implementing the Mitigation Hierarchy from Concept to Construction

and the implementation of mitigation measures. In cases where significant effects remain, they will be offset or compensated, in accordance with the principles outlined in Figure 1. Avoidance and mitigation measures are described in the relevant EIAR chapters and the CEMP and are not repeated here. The purpose of this document is to provide details of the proposed compensation measures and additional enhancements and how they will be implemented and monitored to offset any identified likely significant effects on biodiversity as a result of the Proposed Project.

According to Chartered Institute of Ecology and Environmental Management (CIEEM) guidance, the distinction between mitigation and compensation is that mitigation avoids or reduces the occurrence of negative impacts and effects, whereas compensation addresses effects which are residual, after avoidance and mitigation have been considered[11].

CIEEM guidance further states (emphasis added):

"*Compensation describes measures taken to offset residual effects resulting in the loss of, or permanent damage to, ecological features despite mitigation.* ***For example, it may take the form of replacement habitat or improvements to existing habitats****. Compensation can be provided either within or outside the Site (defined by the red line of a planning application). Compensation should always be seen as a last resort, when all other mitigation options have been exhausted*".

The approaches to providing compensation and enhancement are described below, firstly for hen harrier and then for habitats and secondary target species.

2.2 Hen Harrier

2.2.1 Overview

The overall approach to providing compensation and enhancement is based on the creation and management of suitable nesting and foraging habitat for hen harrier located away from proposed turbine locations that remains suitable for the long-term and is not subject to change in response to forestry management cycles, thus providing a benefit compared with the existing baseline situation.

It is assumed management measures need to compensate for loss of nesting and foraging habitat for two pairs of hen harrier. This is because over the last five years of survey, a maximum of two pairs has been recorded breeding within the Site (see Section 1.3). It is acknowledged that in some survey years, only a single pair has been recorded and that one or both pairs may not necessarily be 'lost' due to the Proposed Project; therefore, providing compensation for two pairs represents a precautionary approach.

Details on territories such as the number of territories and the sizes of territories have been provided in Appendix 6.12 of the accompanying EIAR.

To maximise the chance of success of the proposed management measures, there is a need to provide sufficient foraging and nesting habitat to support at least two pairs of hen harrier. As such, two separate nesting areas will be managed, with multiple options provided for foraging birds.

This approach was developed including consideration of the following key principles, and the recommendations made in the latest '*2022 National Survey of breeding Hen Harrier in Ireland*' report[9] and information provided in the '*Hen Harrier Threat Response Plan 2024-*

[11] CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine. Version 1.3 updated September 2024. Chartered Institute of Ecology and Environmental Management

2028'[12] including its cross-sector actions and enabling measures (including emphasis on landowner incentives and agri-environment approaches). The strategy also drew on precedent and learning from planning processes for recent, comparable wind projects where breeding hen harrier were present. These included: Booltiagh Wind Farm[13], Cahermurphy Wind Farm[14], Carrownagowan Wind Farm[15], Knockshanvo Wind Farm[16] and Taurbeg Wind Farm[17].

The approach considered the following:

- Extent – the extent of the enhancement areas needs to be sufficient to compensate adequately for nesting and foraging habitats that will be lost. A 1:1 ratio of compensation land to habitat lost may not always be appropriate, depending on the quality of what is being proposed to what will be lost;
- Location – compensation habitats need to be located in a way that maximises the chances that they will be used by hen harriers and reduces their potential for disturbance from operating wind turbines;
- Habitat type – habitat types proposed for enhancement must be proven to be used by nesting and foraging hen harrier as shown in the scientific literature and by field survey at the Site;
- Additionality – habitat enhancement plans need to demonstrate clearly that what is proposed provides additional habitat to what is already present;
- Deliverability – habitat enhancement plans must be demonstrated to be deliverable and that any necessary landowner agreements are in place; and
- Establishment time – most habitats will take time to establish to a level at which they are suitable for foraging and nesting hen harrier. In some cases, this can take several years. To provide adequate compensation for lost habitats, compensation areas need to be available for hen harriers at the time that the existing habitats are lost (i.e. commencement of wind farm operation in the case of habitats indirectly lost due to turbine displacement).

There are differences between the lands required for nesting and foraging harriers, and different sized disturbance-free buffers are also required. However, there are also links between nesting and foraging habitats, which we have incorporated into our approach.

This is expanded upon in the sections below, with reference made to key management principles and the local breeding hen harrier population.

2.2.2 Nesting Habitat

2.2.2.1 Nesting Requirements for Hen Harrier in Ireland and at the Site

Research has shown that nesting hen harrier require dense vegetation cover for nesting, and that in Ireland, hen harrier will nest in the pre-thicket stage of first (and particularly) second rotation conifer plantations, upland heath and scrub habitats[9]. While most breeding

[12] NPWS (2024). Hen Harrier Threat Response Plan 2024-2028. Prepared by National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Department of Agriculture, Food and the Marine, and Department of Environment, Climate and Communications. Government of Ireland.

[13] ACP Ref ABP-03-120616 (original permission) and Clare County Council Ref P23/328 (extension to life)

[14] ACP Ref ABP-311044-21

[15] ACP Ref ABP-308799-20

[16] ACP Ref ABP-320705-24

[17] Cork County Council Ref 25/05406

pairs nest in second rotation forest[9], it is thought that this is largely due to the relative lack of suitable heath and scrub habitats, which are likely to be preferred if good quality habitat was more widely available[18].

Fragmented areas for nesting result in an ecological trap (i.e. leads to a negative effect on breeding success and productivity)[19]; therefore, breeding hen harrier are more successful and productive when using homogenous blocks of suitable nesting and foraging areas, with fewer isolated patches of high edge / small area habitats.

MKO surveys[20] showed that hen harriers at the Site have typically nested in small patches of heather, surrounded by a mosaic of scrub and forestry, often in proximity to local roads or forestry tracks, and in one instance, not far from a dwelling house. These locations are unlikely to be optimal and likely reflect limited availability of suitable nesting habitat.

2.2.2.2 Disturbance-Free Buffers from Nesting Areas

Size of Buffer

Goodship and Furness (2022)[8] provide best-practice guidance for assessing disturbance to birds in the context of onshore wind farms in the UK and Ireland. They state that while hen harrier may nest as close as 200 to 300 m from operational turbines[21], a precautionary buffer of 300-750 m should be applied during the breeding season to minimise disturbance.

The guidance also highlights that the buffer size should be informed by the level of habituation to disturbance. Specifically:

"*A buffer zone at the lower end of this range may be sufficient to protect individuals that have some habituation to disturbance. For activities with a high potential for visual and audial disturbance (e.g. forestry operations), a larger buffer zone between 500 – 1,000 m may be necessary during the breeding period*".

Construction and, to a lesser extent, decommissioning activities are considered more disruptive than turbine operation due to increased human presence, vehicle movement, and forestry clearance required for infrastructure development. As such, the most precautionary approach is to apply the upper end of the recommended buffer range during these phases. A 1 km buffer is therefore considered appropriate during construction and decommissioning; see EIAR Chapter 6 and the CEMP appended to the EIAR.

Goodship and Furness (2022) further advise:

"*Therefore, the upper limit of the disturbance buffer should be used unless it can be demonstrated that a lower buffer is sufficient. This is intended to provide a precautionary approach; however, it is noted that in certain circumstances lower buffers will be appropriate. Factors influencing whether a lower buffer would be considered sufficient include, but are not limited to, type of disturbing activity, duration, topography and known levels of habituation. We also recognise the importance of incorporating site-specific factors into our consideration when applying buffers*."

At Lissinagroagh, the Site and surrounding landscape are intersected by a network of roads and subject to ongoing forestry, agricultural operations and red grouse management.

[18] Marc Ruddock, pers. comm.

[19] Sheridan, K., Monaghan, J., Tierney, T.D., Doyle, S., Tweney, C., Redpath, S.M. and McMahon, B.J., 2020. The influence of habitat edge on a ground nesting bird species: hen harrier *Circus cyaneus*. Wildlife Biology, 2020(2), pp.1-10.

[20] Andrew O'Donoghue, pers. comm.

[21] For example, as demonstrated by Madders, M. and Whitfield, D. P. (2006). Upland raptors and the assessment of wind farm impacts. Ibis 148: 43-56

Notably, the southern hen harrier pair has been recorded nesting within 5–10 m of local roads, suggesting a degree of habituation to regular disturbance. Additionally, many historical nest sites have been naturally screened by topography and vegetation, which likely helped reduce the impact of nearby activity.

The findings of the Irish Windharrier project[22] also provide important context. A key publication from this project (Fernandez-Bellon *et al*., 2015)[23] analysed breeding performance at 84 nest sites located at varying distances from wind farms. No statistically significant relationships were found between breeding parameters and distance to the nearest wind turbine; however, non-statistically significant lower nest success rates were observed within 1 km of wind turbines. The authors stated that this putative relationship may be wholly or partly due to the influence of landscape elements, which may be linked to wind farm development (e.g. changes in land use following construction), or it could be due to other unrelated practices (e.g. agricultural intensification, afforestation or peat extraction). The Fernandez-Bellon et al. study did not specifically examine disturbance to nesting hen harrier and while it is acknowledged that disturbance to nesting hen harrier could potentially have contributed towards lower nest success rates, it is likely to have been just one of many different factors responsible.

Taken together, these findings suggest that there is no conclusive evidence of disturbance to nesting hen harriers up to 1 km from operational turbines, and so the maximum buffer distances recommended by Goodship and Furness (2022), i.e. 750 m, represent a conservative and precautionary approach.

Accordingly, a 750 m disturbance-free buffer from operational turbines has been applied to the identification of proposed nesting areas in the preparation of this OBMP.

What to Buffer

A common approach to minimising disturbance to nesting hen harrier by operational turbines is to apply a 750 m buffer around current and historical nest locations, with infrastructure designed to avoid these areas. However, this method is not considered suitable for this Project for two key reasons.

1. **Nest Site Variability**: Survey data indicate that hen harrier do not consistently nest in the same location each year within the Site. This is especially true for the southern pair, which have nested or attempted to nest within a corridor approximately 2.5 km in length over the period 2020-2024. This variability makes it impractical and inappropriate to apply static buffers around previous nest sites; and
2. **Dynamic Forestry Landscape**: Much of the Site comprises commercial agroforestry, where habitat suitability for nesting hen harrier fluctuates over time due to forestry cycles. As areas transition through different stages of growth, their suitability for nesting changes, likely contributing to the observed variation in nest site selection by the southern pair. This also makes it inappropriate to apply buffers to previous nest sites, which are likely to become unsuitable within a few years (if not unsuitable already in some cases).

To address these challenges, two dedicated Nesting Enhancement Areas (“NEAs”) will be established and managed throughout the lifespan of the Proposed Project. These NEAs have been strategically located at least 750 m from all proposed turbine locations and

[22] Wilson, M., Fernández-Bellon, D., Irwin, S. & O’Halloran, J. (2015) The interactions between Hen Harriers and wind turbines: WINDHARRIER - Final Project Report. School of Biological Earth & Environmental Sciences (BEES), University College Cork

[23] Fernández-Bellon, D., Irwin, S., Wilson, M. and O’Halloran, M. (2015) Reproductive output of Hen Harriers *Circus cyaneus* in relation to wind turbine proximity. Irish Birds, 10(2), pp.143-150.

positioned near known nest sites to maximise the likelihood of uptake by breeding hen harrier.

While the NEAs are not 750 m from all other project components such as borrow pits, substations, the meteorological mast, or access roads, this is considered acceptable for the following reasons:

- **Turbines as Primary Disturbance Source**: Wind turbines are expected to be the most significant source of disturbance during the operational phase;
- **Temporary Infrastructure**: Borrow pits and construction compounds will only be present during the construction phase and will be removed and restored thereafter;
- **Low-Impact Infrastructure**: Substations and other permanent infrastructure are low-profile, stationary features that will be largely screened from the NEAs by existing topography and forestry; and
- **Evidence of Habituation**: Observations made during the suite of bird surveys suggest that the southern hen harrier pair have habituated to certain levels of disturbance to some extent, with nests recorded as close as 5–10 m from local roads.

This targeted and flexible approach to buffer design and habitat enhancement reflects both best-practice guidance and site-specific ecological conditions, ensuring that compensation measures are both precautionary and practical.

Nesting Enhancement Areas

Hen harriers do not require very large areas to nest in as the nests themselves are small (the immediate nest-site footprint including the nest platform and surrounding trampled vegetation typically occupies only a few square metres[24,25,26,27]); however, it is important to provide them with several options for nesting to maximise the chances of the Site supporting at least two pairs, which could otherwise potentially be lost because of the Proposed Project.

To this end, two folios of land that are currently low yield forestry coupes managed by Coillte will be created into NEAs and shown in Drawing 2, Appendix A. The areas of the two NEAs are 18.3 ha and 35.85 ha for the northern and southern NEAs respectively, giving a combined total of 54.15 ha. These are located 500 m and 375 m away from previous nesting locations used by the northern and southern pairs respectively, to maximise the chance of uptake by existing pairs.

Furthermore, the NEA areas were also selected due to their topographical and hydrological features, which have been shown to be associated with choice of hen harrier nesting habitat in the scientific literature, again, maximising the chance of uptake. For example, hen harrier nests are typically located on moderate slopes (0-10°), with some preference for north- or east-facing slopes[26,27]. Both NEAs are located on flat to moderate slopes and face north, or northeast.

The creation of the NEAs will involve felling of forestry habitats and creating new heather and scrub habitats, comprising predominantly heather habitats with small patches of scrub

[24] Amar, A. & Redpath, S.M. (2002) Determining the cause of individual differences in nest success: design and analysis of a long-term hen harrier study. Ibis, 144(1), pp.14–26.

[25] Arroyo, B.E., Leckie, F.M., Amar, A., McCluskie, A., & Redpath, S.M. (2009) Habitat use and range management effects on breeding success of hen harriers on Langholm Moor: conservation implications. Animal Conservation, 12(3), pp.283–292.

[26] Picozzi, N. (1980) Food, growth and survival of nestling Hen Harriers Circus cyaneus in Orkney. Journal of Animal Ecology, 49(2), pp.697–706.

[27] Watson, D. (1977) The Hen Harrier. Berkhamsted: T. & A.D. Poyser.

interspersed as a mosaic. These target habitats were chosen because of known suitability for nesting hen harrier in Ireland and based on evidence from surveys at the Site (see Section 2.2.2.1).

A key benefit to the use of dedicated NEAs is that they can be readily managed *in situ* over the lifespan of the Proposed Project. This avoids the issue of suitable nesting habitat moving around the Site as forest coupes are felled, restocked and subsequently reach canopy closure, which would make it impossible to maintain a 750 m buffer for the lifespan of the Proposed Project. Provision of heath and scrub habitats would also have other biodiversity benefits, which would not be achieved via provision of young rotation forestry. For example, this would involve enhancing habitats for other avian species, especially those that prefer open moorland habitats.

The maintenance of NEAs over the lifespan of the Proposed Project provides a long-term ecological benefit that would not occur if the Proposed Project did not proceed.

Disturbance to breeding hen harrier will be avoided through adherence to existing DAFM restrictions[28], which preclude forestry operations within 1.2 km of known nest locations during the breeding season (1 March–15 August). Coillte implements these measures as standard practice.

The use of the NEAs is grounded in evidence from Ireland that demonstrates that hen harrier nest distribution responds to the availability of suitable nesting habitat at the landscape scale. For example, national survey analyses have shown strong selection for, and a positive relationship between nest numbers and the extent of, suitable early-stage plantation habitats, indicating that breeding hen harrier can establish nests in newly available suitable habitat where it occurs [29]. This responsiveness underpins the rationale for creating fixed, high-quality nesting opportunities in locations that are protected from turbine-related disturbance. The strategy aligns with national conservation objectives and best-practice guidance, and its implementation will be secured through planning conditions and formal agreements with landowners for the operational lifespan of the wind farm, anticipated to be 35 years. As such the likelihood of success for the proposed compensatory measures is high.

Furthermore, the NEA lands were also selected because their existing ecological, hydrological and topographical conditions are highly conducive to successful conversion from commercial forestry to a stable heath/scrub mosaic. These open-habitat systems typically establish most readily on soils that retain moisture, have low nutrient status, and contain remnant bog/heath seedbanks. Given that the NEAs located in areas that are currently low yield conifer plantation planted over peat habitats (i.e. are acidic with low nutrient status), with multiple watercourses in the area (i.e. a wet area) and are adjacent to or in proximity to existing heath and bog habitats (i.e. remnant seedbanks likely), the conditions for successful habitat conversion are high. Thus, once forestry is removed, the ground is predisposed to natural re-establishment of heather, bilberry, rush and sedge without requiring intensive intervention, confirming that the NEAs are not low-value or marginal lands but areas with a high predicted probability of successful conversion.

More generally, the use of habitat restoration and long-term management as compensation for residual ecological effects is an established principle in European nature conservation law and guidance, provided that compensatory measures are targeted, technically feasible,

[28] Coillte. (2024). Coillte Forest Birds Report. Coillte

[29] Wilson, M., Gittings, T., O'Halloran, J., Kelly, T. and Pithon, J. (2006). The distribution of Hen Harriers in Ireland in relation to land use cover, particularly forest cover. COFORD, Dublin

secured for the long term, and designed with appropriate timing and monitoring to maintain ecological coherence[30].

2.2.3 Foraging Habitat

A detailed review and assessment of hen harrier foraging habitat requirements in Ireland and at the Proposed Project is provided in EIAR Appendix 6-12 (Hen Harrier Foraging Loss Report) with key findings summarised below.

2.2.3.1 Foraging Requirements for Breeding Hen Harrier

Successful breeding is closely linked to the availability of optimal foraging habitats that support abundant prey such as small mammals and birds[31]. Hen harriers favour areas with sufficient vegetation cover to support prey populations, but not so dense as to hinder prey capture. Typical habitats include moorland, rough grassland, bogs, and rush-dominated pastures with varied sward structure.

2.2.3.2 Assessing Indirect Loss of Hen Harrier Foraging Habitat

Although some studies have reported non-statistical reductions in breeding success within 1 km of wind turbines in Ireland[23], Pearce-Higgins et al. (2009)[32] remains the only study to demonstrate statistically significant displacement effects on foraging hen harriers. As elaborated on in Appendix 6.12 in the EIAR, this research supports the use of a 250 m displacement buffer for assessing habitat loss due to turbine presence in the current Project.

Habitat suitability for foraging hen harrier within the Proposed Project area was evaluated through a combination of literature review and field-based mapping. Details of the mapping are described in the EIAR Biodiversity Chapter.

Habitats currently within 250 m of proposed turbine locations were categorised as either potentially suitable or unsuitable for foraging, with further classification into ‘higher’ and ‘lower’ suitability, with definitions provided in Appendix 6-12 in the accompanying EIAR. Closed-canopy forestry was generally considered unsuitable, while open habitats such as blanket bog and wet grassland were deemed suitable to varying extents.

Initial estimates suggest that 109 ha of currently suitable habitat may be lost due to displacement. When future forestry cycles are considered, acknowledging that some currently unsuitable areas may become suitable over time, the estimated loss increases to an average of 140 ha over the lifetime of the Proposed Project. This figure reflects 76 ha of higher suitability habitat and 64 ha of lower suitability habitat.

Further analysis explored the functional use of these habitats by foraging hen harriers. However, the difference in habitat loss estimates when factoring in functional usage was found to be minimal. Therefore, the habitat suitability-based assessment remains the most robust and precautionary approach.

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[30] European Commission (2012). Guidance document on Article 6(4) of the ‘Habitats Directive’ 92/43/EEC. Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinions of the commission; European Commission (2021). Official Journal C 437/2021; Hoorick, G. (2014). Compensatory measures in European nature conservation law. Utrecht Law Review.

[31] McClure, C. J. W., Westrip, J.R.S., Johnson J. A., Schulwitz, S.E., Virani M.Z., Davies R., Symes A., Wheatley H., Thorstrom R., Amar A. & Buij R., (2018). State of the world's raptors: Distributions, threats, and conservation recommendations. Biological Conservation 227: 390– 402

[32] Pearce-Higgins, J.W., Stephen, L., Langston, R.H.W., Bainbridge, I.P. and Bullman, R. (2009), The distribution of breeding birds around upland wind farms. Journal of Applied Ecology, 46: 1323-1331. https://doi.org/10.1111/j.1365-2664.2009.01715.x

The total effective loss of foraging habitat due to displacement, over the lifetime of the Proposed Project, is estimated at 140 ha. This figure underpins the compensatory measures proposed. Management measures at proposed enhancement lands have been designed to reflect the proportional loss of higher (c.76 ha) and lower (c.64 ha) suitability areas.

2.2.3.3 Foraging Enhancement Lands

To offset the loss of foraging habitats, three peatland / farmland folios totalling 164.25 ha will be enhanced for foraging hen harrier, as shown in Drawing 3, Appendix A. This will offset the loss of 140 ha of foraging habitats over the lifespan of the Proposed Project and could enhance the overall area for foraging hen harrier. These enhancement lands are located within 2 km (and in most cases, they are much closer) of any single NEA, increasing the likelihood of uptake by breeding pairs once NEAs are established (see Section 2.2.4). Additionally, the NEAs themselves will serve as supplementary foraging habitats (see Section 3.4.0 below for further details), further increasing the total area of foraging enhancement lands to 218.4 ha.

Improvement of the habitats selected will increase their suitability for foraging hen harrier and provide a greater quality foraging resource. The overarching goal is to enhance prey availability in the foraging enhancement lands using proven management techniques from the hen harrier project[33], farming organisations[34] and other agri-environmental schemes in Ireland. This approach is aligned with the policy direction of national hen harrier conservation delivery[12], which explicitly recognises that outcomes for hen harrier depend on supporting and incentivising landowners to manage habitat appropriately. The Hen Harrier Project (2017–2023) further demonstrates that, where farmers are supported and incentivised through results-based approaches, measurable habitat improvements can be delivered at scale, providing an evidence-backed model for habitat management as a conservation mechanism for hen harrier and associated upland biodiversity[35].

Importantly, the proposed foraging enhancement habitats will be available for the long term and are not reliant on forestry felling cycles or subject to changing farming practices. This provides a long-term ecological benefit that would not occur if the Proposed Project did not proceed and would enhance habitats for other avian species.

Selection of Foraging Enhancement Lands

The selection of compensatory lands was implemented as follows. First, a desk-based review of available maps and aerial photography was conducted in conjunction with the land agent, project manager and other members of the FEI project team. Second, a habitat mapping exercise was undertaken for areas of potentially suitable land identified during the first stage by Tobin and Bird Surveyors Ltd (overseen by Dr Marc Ruddock) ecologists (full details on survey methodologies and folios surveyed by each survey team are given in Appendix B and Appendix C).

The desk-based exercise focused on identifying lands that are either not currently suitable for foraging hen harrier, such as improved agricultural grasslands or habitat that is suitable for foraging hen harrier but is currently degraded and capable of being enhanced for hen harrier through simple changes in current land management practices as recognised in the Conservation Objectives Supporting Document for Breeding Hen Harrier[36]. Only lands >250

[33] Hen Harrier Project website http://www.henharrierproject.ie/ [last accessed 12 September 2025]

[34] Farming for Nature https://www.farmingfornature.ie/ [last accessed 12 September 2025]

[35] Sullivan and Monaghan (2023). Hen Harrier Project Final Report (2017-2023). Hen Harrier Project Ltd.

[36] NPWS (2022). Conservation Objectives Supporting Document: Breeding Hen Harrier. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

m from any proposed turbine locations and <2 km from NEAs were considered to maximise the chance of usage by breeding hen harrier.

The field surveys involved providing baseline data on habitats to establish the opportunities for habitat and landscape management for foraging hen harrier. Full details of the habitat survey results are given in Appendix B and Appendix C.

Current Land Use within Foraging Enhancement Lands

The proposed foraging enhancement lands are currently predominantly used for agriculture and forestry and are summarised below.

Folio 38 (Drawing 3, Appendix A) in the south was typically associated with agriculture comprising fields that were of uniform sward heights owing to either cattle grazing or grass cutting. Many had evidence of cultivation e.g. slurry spreading. Rush density was typically low. Where wet grasslands were present, rush density was often higher and subject to less intense grazing. Low numbers of hen harrier prey species such as meadow pipits *Anthus pratensis* were present in such grasslands. Many of the associated hedgerows were 'gappy'.

To the north in Folio 28, the habitats typically comprised peatland habitats. In some areas, Sitka spruce *Picea sitchensis* had invaded and evidence of past turf cutting was present. No signs of agricultural management or burning were present. Low intensity grazing by sheep and deer was evident. Displaying prey species such as skylark *Alauda arvensis* and meadow pipits were present throughout.

The largest folio is Folio 13 to the northeast of the Site. This folio is bordered by extensive commercial conifer plantations and includes a mix of habitats. The eastern area consists of semi-improved wet grasslands and poor fen, grazed by cattle and partly used for silage/hay, with unmanaged hedgerows and two streams feeding into the Straduffy River. The western half is upland blanket bog, previously cut for peat and grazed by sheep, with heathland, scrub, and bracken *Pteridium aquilinum* along the river valley. Minor roads provide access throughout. Non-native rhododendron *Rhododendron ponticum*, snowberry *Symphoricarpos albus* and fuchsia *Fuchsia magellanica* are all present.

A breakdown of the size and habitats currently present for each folio is provided below in Table 2-1 with full details provided in Appendix B and Appendix C. The current and potential future suitability of the habitats for foraging hen harrier has been assessed with further explanation on the suitability categorisations given in Appendix 6.12 in the accompanying EIAR. The current habitat suitability categorisation is based both on habitat type and results from the field survey, with habitat features that are sub-optimal highlighted.

In summary, of the total 164.25 ha of foraging enhancement lands, 0 ha, 153.49 ha and 10.76 ha are made up of habitat types that are currently of higher, lower and no suitability for foraging hen harrier.

Following enhancement, there should be 153.49 ha, 1.04 ha and 9.72 ha of habitat types of higher, lower and no suitability for foraging hen harrier.

This will offset c.76 ha and c.64 ha of higher and lower suitability habitat due to be lost due to the Proposed Project, demonstrating that these managed habitats will provide better quality foraging habitat than most of that which will be effectively lost.

Table 2-1: Details of Foraging Enhancement Lands

Folio Number	Fossitt Habitat Type (Code)	Dimensions (area in ha or length in m)	Currently Suitable (Yes / No)	Current Suitability Category (None, Lower, Higher)	Justification for Current Categorisation	Sub-Optimal Habitat Features	Potential to be Suitable in Future Following Enhancement (Yes / No)	Potential Future Suitability (None, Lower, Higher)
28	Conifer plantation (WD4)	6.4 ha	No	None	Closed habitat type	• Closed habitat type	No	None (forestry in this folio is excluded from the OBMP))
	Wet grassland (GS4)	9.18 ha	Yes	Lower	Some level of use	• Sitka spruce invading • Grazing by sheep or deer	Yes	Higher
	Wet heath (HH3)	23.6 ha	Yes	Lower	Preferred habitat type but currently sub-optimal	• Sitka spruce invading • Grazing by sheep or deer • Evidence of past turf cutting	Yes	Higher
	Buildings and artificial surfaces (BL3)	0.15 ha	No	None	Artificial habitat type	• Artificial habitat type	No	None
	Eroding / upland rivers (FW1)	2,341 m	Yes	Lower	Provides habitat for occasional amphibian prey	• None	No	Lower
38	Buildings and artificial surfaces (BL3)	0.64 ha	No	None	Artificial habitat type	• Artificial habitat type	No	None

Folio Number	Fossitt Habitat Type (Code)	Dimensions (area in ha or length in m)	Currently Suitable (Yes / No)	Current Suitability Category (None, Lower, Higher)	Justification for Current Categorisation	Sub-Optimal Habitat Features	Potential to be Suitable in Future Following Enhancement (Yes / No)	Potential Future Suitability (None, Lower, Higher)
	(Mixed) conifer woodland (WD3)	0.08 ha	No	None	Closed habitat type	• Closed habitat type	No	None
	Oak-ash-hazel woodland (WN2)	0.38 ha	No	None	Closed habitat type	• Closed habitat type	No	None
	Scrub (WS1)	2.97 ha	Yes	Lower	Preferred habitat type but currently sub-optimal	• Very dense	Yes	Higher
	Wet grassland (GS4)	14.45 ha	Yes	Lower	Some level of use	• Some areas had soft rush density >70% • Some encroachment of scrub and hedgerow in areas • Poaching from livestock • Grazing by cattle in summer • Leaked animal waste from nearby pig farm	Yes	Higher

Folio Number	Fossitt Habitat Type (Code)	Dimensions (area in ha or length in m)	Currently Suitable (Yes / No)	Current Suitability Category (None, Lower, Higher)	Justification for Current Categorisation	Sub-Optimal Habitat Features	Potential to be Suitable in Future Following Enhancement (Yes / No)	Potential Future Suitability (None, Lower, Higher)
	Treelines (WL2)	613 m	Yes	Lower	Effectively an escaped hedgerow which is a preferred habitat type; not closed canopy	• None	No	None
	Hedgerows (WL1)	1,477 m	Yes	Lower	Preferred habitat type but currently sub-optimal	• Unmanaged and gappy • Some less than 3 m wide • Generally, not stockproof	Yes	Higher
	Drainage ditches (FW4)	99 m	Yes	Lower	Provides habitat for occasional amphibian prey	• None	No	Lower
13	Upland blanket bog (PB2)	14.01 ha	Yes	Lower	Preferred habitat type but currently sub-optimal	• Some self-seeded Sitka spruce and rhododendron invading	Yes	Higher
	Cutover bog (PB4) and mosaics	33.33 ha	Yes	Lower	Some level of use	• Heavily disturbed • Heavily grazed by sheep	Yes	Higher

Folio Number	Fossitt Habitat Type (Code)	Dimensions (area in ha or length in m)	Currently Suitable (Yes / No)	Current Suitability Category (None, Lower, Higher)	Justification for Current Categorisation	Sub-Optimal Habitat Features	Potential to be Suitable in Future Following Enhancement (Yes / No)	Potential Future Suitability (None, Lower, Higher)
						• Low heather and *Sphagnum* moss coverage • Extensive artificial drains present		
	Poor fen and flush (PF2)	2.5 ha	Yes	Lower	Preferred habitat type but currently sub-optimal	• Heavily grazed by sheep in places • Poor variety in sward type	Yes	Higher
	Wet grassland (GS4) and mosaics	46.71 ha	Yes	Lower	Some level of use	• Some areas of lower quality and dominated by soft rushes (>70%) • Low sward height and cover • Homogeneity of sward • Application of fertilisers • Overgrazed by cattle • Vehicle disturbance and soil compaction	Yes	Higher

Folio Number	Fossitt Habitat Type (Code)	Dimensions (area in ha or length in m)	Currently Suitable (Yes / No)	Current Suitability Category (None, Lower, Higher)	Justification for Current Categorisation	Sub-Optimal Habitat Features	Potential to be Suitable in Future Following Enhancement (Yes / No)	Potential Future Suitability (None, Lower, Higher)
						• Invasive fuchsia and snowberry present • Fly tipping and littering • Artificial drains		
	Acid grassland (GS3) and mosaics	2.45 ha	Yes	Lower	Some level of use	• Heavily grazed by sheep	Yes	Higher
	Dry siliceous heath (HH1) and mosaics	1.46 ha	Yes	Lower	Preferred habitat type but currently sub-optimal	• Badly degraded by sheep grazing with damaged heather • Artificial drains	Yes	Higher
	Wet heath (HH3)	2.83 ha	Yes	Lower	Preferred habitat type but currently sub-optimal	• Heavily grazed by sheep • Disturbance by sheep • Heather burning • Degenerate heather • Peat slippage • Self-seeded conifers • Artificial drains	Yes	Higher

Folio Number	Fossitt Habitat Type (Code)	Dimensions (area in ha or length in m)	Currently Suitable (Yes / No)	Current Suitability Category (None, Lower, Higher)	Justification for Current Categorisation	Sub-Optimal Habitat Features	Potential to be Suitable in Future Following Enhancement (Yes / No)	Potential Future Suitability (None, Lower, Higher)
	Dense bracken (HD1) and mosaics	0.12 ha	No	None	Too dense to allow foraging currently	• Too dense to allow foraging • Disturbance and overgrazing by sheep • Self-seeded conifers • Degenerate sward • Artificial drains	Yes	Lower
	Semi-natural woodland (WN)	1.58 ha	No	None	Closed habitat type strongly avoided	• Closed habitat type •	No	None
	Highly modified / non-native woodland (WD) and mosaics	0.63 ha	No	None	Closed habitat type strongly avoided	• Self-seeded conifers • Forestry drains • Closed habitat type • Disturbance from forestry operations • Forestry edge effects	Yes	Lower
	Hedgerows (WL1)	5,616 m	Yes	Lower	Preferred habitat type but	• Generally overgrown and unmanaged	Yes	Higher

Folio Number	Fossitt Habitat Type (Code)	Dimensions (area in ha or length in m)	Currently Suitable (Yes / No)	Current Suitability Category (None, Lower, Higher)	Justification for Current Categorisation	Sub-Optimal Habitat Features	Potential to be Suitable in Future Following Enhancement (Yes / No)	Potential Future Suitability (None, Lower, Higher)
					currently sub-optimal	• Often gappy		
	Treelines (WL2)	928 m	No	None	Tend to avoid mature trees	• Limited in extent and comprised of largely mature trees	No	None
	Eroding / upland rivers (FW1)	4,328 m	Yes	Lower	Provides habitat for occasional amphibian prey	• Many modified	No	Lower
	Drainage ditches (FW4)	6,544 m	Yes	Lower	Provides habitat for occasional amphibian prey	• Many artificial	No	Lower
	Spoil and bare ground (ED2)	0.13 ha	No	None	Unvegetated habitat type	• Lack of vegetation	Yes	Lower
	Recolonising bare ground (ED3)	0.13 ha	No	None	Largely bare habitat type	• Largely bare	Yes	Lower
	Active quarries (ED4)	0.13 ha	No	None	Unvegetated habitat type	• Lack of vegetation	No	None
	Stonewalls and other	110 m	No	None	Artificial, unvegetated habitats	• Artificial habitats • Lack of vegetation	No	None

Folio Number	Fossitt Habitat Type (Code)	Dimensions (area in ha or length in m)	Currently Suitable (Yes / No)	Current Suitability Category (None, Lower, Higher)	Justification for Current Categorisation	Sub-Optimal Habitat Features	Potential to be Suitable in Future Following Enhancement (Yes / No)	Potential Future Suitability (None, Lower, Higher)
	stonework (BL1)							
	Roads and buildings (BL3)	0.36 ha / 2,160 m	No	None	Artificial habitats	• Artificial habitats • Linear post and wire fence feature along road	No	None

2.2.4 Relationship between Nesting and Foraging Habitat

The scientific literature shows that 90% of foraging flights by breeding hen harrier occur within 2 km from nest sites[37,38], with foraging females spending most of their time within 1 km of the nest and hunting males mostly within 2 km of the nest[39]. Therefore, foraging lands have been located within 2 km of at least one of the NEAs (and in practice each NEA has foraging lands adjacent to it) to ensure that they are available and can be used by nesting harriers.

Each NEA can be used for both nesting and foraging, and so each NEA also counts towards the total amount of foraging habitat available to hen harrier. This is because nesting harriers prefer to nest within small patches of scrub surrounded by heath (see Section 2.2.2.1), which are also suitable for foraging (see Section 2.2.3). Any single nesting area will be very small relative to the overall size of each NEA and so use of the NEA by both nesting and foraging birds will not be mutually exclusive. This means the 54.15 ha of land taken up by the NEAs (which will be higher suitability habitat when converted) when combined with the 164.25 ha of foraging enhancement lands will result in a total of 218.4 ha of enhancement lands available for foraging hen harrier. This is greater than a 1:1 ratio of habitat loss: compensatory lands.

Both NEAs and the nearby foraging enhancement lands represent large, continuous blocks of habitats, which will help prevent any negative fragmentation effects from materialising, as described in Section 2.2.2.1.

A turbine-free corridor c.1.2 km wide is present between turbines T13 and T14 and the rest of the array, which is not to be managed for hen harrier but is a consequence of turbine layout that has been dictated by other factors. However, this corridor will allow for passage of foraging hen harrier through the turbine array without being subject to displacement effects or collision risk, which is especially relevant for years where only a single breeding pair is present, as it will help the birds access foraging habitat areas at the other end of the Site.

2.3 Habitats and Secondary Target Species

Appropriate compensation measures to off-set residual effects on IEFs are listed below, including habitats and secondary target species (EIAR Chapter 5 – Biodiversity, Section 5.9):

- Management of 5.4ha of Upland blanket bog (PB2) and Wet heath (HH3) for biodiversity;
- Management of 22.58ha of Wet grassland (GS4) for marsh fritillary;
- Planting of 4.9ha of (Mixed) broadleaved woodland (WD1); and,
- Planting of 1.53km of Hedgerows (WL1)/Treelines (WL2) habitat for biodiversity.

Compensation measures are actions implemented to offset likely significant effects on IEFs associated with development (CIEEM, 2018)[11]. Compensation should aim to achieve ecological equivalence through matching the function, condition and scale of the IEFs that have been lost (CIEEM, 2018)[11]. Compensation ratios of greater than 1:1 ratio of lost to

[37] Arroyo, B.E. Leckie, F., Amar, A., Hamilton, J., McCluskie, A. & Redpath, S. (2005). Habitat use and range management on priority areas for hen harriers: 2004 report. CEH report for SNH.

[38] Arroyo, B.E. Leckie, F., & Redpath, S.M. (2006). Habitat use and range management on priority areas for hen harriers: final report. CEH report for SNH.

[39] Arroyo, B., Amar, A., Leckie, F., Buchanan, G.M., Wilson, J.D. & Redpath, S. 2009. Hunting habitat selection by Hen Harriers on moorland: implications for conservation management. Biological Conservation 142: 586-596.

restored are often recommended to account for uncertainty, especially in restoration, habitat creation, or species translocation (CIEEM, 2018) [11].

2.4 Timings

The overall approach to the programme for this OBMP assumes that no compensation or enhancement works will commence until planning permission is granted. Upon receiving planning permission, a detailed BMP will be produced, which will contain specific management plans or Farm Plans for each landholding.

2.4.1 Hen harrier

In the year prior to construction, NEA works will include felling, baseline surveys and agreement of NEA-specific plans. Habitat establishment then continues through the two-year construction phase. Development and agreement of the Farm Plans will also occur in year prior to construction, but implementation of the Farm Plans will occur at the start of Project construction. The rationale for this is that it will take longer to establish the NEAs than enhancing the foraging lands covered by the Farm Plans, and so a longer lead time is needed. This is because there are multiple actions that will need to occur to establish the NEAs including the felling of forestry, baseline surveys and the establishment of heather and scrub. In contrast, implementation of the Farm Plans will involve actions that generally can be achieved much more quickly and easily.

Works will commence at least 1 years prior to Project operation commencing, with the expectation that it will take c.2 years for Project construction, and the operational lifespan of the Proposed Project will be 35 years.

2.4.2 Habitats and Secondary Target Species

The majority of habitat loss associated with the Proposed Project will take place during the construction phase. Consequently, the compensation measures will be implemented as soon as possible after the issuance of the individual Farm Plans, commencing in the pre-construction phase (Table 3-10).

3.0 Plan Details

As stated previously, this document forms an outline plan and following planning consent, the intention is to develop and agree a detailed BMP with the planning authority and NPWS to address any specific requirements attached to the permission, with specific management plans and farm plans for each landholding contained therein.

3.1 Roles and Responsibilities

The Developer will assume overall responsibility for the implementation of the detailed BMP. The Developer will be responsible for agreed payments to landowners, the appointment and payment of relevant agricultural and ecological specialists, specialist agents / groups, and provision of *inter alia* materials. The Developer or their appointed agents will also be responsible for ensuring compliance with relevant planning conditions and engaging with statutory bodies and advisory agencies as needed.

The agents appointed by the Developer will be responsible for preparing / overseeing the preparation of the specific Farm Plans and any management plans for NEAs forming part of the detailed BMP. The agents / group will also assume responsibility for auditing the land holdings, determining if the measures are achieving the desired results and, where necessary, amending each Farm Plan or NEA management plan to achieve the required results.

The responsibility for implementing the measures will lie with the landowner once the relevant Farm Plan has been prepared and agreed. In the case of the NEAs, the responsibility for implementing the measures lies with the Developer.

3.2 Aims and Objectives

The aims of the OBMP are broadly described here along with more detailed objectives associated with each aim, which illustrate how each aim will be implemented along with the measures of success for each aim, any monitoring and remedial actions required and the indicative programme to achieve each aim and objective.

3.2.1 Aim 1: Management of lands for nesting hen harrier

The creation and management of two NEAs will involve the removal of 54.15 ha of conifer plantation, the restoration of heath and scrub habitats and their ongoing management.

The specific objectives under Aim 1 seek to align with conservation goals and address specific needs of hen harrier and their preferred nesting habitats.

3.2.1.1 Objective 1.1: Establishment and Management of NEAs

The suite of management measures proposed for the NEAs have been developed using the measures applied in the hen harrier project[40], literature on the ecology of the species, UK

[40] Hen Harrier Project website http://www.henharrierproject.ie/ [last accessed 15 September 2025]

and Irish heathland restoration guidelines[41,42,43,44], and experience of the ecologists working on the Proposed Project. The suite of management measures that will be implemented have been tried and tested on other schemes in the UK and Ireland[45]. Baseline surveys carried out post-felling will be used to further develop the targeted habitat management measures.

The proposed management measures outlined below are management prescriptions that are routinely used by a variety of community, conservation and development projects across Ireland and the UK to convert conifer plantation to heathland.

Targets

Minimum targets for success include:

- Creation of two NEAs for hen harrier.
- Maintenance of two NEAs for hen harrier over the lifespan of the Proposed Project.
- Compliance with NEA management plans.

Establishment Actions

Establishment actions to be implemented will include, but are not limited to, the following:

a) Felling conifer plantation

- The first step in establishing the NEAs will be to remove the existing low-yield forestry coupes so that they can be converted into mosaics of heather and scrub suitable for hen harrier nesting.
- All felling will be carefully timed to avoid disturbing any breeding birds; felling will not occur if any birds of conservation concern are present during the breeding bird season of April to August and are liable to be disturbed by felling works. However, if surveys confirm that the works ware unlikely to cause to disturbance, they may proceed during this period.
- Some scattered trees or deadwood may be retained where appropriate, as these can provide perching opportunities for birds, but care will be taken to ensure that they do not create vantage points for predators such as crows.
- Brash will either be removed from the site or carefully piled to avoid excessive nutrient enrichment of soils, which could otherwise suppress heather and scrub regeneration.

[41] NatureScot. Peatland ACTION – Technical Compendium – Restoration – 8 Forest to bog restoration. https://www.nature.scot/doc/peatland-action-technical-compendium-restoration-8-forest-bog-restoration [last accessed September 2025]

[42] Forestry Commission. Forests and Peatland Habitats (Guideline Note). https://www.forestry.gov.scot/edocman/forests-and-peatland-habitats.pdf [last accessed September 2025]

[43] IUCN. (2024). Forest to Bog Restoration – Demonstrating Success' https://www.iucn-uk-peatlandprogramme.org/sites/default/files/2024-03/Demonstrating%20Success%20Forest%20to%20Bog_small.pdf [last accessed September 2025]

[44] Natural England. (1992). The Lowland Heathland Management Handbook. https://publications.naturalengland.org.uk/publication/2267376#:~:text=This%20record%20was%20published%20by%20Natural%20England%20on,lowland%20heathlands%20where%20the%20primary%20objective%20is%20conservation. [last accessed September 2025]

[45] LIFE Raised Bog Restoration. https://www.raisedbogs.ie/ [last accessed September 2025]

b) Baseline survey

- Ecological specialists will commence survey work of the NEAs post-felling of conifer plantation, which will include, as a minimum, the following:
    - Survey and classification of habitats present within each landholding, as well as vegetation types within the same. Habitat classification will follow '*A Guide to Habitats in Ireland*'[46]; and
    - Survey and classification of soils, and consideration of topography, drainage and access within each landholding.
- The baseline survey results will be used to prepare a Management Plan specific to each NEA area, which will form part of one overall detailed BMP. These surveys will assist in identifying the optimal land management programme to establish and manage the NEAs for nesting hen harrier. Each NEA Management Plan will set out specific measures for each NEA to achieve the optimum results for nesting hen harrier such as:
    - Methods of heather establishment;
    - Methods of creating and maintaining the appropriate habitat structure (e.g. heath and scrub mosaic); and
    - Setting specific targets / outcomes that will be audited in line with a set schedule.

c) Habitat creation: heath and scrub mosaic

- Following felling, the land will be restored to a heath and scrub mosaic. This is expected to be successful given that the native habitats in the wider area are predominantly peat habitats that contain heather, suggesting that the underlying soil type and pH is suitable for heather establishment. There are also numerous case studies and guidance documents demonstrating conifer habitats being successfully converted to heathland habitats[43].
- Where a viable heather seedbank exists, natural regeneration will be encouraged. It is likely that a natural seedbank exists for the northern NEA given the presence of peat habitats containing heather immediately adjacent to the NEA itself (see EIAR Chapter 5 for further details). It is less clear that this is the case for the southern NEA, as fewer peat habitats are located immediately nearby.
- In areas where the seedbank has been lost, which could be the case for the southern NEA, brush-harvested heather seed may be collected from nearby heathland and spread onto bare ground or cutover peat if possible.
- Alternatively, bought seed or cut heather brash from a nearby site may be used.
- Scarification or light soil disturbance will be used, where possible and where necessary, to expose mineral or peat surfaces to encourage germination.
- Hydrological restoration will also form part of habitat creation, where appropriate, with drains blocked to re-wet peat soils and support *Sphagnum* moss growth alongside heather, although care would be taken to avoid potentially suitable nesting areas from becoming too wet to support nesting hen harrier.
- Any habitat creation works will be timed to avoid disturbing hen harrier or other bird species of conservation interest during the breeding season of April – August.

[46] Fossitt (2000). A Guide to Habitats in Ireland. The Heritage Council.

However, if surveys confirm that the works are unlikely to cause disturbance, they may proceed during this period.

d) Habitat structure for hen harrier nesting

- Once initial heather and scrub establishment has taken place, the restored NEAs will be managed to create a mosaic of vegetation types, maintaining heather of different heights alongside open bog and scattered scrub. This will be implemented via targeted cutting and potentially winter grazing.
- Tall heather (over 30–40 cm) will be maintained in areas away from forestry edges to provide secure nesting cover for hen harrier.
- In contrast, shorter heather and grassland will be maintained near nesting patches to support foraging.
- Any habitat structuring works will be timed to avoid disturbing hen harrier or other bird species of conservation interest during the breeding season of April – August. However, if surveys confirm that the works are unlikely to cause disturbance, they may proceed during this period.

Monitoring and Remedial Actions

Although the conversion of conifer plantation to heath and scrub mosaic is a well-established and frequently successful restoration method in the UK and Ireland, several ecological and practical challenges may arise during implementation. Awareness of these potential pitfalls enhances the robustness of the management framework and ensures appropriate remedial measures can be deployed if required.

Potential Pitfall 1: Slow or Patchy Heather Establishment

Post-felling sites may exhibit slow or uneven heather regeneration, especially where the historic heathland seedbank has been depleted or where conifer canopy cover limited dwarf shrub persistence.

Potential Pitfall 2: Excessive Nutrient Enrichment from Brash and Litter

Nutrient pulses from decomposing brash and forestry residues can favour competitive grasses (e.g. *Molinia, Agrostis*) over dwarf shrubs, thereby suppressing heath regeneration.

Potential Pitfall 3: Regeneration of Conifers and Invasive Scrub

Self-seeding conifer regeneration is common after felling and can rapidly reverse progress if not controlled. Invasive or over-dominant scrub species (e.g. gorse, birch) may also colonise newly exposed soils before heather becomes established.

Potential Pitfall 4: Hydrological Instability After Felling

Legacy drains may continue to dry peat soils, inhibiting heath development, while over-blocking can lead to localised waterlogging. Both hydrological extremes can reduce the suitability of the developing habitat.

Potential Pitfall 5: Soil Compaction or Erosion Following Timber Extraction

Ground compaction from forestry machinery or exposure of bare peat can hinder heather establishment and increase erosion risk on sloped areas.

Potential Pitfall 6: Risk of Fire During Early Establishment

Newly opened habitats can be more vulnerable to fire until vegetation structure matures. Restoration programmes in upland and lowland heath have highlighted the increased fire risk associated with early-stage heather development where dry material accumulates.

Monitoring and remedial actions that will be implemented (if required) include:

- Monitoring will be undertaken regularly to check for regenerating conifers, which will be removed promptly wherever possible, and to ensure that scrub levels remain balanced, providing nesting opportunities without closing the habitat.
- Routine site monitoring will also assess vegetation condition, fire risk, and the overall suitability of the habitat for nesting hen harrier (see Section 3.3 for further details).
- The long-term success of the NEAs will depend on active management throughout the lifespan of the Proposed Project. The results of monitoring will guide adaptive management actions allowing the NEAs to be maintained as high-quality nesting habitat over the full operational life of the wind farm.
- Where heather regeneration is slow or uneven, additional measures could include brush-harvested seed from nearby donor sites, spreading cut heather brash to provide seed and microclimate benefits and carrying out targeted scarification to expose mineral or peat surfaces to stimulate germination.
- Supplementary livestock feeding will not be permitted within or adjacent to heather areas or watercourses, as this can cause poaching, nutrient enrichment, and invasive plant spread. Additional nutrient management interventions could include additional brash removal or raking of any enriched topsoil patches, and/or the use of directed seasonal grazing to suppress competitive grasses.
- If monitoring reveals over-wetting or drying, peat dams may be installed, existing dams adjusted, or shallow relief channels cut to stabilise conditions.
- Fire prevention will be addressed by reducing purple moor grass dominance through use of appropriate machines where required. Additional fire protection will be provided by establishing firebreaks, particularly if fire risk increases due to dry vegetation or climatic conditions.
- Native scrub species such as willow *Salix* spp. and bog myrtle *Myrica gale* will be retained and encouraged, while invasive or over-dominant scrub, particularly gorse, will be controlled through flailing. Stump or root treatments may be implemented to control invasive conifers where regrowth persists.
- Any remedial works will be timed to avoid disturbing hen harrier or other bird species of conservation interest during the breeding season of April – August. However, if surveys confirm that the works are unlikely to cause disturbance, they may proceed during this period.

Programme

The indicative programme to achieve Objective 1.1 is given in Table 3-1.

Table 3-1: Indicative Management and Monitoring Programme for Objective 1.1

Summary Action	Timescale Relative to Planning Consent
Fell conifers	Year 3
Baseline survey of NEAs post-felling of conifers and development of specific management plans for each NEA	To be conducted following felling of conifers in Year 3
Habitat creation: heath and scrub	To be commenced following baseline survey and development of specific management plans for each NEA landholding in Year 4

Summary Action	Timescale Relative to Planning Consent
Habitat structuring for nesting hen harrier	Upon establishment of heather i.e. years 4-5
Monitoring (condition assessment of habitats in NEAs) / Reporting	Years 4 to 8 and then every 5 years thereafter for the lifespan of the Proposed Project
Remedial actions (invasive / problematic native plant control and scrub control)	As required

3.2.2 Aim 2: Management of lands to improve suitability for foraging hen harrier

The enhancement of lands for foraging hen harrier will involve management actions to be implemented at 164.25 ha of agricultural, peatland and woodland habitats. Of this total, c. 86.37 ha comprises of agricultural lands / wooded habitats and the other 77.85 ha comprises of peatlands.

The specific objectives under this Aim seek to align with conservation goals and address the specific needs of hen harrier and their preferred foraging habitats.

3.2.2.1 Objective 2.1: Management of Agricultural Lands

The suite of management measures proposed for the agricultural lands have been developed using the measures applied in the hen harrier project, literature on the ecology of the species and experience of the ecologists working on the wind farm project. The suite of management measures that will be implemented have been tried and tested by the hen harrier project[40], farming organisations[47] 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 legal agreements for the 164.25 ha of offset lands will be for the lifetime of the wind farm once operational plus an additional 2 years from commencement of construction. The Landowner participation is secured through legal agreement for the management of their lands for biodiversity.

The suite of standard management measures is contained in the legal agreements that the landowners have committed to.

Targets

Minimum targets for success include:

- 86.37 ha of agricultural land to be enhanced for foraging hen harrier.
- Of this 86.37-ha total, at least 75.76 ha of land to comprise higher suitability habitat and 0.89 ha of lower suitability habitat following enhancement.
- Compliance with Farm Plans.

Establishment Actions

Establishment actions to be implemented include, but are not limited to, the following:

[47] Farming for Nature https://www.farmingfornature.ie/ [last accessed 15 September 2025]

a) Grazing Regime

- Livestock management plays an important role in maintaining habitats that are beneficial for hen harrier. When livestock grazing is carefully controlled, it helps to create a varied landscape with patches of open ground and areas of low, native vegetation, which are ideal for hen harriers to hunt. Overgrazing, however, can degrade vegetation cover and reduce the abundance of prey species, so balancing livestock density ensures that habitats remain rich in biodiversity. This balanced approach encourages the presence of small mammals, birds, and invertebrates that hen harrier relies on for food.
- The hen harrier project field guidance states[48] "*Sward structure is an important contributor to both prey numbers and prey accessibility. Rush tussocks create foraging and nesting opportunities for small rodents along with Meadow Pipits and other ground nesting birds. Sward structure responds well to management and significant progress can be made in a single growing season*." The overall aim of the grassland management will be to create foraging and nesting opportunities for hen harrier prey species through changes to the grazing regime by changes to the length of time lands are grazed, and reduction or increase in stocking density as deemed appropriate to develop and / or enhance foraging habitat for hen harrier. The specific detail of the grazing regime will be developed on a land holding by land holding basis and provided in relevant Farm Plans.
- The grazing management may also help increase potential for marsh fritillary *Euphydryas aurina* in wet grasslands with abundant devil's bit scabious *Succissa pratensis* (Section 3.2.3.2).

b) Rush Management

- The structure of the sward, as described earlier, is important to the successful provision of optimal foraging habitat for hen harrier. Sward structure must include a mix of vegetation heights and while rush tussocks are a desirable part of the sward, they must not make up more than 70% of the sward at most[48].
- As a rule of thumb, rush management will not be carried out during the period 1 March – 31 August inclusive to avoid disturbance and mortality or injury of ground nesting bird species and other wildlife.
- The management of rushes cannot be carried out using chemicals such as glyphosate.
- Mechanical control may therefore be required from time to time to prevent rush cover becoming excessive. Where mechanical control is to be undertaken, the rush cutting regime will be specified in the Farm Plan.

c) Delayed Topping / Mowing

- The availability of tussocky rushes and multi- layered swards is key to supporting the prey species of birds and small mammals favoured by hen harrier. However, individual landholdings may be allowed, as specified in each Farm Plan, to top or mow grasslands during the period referenced above. Any such allowance / deviation would be written into the relevant Farm Plan and closely monitored.

[48] Hen Harrier Programme Field Guidance for scoring Species Rich Grassland Ver. 2 June 2021 http://www.henharrierproject.ie/HHPSRGGuidance.pdf [last accessed 15 September 2025]

- As a rule of thumb, topping or mowing will not be carried out during the period 1 March – 31 August inclusive to avoid disturbance and mortality or injury of ground nesting bird species and other wildlife.

d) Hedgerow Establishment and Management

- The hen harrier project supporting actions states "*Hen harrier show strong preferences for foraging along intact, dense structured hedgerows between 3 and 4 metres wide. Supporting actions on farm plans therefore should establish and restore hedgerows to these ideal specifications*."
- The Farm Plan for each landholding will therefore include establishment and enhancement of hedgerows in appropriate locations through additional planting (gapping up) of hedgerows with native species to encourage dense growth.
- Where available, native hedgerow species will be of local provenance and where appropriate, a buffer strip along hedgerows will be retained and sown with wild bird cover crops to provide additional foraging habitat. The cover crop will provide cover for small mammals and birds and attract invertebrates.
- Management of hedgerows using low impact mechanical means will be limited to a minimum of every 3 years and with the exact rotation period for each landholding specified in the relevant Farm Plan. Fencing of hedgerows may be required to protect them from livestock.
- Control and removal of invasive and non-native invasive species (INSS) present within hedgerows will be implemented (Section 3.2.3.1).

e) Scrub Development

- Scrub is a valuable habitat for hen harrier and many of their prey species. Hen harrier will hunt along the edges of scrub and allowing scrub at suitable locations will increase suitable foraging habitat and may also provide roosting opportunities.
- Scrub encroachment into grasslands will be discouraged through the continued use of grazing animals or by use of mechanical means if specified in the relevant Farm Plan.
- The locations for any desired scrub expansion will be agreed with the landowner and set out in the relevant Farm Plan.

f) Reduction / Cessation of Fertiliser Application

- The requirements for reduction or cessation of the application of fertilisers will be determined by soil testing and surveys carried out by the agricultural advisor to inform each individual farm plan.
- The aim of this measure would be to increase the species and structure diversity of the grassland sward through reduced nitrate application.
- This measure would also assist in meeting the requirements of the Nitrates Directive and improve the quality of surface water run-off to streams and drains locally.

Monitoring and Remedial Actions

Although management of farm habitats for foraging hen harrier is well-established in Ireland, several ecological and practical challenges may arise during implementation. Awareness of these potential pitfalls enhances the robustness of the management framework and ensures appropriate remedial measures can be deployed if required.

Potential Pitfall 1: Incorrect or Inconsistent Grazing Levels

Both over-grazing and under-grazing are common causes of management failure in agricultural habitats. Over-grazing reduces vegetation height, eliminates tussocks and cover for small mammals/birds, and reduces invertebrate abundance. Under-grazing results in dense rank grassland (particularly *Molinia* or *Agrostis*), inhibiting prey accessibility for hen harrier.

Potential Pitfall 2: Excessive Rush Encroachment

Rushes (*Juncus* spp) are valuable in moderation but >70% cover typically results in reduced prey accessibility for hen harrier.

Potential Pitfall 3: Nutrient Enrichment from Fertilisers or Livestock

Nutrient pulses can cause conversion of diverse swards into uniform ryegrass or *Molinia* stands, resulting in reduction in tussock variability and thus species richness of hen harrier prey habitats.

Potential Pitfall 4: Poorly Timed Cutting or Tipping

If cutting occurs too early, it eliminates prey nests / cover and reduces structural heterogeneity. If it occurs too late, it allows coarse grasses to dominate and collapse, forming thatch. Both issues can hinder foraging hen harrier.

Potential Pitfall 5: Hedgerow Declines or Structural Failure

Hedgerows are critical for foraging hen harrier and gaps, over-trimming, excessive grazing pressures and INNS invasion can reduce structural density and prey availability.

Potential Pitfall 6: Excessive or Uncontrolled Scrub Spread

Scrub is beneficial in patches but if unmanaged can close in grasslands, reduce open-foraging zones and displace vegetation preferred by small mammals that are hen harrier prey.

Potential Pitfall 7: Soil Compaction / Poaching

Livestock pressure on wet soils may destroy tussock structure, increase bare ground or puddling and reduce plant diversity which may negatively affect hen harrier prey species.

Monitoring and remedial actions that will be implemented, if required, include:

- Monitoring will be undertaken regularly to check for compliance with the establishment actions outlined in each respective Farm Plan (see Section 3.3 for further details).
- Any management prescriptions will be amended, if required, depending on the monitoring results.
- Any remedial works will be timed to avoid disturbing hen harrier or other bird species of conservation interest during the breeding season of April – August. However, if surveys confirm that the works are unlikely to cause disturbance, they may proceed during this period.

Programme

The indicative programme to achieve Objective 2.1 is given in Table 3-2.

Table 3-2: Indicative Management and Monitoring Programme for Objective 2.1

Summary Action	Timescale Relative to Planning Consent
Development and agreement of Farm Plans	Year 3

Summary Action	Timescale Relative to Planning Consent
Grazing management, rush management, delayed topping / mowing / hedgerow establishment and management, scrub development and fertiliser management	From the commencement of construction (Year 4), and then every year for the lifespan of the Proposed Project
Monitoring (compliance checks for Farm Plans) / Reporting	Every year for the lifespan of the Proposed Project: years 5-8 specialist site visits to be conducted per year, then after year 8, annual landowner self-reporting supported by formal team inspections every 3 years
Remedial actions (similar to establishment actions)	As required; formal team inspections would be reinstated if landowner self-reporting found to be unsatisfactory

3.2.2.2 Objective 2.2: Management of Peatland Habitats

The management measures proposed for peatland habitats were developed in the same way as described in Section 3.2.2.1 above. Approximately 77.85 ha of peatland habitats will be managed for the benefit of foraging hen harrier. Of these, c. 49.52 ha forms part of Dough/Thur Mountains NHA (Folio 13).

The site synopsis for Dough/Thur Mountains NHA[49] states that habitat loss and damage to the hydrological condition of the NHA are due to sheep grazing and machine cutting of peat within the NHA, as well as extensive conifer afforestation, peat cutting and grazing nearby. The management of peatlands within Folio 13 for hen harrier will help improve the condition of habitats within the NHA also. Liaison with National Parks & Wildlife Service (NPWS) will be undertaken at the stage of preparing the detailed BMP.

Targets

Minimum targets for success include:

- At least 77.85 ha of land to be enhanced for foraging hen harrier.
- Of this 77.85-ha total, at least 77.73 ha of land to comprise higher suitability habitat and 0.12 ha of lower suitability habitat following enhancement.
- Compliance with Farm Plans.

Establishment Actions

The establishment actions to be implemented include, but are not limited to, the following:

a) Heather Management

- Winter grazing will be avoided across peatland restoration areas to prevent poaching, compaction and damage to young heather and *Sphagnum* regeneration.
- Light summer grazing by cattle will be used selectively to reduce the dominance of purple moor grass and to encourage a structurally diverse sward that benefits small mammals and passerine prey species.

[49] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002384.pdf [last accessed September 2025]

- Any grazing prescriptions (stock type, timing, intensity and paddock rotation) will be specified in the Farm Plan for each holding based on guidance from Teagasc[50], the Irish Hen Harrier Project[35] and the Scottish Government[51].
- Burning will be prohibited as a routine management action; where vegetation control is required and cannot be undertaken by grazing, mechanical measures (e.g. flail mowing) will be considered only where ecologically justified

b) Scrub Management

- Existing native scrub such as willow and bog myrtle will be retained and encouraged in discrete patches to provide structural diversity and roosting opportunities.
- Management will prevent scrub from developing into continuous closed canopy that would reduce open bog/heath habitat. Gorse and other species that threaten to dominate open peatland will be controlled sensitively, favouring hand-cutting and removal rather than wholesale clearance, and any clearance will be staged to maintain cover for wildlife. Where appropriate, small areas will be allowed to succeed towards bog woodland to increase habitat heterogeneity, subject to site-specific assessment.

c) Soil and Peat Management

- Measures to protect peat and soil structure will include minimising vehicular access, reducing winter stocking densities on vulnerable ground, and relocating any necessary supplementary feeding away from fragile, wet peat areas and watercourses.
- Stock types will be adjusted where necessary (for example, favouring lighter stock) to reduce poaching and erosion.
- The establishment of vegetation cover on bare peat (e.g. by encouraging heather and *Sphagnum* recolonisation) will be prioritised to reduce erosion risk; in severely eroded areas, temporary stabilisation (for example, coir rolls or geotextile where appropriate) may be used under ecological supervision

d) Hydrological Management

- Restoration of natural peatland hydrology is a core action and will be achieved primarily through blocking or damming drainage ditches, ceasing maintenance of artificial drains, and avoiding the creation of new drains.
- Peat dams, bunds or other low-impact blocking techniques will be used to raise water tables and rewet peat where appropriate, with works prioritised in shallow peat and purple moor grass dominated areas to encourage *Sphagnum* recovery and heather regeneration.
- Hydrological interventions will be designed and monitored to avoid unintended downstream impacts and to protect sensitive watercourses.

[50] Kelly, K. (2022). *Conservation Grazing in the Uplands.* Munster Technological University / Teagasc Signpost Series. https://inrbs.ie/conservation-grazing/

[51] Scottish Government (2015). *Supporting Guidance for Heather Restoration.* Agri-Environment Climate Scheme (AECS). https://www.ruralpayments.org/topics/all-schemes/agri-environment-climate-scheme/management-options-and-capital-items/heather-restoration/guidance-for-heather-restoration/

e) Control of Negative Indicators and Invasive Species

- Applications of fertiliser and manure will be avoided on areas targeted for peatland restoration to reduce nutrient enrichment and encourage a naturally diverse bog flora.
- Management of grazing timing and intensity will be used to reduce spread of weedy species.
- Where invasive non-native species (e.g. rhododendron, self-seeded conifers) are present, removal will be undertaken using the least damaging techniques practicable e.g. targeted cutting, pulling, or herbicide injection by specialists where necessary and lawful, and will be followed by habitat recovery measures to prevent re-invasion (EIAR Chapter 5 – Biodiversity, Appendix 5-8).

f) Fire and Fuel Load Management

- Uncontrolled burning is a major threat to peatland biodiversity and carbon stores and will be avoided.
- Fuel load reduction will be achieved by controlling purple moor grass through summer grazing or, where required, flail-mowing in carefully targeted strips

g) Turbary (Peat Cutting)

- New peat-cutting operations will be avoided in peatland management areas; existing cutover areas will be prioritised for rehabilitation.
- Old cut areas will be stabilised and rehabilitated by drain blocking, re-vegetation where required, and stock exclusion until natural recovery progresses.

h) Supplementary Feeding

- Supplementary feeding will be minimised and located away from sensitive peatland and watercourse margins to avoid nutrient enrichment, poaching and concentration of stock that damage vegetation.
- Where supplementary feeding is necessary, concentrates rather than bulky, wet feed will be preferred, and feeding sites will be rotated.
- All feeding locations and timings will be agreed and written into the relevant Farm Plan.

i) Bracken Control

- Bracken control will be targeted to locations where it is actively suppressing heather or preventing recovery of characteristic peatland vegetation.
- Control methods will be selected to avoid excessive soil disturbance or erosion and will focus on sites judged to have a good potential for recovery; specialist advice will be sought before any large-scale bracken removal.

j) Other Damaging Activities

- Dumping, unauthorised use of machinery, creation of new tracks, and recreational activities that cause erosion or disturbance will be prohibited within peatland restoration areas.
- Vehicle access will be minimised and controlled, and landowners will be required under the agreements to prevent damaging activities.

Monitoring and Remedial Actions

Although management of farm habitats for foraging hen harrier is well-established in Ireland, several ecological and practical challenges may arise during implementation. Awareness of these potential pitfalls enhances the robustness of the management framework and ensures appropriate remedial measures can be deployed if required.

Pitfall 1: Hydrological Instability

Peatlands are highly sensitive to hydrological change. If drains continue to function, peat dries, *Molinia* dominates and heather dies back. If blocking is excessive, waterlogging reduces hen harrier prey diversity and destabilises surface peat.

Pitfall 2: Molinia Dominance

Molinia often becomes dominant after past grazing pressure or drainage. It can form dense monocultures limiting movement of small mammals, invertebrate abundance, and accessibility for hen harrier foraging.

Pitfall 3: Excess Scrub and Gorse Encroachment

When scrub or gorse dominates the habitat becomes structurally unsuitable, the prey base changes and vegetation become more fire prone, all of which could negatively affect foraging hen harrier.

Pitfall 4: Soil / Peat Damage from Livestock

Poaching, rutting and compaction can create bare peat vulnerable to erosion and reducing suitability for foraging hen harrier by removing habitats for prey species.

Pitfall 5: Nutrient Enrichment

If uncontrolled, enrichment shifts peatland composition towards grassland degraded states, which limits hen harrier foraging by removing habitats for prey species.

Pitfall 6: Bracken and Self-Seeded Conifer Spread

Bracken and conifers may self-spread and colonise the peatland habitats, which if uncontrolled, could limit hen harrier foraging through removal of habitats for prey species.

Pitfall 7: Fire Risk and Fuel Load Accumulation

Peatlands with unmanaged *Molinia* or gorse are highly flammable and fires could reduce hen harrier foraging opportunities by removing habitats for prey species.

Monitoring and remedial actions that will be implemented include:

- Monitoring will be undertaken regularly to check for compliance with the establishment actions outlined in each respective Farm Plan (see Section 3.3 for further details).
- Management prescriptions will be adjusted, if required, depending on the monitoring results.
- Any remedial works will be timed to avoid disturbing hen harrier or other bird species of conservation interest during the breeding season of April – August. However, if surveys confirm that the works are unlikely to cause disturbance, they may proceed during this period.

Programme

The indicative programme to achieve Objective 2.2 is given in Table 3-3.

Table 3-3: Indicative Management and Monitoring Programme for Objective 2.2

Summary Action	Timescale Relative to Planning Consent
Development and agreement of Farm Plans / Liaison with NPWS	Year 3
Management of heather, scrub, soil/peat, hydrological, invasive species, fire, turbary, supplementary, bracken and other damaging activities	From the commencement of construction (Year 4), and then every year for the lifespan of the Proposed Project
Monitoring (compliance checks for Farm Plans) / Reporting	Every year for the lifespan of the Proposed Project: years 5-8 specialist site visits to be conducted per year, then after year 8, annual landowner self-reporting supported by formal team inspections every 3 years
Remedial actions (similar to establishment actions)	As required; formal team inspections would be reinstated if landowner self-reporting found to be unsatisfactory

3.2.2.3 Objective 2.3: Management of Disturbance

Human-related disturbance can affect foraging and breeding hen harrier through displacement and has potentially negative consequences for long-term population persistence or recovery. Disturbance reduces nest attendance and increases predation risk, influenced by factors like nest visibility, predator proximity, and food availability[52]. Birds leaving nests to find food can leave them unguarded[53]. Disruptions from roads, trails, tracks, buildings, burning, can lead to habitat loss and increased predator access.

Management of disturbance helps create a more stable and secure environment where hen harriers can nest, hunt, and rear their young with minimal stress. Reducing disturbance around nesting sites decreases the likelihood of nest abandonment, ensuring that chicks have a higher chance of survival.

This management also encourages other wildlife to inhabit the area, supporting broader biodiversity that enhances the ecological balance of the hen harrier's habitat. In summary, disturbance management not only directly benefits hen harriers by providing safer, quieter spaces for essential behaviours but also promotes a healthier ecosystem, which sustains a resilient and productive habitat for these birds and other wildlife.

Targets

Minimum targets for success include:

- Enforcement of buffer zones during the hen harrier nesting season where required.
- Compliance with disturbance restrictions written into Farm Plans.

[52] Ruddock, M. & Whitfield, D.P. (2007). A review of disturbance distances in selected bird species. Report from Natural Research (Projects) Ltd to Scottish Natural Heritage. Natural Research, Banchory, UK

[53] Caravaggi, A., Irwin, S., Lusby, J., Ruddock, M., Mee, A., Nagle, T., O'Toole, L., O'Neill, S. & O'Halloran, J., (2019). Anthropogenic pressures within the breeding range of the Hen Harrier *Circus cyaneus i*n Ireland. Bird Study 66: 461-470

Establishment Actions

The establishment actions to be implemented will include, but are not limited to, the following:

- Restricting forestry operations within 750 m of each NEA during the hen harrier breeding season (April to August inclusive) or within 750 m of active nests within the NEA (if nest locations are known).
- Implementing training for forestry contractors operating near NEAs on hen harrier protection protocols such as buffer zones.
- Limiting recreational activities within NEAs via fencing, signage and any other mechanisms available.
- Limiting recreational activities within foraging enhancement lands, which will be agreed and written into the relevant Farm Plans.

Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented include:

- Monitoring will be undertaken regularly (see Section 3.3 for further details) to check for compliance with the establishment actions outlined in each respective Farm Plan and NEA Management Plan.
- Management prescriptions will be adjusted if required depending on the monitoring results.
- Any remedial works will be timed to avoid disturbing hen harrier or other bird species of conservation interest during the breeding season of April – August. However, if surveys confirm that the works are unlikely to cause disturbance, they may proceed during this period.

Programme

The indicative programme to achieve Objective 2.3 is given in Table 3-4.

Table 3-4: Indicative Management and Monitoring Programme for Objective 2.4

Summary Action	Timescale Relative to Planning Consent
Development and agreement of Farm Plans	Year 3
Training forestry operatives on hen harrier protection protocols to avoid disturbance	Year 3
Restricting forestry operations / limiting recreational activities within buffer zones	Every year for the lifespan of the Proposed Project from year 4 onwards
Monitoring (compliance checks for Farm Plans / NEA Management Plans) / Reporting	For NEAs, years 4 to 8 and then every 5 years thereafter for the lifespan of the Proposed Project. For Farm Plans, years 5-8 specialist site visits to be conducted per year, then after year 3, annual landowner self-reporting supported by formal team inspections every 3 years

Summary Action	Timescale Relative to Planning Consent
Remedial actions	As required; for Farm Plans, formal team inspections would be reinstated if landowner self-reporting found to be unsatisfactory

3.2.3 Aim 3: Management of lands for habitats and secondary target species

Appropriate compensation measures to off-set residual effects on IEFs are listed below, including habitats and secondary target species (EIAR Chapter 5 – Biodiversity, Section 5.9):

- Management of 5.4ha of Upland blanket bog (PB2) and Wet heath (HH3) for biodiversity;
- Management of 2ha of Wet grassland (GS4) for marsh fritillary;
- Planting of 1.5km of Hedgerows (WL1)/Treelines (WL2) habitat for biodiversity; and
- Planting of 4.9ha of (Mixed) broadleaved woodland (WD1) to compensate for the loss of bat foraging habitat within the proposed Wind Farm Site and for the loss of habitat along the Turbine Delivery Route (TDR).

3.2.3.1 Objective 3.1: Restore Upland Habitats

A total of 5.43 ha of Upland blanket bog (PB2) and Wet heath (HH3) will be managed to compensate for the loss of upland habitats as a result of the Proposed Project.

Targets

Minimum targets for success are defined by the Annex I habitat condition assessments for upland habitats and are summarised below[54]:

- Annex I habitat type 7130* Blanket bog (active):
    - Positive indicator species ≥ 7 (Appendix VI)
    - Bryophyte/lichen cover (excluding Sphagnum fallax) ≥ 10
    - Cover of *Calluna vulgaris, Eleocharis multicaulis, Eriophorum vaginatum, Molinia caerulea, Schoenus nigricans* and *Trichophorum germanicum* individually < 75%
    - Negative indicator species (*Agrostis capillaris, Holcus lanatus, Phragmites australis, Pteridium aquilinum, Ranunculus repens*) collectively < 1%
    - Non-native species cover < 1%
    - Scattered native trees and scrub cover < 10%
    - Damaged Sphagnum < 10% of total *Sphagnum* cover
    - Browsed shoots of ericoids < 33%

[54] Perrin, P.M., Barron, S.J., Roche, J.R. & O'Hanrahan, B. (2014) Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland. Irish Wildlife Manuals No. 79, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Available at: https://www.npws.ie/sites/default/files/publications/pdf/IWM79.pdf [accessed: 28/01/2026].

  - No burning impacts on moss/lichen layer or peat exposure
  - No burning within sensitive area boundaries
  - Disturbed bare ground < 10%
  - Drainage impacts (trampling, tracking, ditches, peat cutting) < 10%
  - Erosion gullies and eroded areas < 5% of bog mosaic

Positive indicator species for the Annex I habitat type consist of:

Bog rosemary *Andromeda polifolia*, Breutelia moss *Breutelia chrysocoma*, heather *Calluna vulgaris*, Bigelow's sedge *Carex bigelowii*, liverwort *Diplophyllum albicans*, sundews *Drosera spp.*, crowberry *Empetrum nigrum*, cross-leaved heath *Erica tetralix*, common cotton-grass *Eriophorum angustifolium*, hare's-tail cotton-grass *Eriophorum vaginatum*, bogbean *Menyanthes trifoliata*, bog myrtle *Myrica gale*, bog asphodel *Narthecium ossifragum*, non-crustose lichens, sphagnum moss *Odontoschisma sphagni*, lousewort *Pedicularis sylvatica*, butterwort *Pinguicula lusitanica*, purple-scaled liverwort *Pleurozia purpurea*, thyme-leaved milkwort *Polygala serpyllifolia*, woolly fringe-moss *Racomitrium lanuginosum*, rushes *Rhynchospora spp.*, liverwort *Scapania gracilis*, black bog-rush *Schoenus nigricans*, sphagnum mosses *Sphagnum spp.*, exclude *S. fallax*, deer grass *Trichophorum germanicum*, bilberry *Vaccinium myrtillus*[54].

- Annex I habitat type 4010 North Atlantic wet heath
  - *Erica tetralix* present — 20 m radius
  - Cover of positive indicator species ≥ 50%
  - Total cover of *Cladonia species, Sphagnum species, Racomitrium lanuginosum* and pleurocarpous mosses ≥ 10%
  - Cover of ericoid species and *Empetrum nigrum* ≥ 15%
  - Cover of dwarf shrub species < 75%
  - Cover of negative indicator species (*Agrostis capillaris, Holcus lanatus, Phragmites australis, Ranunculus repens*) collectively < 1%
  - Cover of non-native species < 1%
  - Cover of scattered native trees and scrub < 20%
  - Cover of *Pteridium aquilinum* < 10%
  - Cover of *Juncus effusus* < 10%
  - Crushed, broken or pulled-up *Sphagnum* species < 10% of *Sphagnum* cover
  - Browsed shoots of ericoids < 33% (assess ≥ 10 shoots across plot)
  - No burning impacts on bryophyte
  - No burning within boundaries of sensitive areas
  - Disturbed bare ground < 10%
  - Drainage impacts from trampling, tracking or ditches < 10%

Positive indicator species for the Annex I habitat type consist of:

Breutelia moss *Breutelia chrysocoma*, heather *Calluna vulgaris*, sedges *Carex spp.*, liverwort *Diplophyllum albicans*, sundews *Drosera spp.*, Irish heath *Erica erigena*, cross-leaved heath *Erica tetralix*, common cotton-grass *Eriophorum angustifolium*, bog myrtle *Myrica gale*, bog asphodel *Narthecium ossifragum*, non-crustose lichens, pleurocarpous mosses, purple-scaled liverwort *Pleurozia purpurea*, thyme-leaved milkwort *Polygala serpyllifolia*, tormentil

Potentilla erecta, rushes *Rhynchospora spp.*, creeping willow *Salix repens*, black bog-rush *Schoenus nigricans*, sphagnum mosses *Sphagnum spp.*, devil's-bit scabious *Succisa pratensis*, deer grass *Trichophorum germanicum*[54].

Establishment Actions

Phase 1 surveys of the peatland habitats have already been carried out within the enhancement lands (2024). Further to this, Annex I habitat condition assessments surveys will be carried out within the 5.4ha of Upland blanket bog (PB2) and Wet heath (HH3) to be restored. As stated in Section 3.2.1.1, the baseline survey results will be used to prepare a Management Plan specific to each area, which will form part of one overall detailed BMP. These surveys will assist in identifying the optimal land management programme to establish and manage the upland habitat. Each Management Plan will set out specific measures for each area to achieve the optimum results for the structure and function of the upland habitats.

Aim 3 is in alignment with Aim 2, meaning the management actions recommended in Section 3.2.2.2 will be implemented to restore and enhance the management of 5.43 ha of Upland blanket bog (PB2) and Wet heath (HH3). These areas may overlap with the hen harrier foraging habitat and are not required to be spatially distinct, given that the aims and objectives are aligned. It is likely, based on proposed measures under Aim 2 that an area larger than 5.43ha will be restored.

The following establishment actions, described in full in Section 3.2.2.2, are to be implemented within the 5.43 ha of Upland blanket bog (PB2) and Wet heath (HH3) to be restored and are also listed below for clarity:

a) Heather Management
b) Scrub Management
c) Soil and Peat Management
d) Hydrological Management
e) Control of Negative Indicators and Invasive Species
f) Fire and Fuel Load Management
g) Turbary (Peat Cutting) Management
h) Supplementary Feeding Management
i) Bracken Control
j) Management of Other Damaging Activities

As stated in Section 3.2.1.1 c), hydrological restoration will also form part of upland habitat restoration, where appropriate, with drains to be blocked in order to re-wet peat soils and support *Sphagnum* mosses. This action deviates from that listed for hen harrier in Section 3.2.1.1 c), as no upper threshold for wetness will be applied, given that peatland habitats cannot be too wet to support their restoration objectives. The management and restoration for restoration of upland habitats will follow guidance on drain blocking on peatlands listed in '*Best Practice in Raised Bog Restoration in Ireland'*[55].

As stated in Section 3.2.2.1, overgrazing can threaten the structure of sensitive peatland vegetation. For the restoration of upland habitats, a stocking rate of 0.02LU/ha/yr will be

[55] Mackin, F., Barr, A., Rath, P., Eakin, M., Ryan, J., Jeffrey, R. & Fernandez Valverde, F. (2017) Best practice in raised bog restoration in Ireland. Irish Wildlife Manuals No. 99, National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland. Available at: https://www.npws.ie/sites/default/files/publications/pdf/IWM99_RB_Restoration_Best%20Practice%20Guidance.pdf [accessed: 28/01/2026].

implemented (NatureScot, 2025)[56]. For the purposes of this assessment, one livestock unit (LU) is defined as equivalent to one cow, with one ewe representing approximately 0.15 LU. Calculations must consider grazing/trampling pressure from wild herbivores. The upland habitat to be restored will only be grazed in the dryer summer months and livestock will be removed if poaching is noted.

The indicative timeline for management actions is listed in Table 3-5.

Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented include:

- Monitoring will be undertaken regularly to check for compliance with the establishment actions outlined in each respective Farm Plan.
- Management prescriptions will be adjusted, if required, depending on the monitoring results.
- Regenerating conifers will be removed promptly wherever possible.
- Species composition will be recorded using relevés. The Irish Vegetation Classification (IVC) will be used for the identification of the vegetation community (IVC, no date).
- As the stocking rates are based on guidelines and successful results are dependent on external factors such as the weather, the grazing effects must be monitored and possibly adjusted accordingly.
- Where invasive non-native species (e.g. rhododendron, self-seeded conifers) are present, removal will be undertaken using the least damaging techniques practicable e.g. targeted cutting, pulling, or herbicide injection by specialists where necessary and lawful, and will be followed by habitat recovery measures to prevent re-invasion (EIAR Chapter 5 – Biodiversity, Appendix 5-8).

Programme

Table 3-5: Indicative Management and Monitoring Programme for Objective 2.4

Summary Action	Timescale Relative to Planning Consent
Baseline Annex I habitat condition assessment surveys	Year 3
Development and agreement of Farm Plans / Liaison with NPWS	Year 3
Management of hydrology, invasive species, fire, turbary, grazing, supplementary feed, bracken and other damaging activities	From the commencement of construction (Year 4), and then every year for the lifespan of the Proposed Project
Record IVC vegetative composition using relevés.	Annual landowner self-reporting supported by formal team inspections every 3 years
Monitoring Annex I habitat condition assessment surveys	Annual landowner self-reporting supported by formal team inspections every 3 years

[56] NatureScot (2025) Peatland ACTION – Peatland Management Guidance: grazing and muirburn, NatureScot. Available at: https://www.nature.scot/doc/peatland-action-peatland-management-guidance-grazing-and-muirburn [accessed: 28/01/2026].

Summary Action	Timescale Relative to Planning Consent
Identify threats to the structure and function of habitats and recommend appropriate management actions	Annual landowner self-reporting supported by formal team inspections every 3 years
Monitoring (compliance checks for Farm Plans) / Reporting	Every year for the lifespan of the Proposed Project: years 5-8 specialist site visits to be conducted per year, then after year 8, annual landowner self-reporting supported by formal team inspections every 3 years
Remedial actions (similar to establishment actions)	As required; formal team inspections would be reinstated if landowner self-reporting found to be unsatisfactory

3.2.3.2 Objective 3.2: Management of Wet Grassland Habitat (GS4) for Marsh Fritillary

Marsh fritillary larval is listed as vulnerable on the red list of Irish butterflies and is listed on Annex II of the Habitats Directive[57]. To compensate for the loss of suitable habitat for the species within the proposed Wind Farm Site, 2.58 ha of Wet grassland (GS4) will be managed within the enhancement lands for the secondary target species marsh fritillary. There may be additional ancillary benefits to marsh fritillary arising from management of hen harrier habitat and so additional habitats beyond this 2.58 ha may potentially be available for marsh fritillary.

Targets

The targets for success are taken from guidance on '*Marsh Fritillary Habitat Condition*'[58]:

- Implement conservation grazing techniques to promote biodiversity;
- Evidence of cattle grazing;
- Absence of overgrazing and poaching;
- Structured vegetation with variation in sward height;
- >10% cover of low invading scrub (<0.25m);
- <10% cover of tall scrub (>0.5m);
- Vegetation height 12-25cm tall;
- >20% frequency of at least 3-9+/m^2 plants of Devil's-bit scabious *Succisa pratensis*;
- Habitat being occupied by the secondary target species marsh fritillary.

Establishment Actions

A) Grazing Regime

[57] Regan, E.C., Nelson, B., Aldwell, B., Bertrand, C., Bond, K., Harding, J., Nash, D., Nixon, D. & Wilson, C.J. (2010) Ireland Red List No. 4 – Butterflies. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland. Available at: https://www.npws.ie/app/uploads/2021/04/RL_2010_Butterflies.pdf [accessed: 28/01/2026].

[58] National Biodiversity Data Centre (2025a) Marsh Fritillary Habitat Condition Form (v3). Available at: https://biodiversityireland.ie/app/uploads/2025/11/Marsh-Fritillary-Habitat-Condition-Form_v32025.pdf [accessed: 28/01/2026].

Small-scale non-intensive farming with cattle in spring and summer months is the optimum approach to managing wet grassland for marsh fritillary[59]; cattle grazing best practice facilitates the creation of an uneven sward structure, which is favoured by the marsh fritillary[59].

Grazing rates will likely vairy from year to year, but recommended grazing rates prescribe 1LU/ha of cattle[60] (INCC, 2018). Stocking rates may not be increased without written recommendation within monitoring reports.

Monitoring of the receiving site will include observation on sward height, with the aim of the grazing regime to maintain the sward height between 12-25 cm[59]. The cattle must be moved elsewhere if the sward height reaches below 12cm, as this threshold indicative of overgrazing[60]. Similarly, if poaching is noted throughout the site, then adjustments to stocking rates and/or the length of the grazing season must be made. Supplementary feed will not be placed within the area as it can lead to localised nutrient enrichment.

Controlled burning events will not be implemented[60]. Sheep grazing within enhancement lands for marsh fritillary is to be avoided as it is unsuitable for the species[59].

B) Cessation of Fertiliser Application

As listed in Section 3.2.2.1, the cessation of the application of fertilizers will be implemented within the habitats managed for marsh fritillary. The aim of this measure would be to increase the species and structure diversity of the grassland sward through reduced nitrate application.

Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented include:

- Monitoring will be undertaken regularly to check for compliance with the establishment actions outlined in each respective Farm Plan.
- As the stocking rates are based on guidelines and successful results are dependent on external factors such as the weather, the grazing effects must be monitored and possibly adjusted accordingly.
- Management prescriptions will be adjusted, if required, depending on the monitoring results.
- Species composition will be recorded using relevés. The Irish Vegetation Classification (IVC) will be used for the identification of the vegetation community (IVC, no date).
- Habitat Condition Assessments will be carried out across the 2.58ha of Wet grassland (GS4) managed for the secondary target species marsh fritillary[58].
- Marsh fritillary larval web monitoring will be conducted each monitoring year[61].

[59] Phelan, N., Nelson, B., Harding, J. & Lysaght, L. (2021) Ireland's Butterflies Series No. 1: Habitat Management for the Marsh Fritillary. National Biodiversity Data Centre, Waterford. Available at: https://biodiversityireland.ie/app/uploads/2021/08/Irelands-Butterfly-Series-Marsh-Fritillary-WEB.pdf [accessed: 28/01/2026].

[60] INCC (2018) Habitat Management: The Marsh Fritillary Butterfly. Institute of Nature Conservation Cymru / Natural Resources Wales. Available at: https://www.natureconservation.wales/wp-content/uploads/2021/02/INCC-Habitat-Management.-The-Marsh-Fritillary-Butterfly-Eng.pdf [accessed: 28/01/2026].

[61] National Biodiversity Data Centre (2025) Marsh Fritillary Larval Survey Form. Available at: https://biodiversityireland.ie/app/uploads/2025/11/Marsh-Fritillary-Larval-Survey-Form-2025.pdf [accessed: 28/01/2026].

- Where invasive non-native species (e.g. rhododendron, self-seeded conifers) are present, removal will be undertaken using the least damaging techniques practicable e.g. targeted cutting, pulling, or herbicide injection by specialists where necessary and lawful, and will be followed by habitat recovery measures to prevent re-invasion (EIAR Chapter 5 – Biodiversity, Appendix 5-8).

Programme

Table 3-6: Indicative Management and Monitoring Programme for Objective 2.5

Summary Action	Timescale Relative to Planning Consent
Baseline marsh fritillary habitat condition assessment surveys	Year 3
Development and agreement of Farm Plans / Liaison with NPWS	Year 3
Management of hydrology, invasive species, fire, turbary, grazing, supplementary feed, bracken and other damaging activities	From the commencement of construction (Year 4), and then every year for the lifespan of the Proposed Project
Record IVC vegetative composition using relevés.	Annual landowner self-reporting supported by formal team inspections every 3 years
Marsh fritillary larval web monitoring	Annual landowner self-reporting supported by formal team inspections every 3 years
Monitoring marsh fritillary habitat condition assessment surveys	Annual landowner self-reporting supported by formal team inspections every 3 years
Identify threats to the structure and function of habitats and recommend appropriate management actions	Annual landowner self-reporting supported by formal team inspections every 3 years
Monitoring (compliance checks for Farm Plans) / Reporting	Every year for the lifespan of the Proposed Project: years 5-8 specialist site visits to be conducted per year, then after year 8, annual landowner self-reporting supported by formal team inspections every 3 years
Remedial actions (similar to establishment actions)	As required; formal team inspections would be reinstated if landowner self-reporting found to be unsatisfactory

3.2.3.3 Objective 3.3 Management of (Mixed) Broadleaved Woodland (WD1)

A combined total of 4.9ha of (Mixed) broadleaved woodland (WD1) will be planted within the enhancement lands to compensate for the loss of 2.9ha of higher value foraging habitat for bat species within the proposed Wind Farm Site as well as the loss of 1.96ha of (Mixed) broadleaved woodland (WD1) along the TDR.

Targets

Minimum targets for success are defined by the Annex I habitat condition assessments for 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) and are summarised below[62]:

- Positive indicator species: At least 1 target species; >6 positive species;
- Negative species cover: <10% cover of plot;
- Negative species regeneration: Absent;
- Median canopy height: >7 m;
- Total canopy cover: >30% of plot;
- Proportion of target species in canopy: >50% of canopy;
- Native shrub layer cover: 10–75% of plot;
- Native dwarf shrub/field layer: >20% of plot, height >20 cm;
- Bryophyte cover: >4%;
- Grazing pressure: Absent;
- Nettle (*Urtica dioica*) cover: <75% cover of plot.

Positive indicator species inclusive of target species for the Annex I habitat type are listed below[62]:

- Target species: alder *Alnus glutinosa*, ash *Fraxinus excelsior*, grey willow *Salix cinerea*, willow *Salix spp.*
- Other woody species: downy birch *Betula pubescens*, hawthorn *Crataegus monogyna*, bittersweet nightshade *Solanum dulcamara*, guelder rose *Viburnum opulus*
- Herbs, ferns & graminoids: creeping bent *Agrostis stolonifera*, wild angelica *Angelica sylvestris*, remote sedge *Carex remota*, meadowsweet *Filipendula ulmaria*, marsh bedstraw *Galium palustre*, yellow iris *Iris pseudacorus*, gypsywort *Lycopus europaeus*, water mint *Mentha aquatica*, reed canary grass *Phalaris arundinacea*, creeping buttercup *Ranunculus repens*, bloody dock *Rumex sanguineus*, common nettle *Urtica dioica.*
- Mosses: pointed spear-moss *Calliergonella cuspidata*, tree-climbing moss *Climacium dendroides*, foxtail feather-moss *Thamnobryum alopecurum.*

Establishment Actions

A) Woodland Planting

The Irish Native Woodland Scheme (NWS), under the 2023-2027 Forestry Programme, supports landowners in establishing new native woodlands[63]. A forester and ecologist registered under the native woodland scheme registered will be contracted to oversee the application process, planting, and maintenance of the woodland.

[62] Daly, O.H., O'Neill, F.H., & Barron, S.J. (2023). The monitoring and assessment of four EU Habitats Directive Annex I woodland habitats. Irish Wildlife Manuals, No. 146. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland. Available at: IWM146.pdf [accessed: 28/01/2026].

[63] Department of Agriculture, Food and the Marine. (2023). Farm forestry booklet: Plant the forest that suits your farm [PDF]. Government of Ireland. Available at: https://assets.gov.ie/static/documents/farm-forestry-booklet-3b208876-f664-44a3-843e-2d98890cf07d.pdf [accessed: 28/01/2026].

The forester and ecologist will select an appropriate planting mix based on the underlying soil type. The most suitable areas for planting within the enhancement lands are the Wet grassland (GS4) areas. The underlying soil type for Wet grassland (GS4) is likely a gley soil. Under such circumstances, the most appropriate planting mix to select for woodland for establishment consists of: alder *Alnus glutinosa* (50%), grey willow *Salix cinerea* (10%), downy birch *Betula pubescens* (10%), pedunculate oak *Quercus robur* (10%), hawthorn *Crataegus monogyna* (5%), plus minor species (15%) comprising at least one of the following: holly *Ilex aquifolium*, hazel *Corylus avellana*, guelder rose *Viburnum opulus*[63].

It is important to note that peatlands are not suitable for tree planting and are not eligible for planting under the scheme, due to their ecological and hydrological sensitivities (S.I. No. 484/2023).

B) Hydrology

As listed in Section 3.2.2.2, hydrological restoration will also form part of habitat creation, where appropriate, with drains blocked. This will facilitate the re-establishment of natural riverine processes and alluvial habitats, specifically the development of alluvial woodland.

Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented include:

- Monitoring will be undertaken regularly to check for compliance with the establishment actions outlined in each respective Farm Plan.
- Management prescriptions will be adjusted, if required, depending on the monitoring results.
- Species composition will be recorded using relevés. The Irish Vegetation Classification (IVC) will be used for the identification of the vegetation community (IVC, no date).
- Where invasive non-native species (e.g. rhododendron, self-seeded conifers) are present, removal will be undertaken using the least damaging techniques practicable e.g. targeted cutting, pulling, or herbicide injection by specialists where necessary and lawful, and will be followed by habitat recovery measures to prevent re-invasion (EIAR Chapter 5 – Biodiversity, Appendix 5-8).

Programme

Table 3-7: Indicative Management and Monitoring Programme for Objective 2.5

Summary Action	Timescale Relative to Planning Consent
Development and agreement of Farm Plans / Liaison with NPWS	Year 3
Management of hydrology, invasive species, and other damaging activities	From the commencement of construction (Year 4), and then every year for the lifespan of the Proposed Project
Record IVC vegetative composition using relevés.	Annual landowner self-reporting supported by formal team inspections every 3 years
Monitoring Annex I habitat condition assessment surveys	Annual landowner self-reporting supported by formal team inspections every 3 years
Identify threats to the structure and function of habitats and recommend appropriate management actions	Annual landowner self-reporting supported by formal team inspections every 3 years

Summary Action	Timescale Relative to Planning Consent
Monitoring (compliance checks for Farm Plans) / Reporting	Every year for the lifespan of the Proposed Project: years 5-8 specialist site visits to be conducted per year, then after year 8, annual landowner self-reporting supported by formal team inspections every 3 years
Remedial actions (similar to establishment actions)	As required; formal team inspections would be reinstated if landowner self-reporting found to be unsatisfactory

3.2.3.4 Objective 3.4 Establishment of Hedgerows (WL1) and Treelines (WL2)

A combined total of 1.5km of Hedgerows (WL1) and Treelines (WL2) will be established within the enhancement lands to compensate for habitat loss as a result of the Proposed Project. Objective 2.7 is in alignment with Objective 2.2 Section 3.2.2.1 d), consequently, the hedgerow planting and enhancement for hen harrier can also fulfil this compensation objective.

Targets

Minimum targets for success are defined by the '*Hedgerow Appraisal System*'[64] and are summarised below.

- Establishing a minimum of 1.5km of Hedgerows (WL1)/Treelines (WL2)
- Species Diversity Significance (10+ species / 30m strip);
- Ground Flora Significance Floristic: (>7 species / 30m strip);
- Ground Flora Significance Pteridophytes: (>5 species);
- Habitat Connectivity Significance: Multiple links with semi-natural habitats;
- Landscape Significance: Mature trees;
- Structural Variables: Height >4m and Width >3m;
- Profile: Overgrown top heavy with outgrowth at base;
- Basal density: Dense; and,
- Continuity: Continuous.

Establishment Actions

A) Species Diversity

Species will be selected for planting to maximise the biodiversity vale of the Hedgerows (WL1) with the aim of supporting >10 favourable species /30m strip inclusive of trees, shrubs and climbers[64].

Favourable hedgerow tree and shrub species consist of: Alder *Alnus glutinosa*, Silver birch *Betula pendula*, Dogwood *Cornus sanguinea*, Hazel *Corylus avellana*, Hawthorn *Crataegus monogyna*, Broom *Cytisus scoparius*, Spindle-tree *Euonymus europaeus*, Ash *Fraxinus excelsior*, Ivy *Hedera helix*, Holly *Ilex aquifolium*, Honeysuckle *Lonicera periclymenum*, Crab

[64] Foulkes, N., Fuller, J., Little, D., McCourt, S. & Murphy, P., 2013. Hedgerow Appraisal System: Best Practise Guidance on Hedgerow Surveying, Data Collation and Appraisal. Available at: https://hedgerows.ie/wp-content/uploads/2019/11/HAS-Publication-Final-March-2013.pdf [Accessed 29 January 2026].

Apple *Malus sylvestris*, Bog Myrtle *Myrica gale*, Scots pine *Pinus sylvestris*, Black poplar *Populus nigra*, Aspen *Populus tremula*, Wild cherry *Prunus avium*, Bird Cherry *Prunus padus*, Blackthorn, sloe *Prunus spinosa*, Sessile oak *Quercus petraea*, Pedunculate oak *Quercus robur*, Purging Buckthorn *Rhamnus cathartica*, Wild Rose *Rosa spp.*, Raspberry *Rubus idaeus*, Eared willow *Salix aurita*, Goat willow *Salix caprea*, Rusty willow *Salix cinerea* subspp. *oleifolia*, Bay Willow *Salix pentandra*, Elder *Sambucus nigra*, Bittersweet *Solanum dulcamara*, Whitebeam *Sorbus aria*, Whitebeam *Sorbus hibernica*, Rowan *Sorbus aucuparia*, Yew *Taxus baccata*, Gorse *Ulex europaeus*, Wych Elm *Ulmus glabra*[64].

B) Structure

Wide hedgerows, such as those to be implemented under Objective 2.2, have a wider biodiversity value beyond foraging hen harrier with hedgerows with a width exceeding 3m considered to be highly favourable[64]. Similarly, the recommendation to plant gaps in hedgerows will increase the overall biodiversity value with continuous hedgerows considered highly favourable and those with >10% of >5m considered in unfavourable condition[64].

C) Buffer Strip

As listed in Objective 2.2 buffer strip along hedgerows will be implemented with grassy margins 2m either side of the hedge[64]. The buffer strips will be fenced off to protect from grazing. No artificial fertilisers or herbicides will be used within the buffer stip.

D) Management

Failed or dead plants have to be replaced in the following planting seasons.

Management of Hedgerows (WL1) will be implemented using low impact mechanical means on a minimum 3-year cycles to allow flowering and fruiting. Hedgerows will be side trimmed only and will remain un-topped for biodiversity (Teagasc, 2025).

Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented include:

- Monitoring will be undertaken regularly to check for compliance with the establishment actions outlined in each respective Farm Plan.
- Management prescriptions will be adjusted, if required, depending on the monitoring results.
- Hedgerow appraisal following guidance '*Hedgerow Appraisal System*'[64] will be undertaken in monitoring years and recommendations on management will be made accordingly.
- Where invasive non-native species (e.g. rhododendron, self-seeded conifers) are present, removal will be undertaken using the least damaging techniques practicable e.g. targeted cutting, pulling, or herbicide injection by specialists where necessary and lawful, and will be followed by habitat recovery measures to prevent re-invasion (EIAR Chapter 5 – Biodiversity, Appendix 5-8).

Programme

Table 3-8 Indicative Management and Monitoring Programme for Objective 2.6

Summary Action	Timescale Relative to Planning Consent
Baseline marsh fritillary habitat condition assessment surveys	Year 3

Summary Action	Timescale Relative to Planning Consent
Development and agreement of Farm Plans / Liaison with NPWS	Year 3
Management of invasive species	From the commencement of construction (Year 4), and then every year for the lifespan of the Proposed Project
Record IVC vegetative composition using relevés.	Annual landowner self-reporting supported by formal team inspections every 3 years
Monitoring hedgerow condition using the Hedgerow Appraisal System	Annual landowner self-reporting supported by formal team inspections every 3 years
Identify threats to the structure and function of habitats and recommend appropriate management actions	Annual landowner self-reporting supported by formal team inspections every 3 years
Monitoring (compliance checks for Farm Plans) / Reporting	Every year for the lifespan of the Proposed Project: years 5-8 specialist site visits to be conducted per year, then after year 8, annual landowner self-reporting supported by formal team inspections every 3 years; formal team inspections would be reinstated if landowner self-reporting found to be unsatisfactory
Remedial actions (similar to establishment actions)	As required; formal team inspections would be reinstated if landowner self-reporting found to be unsatisfactory

3.3 Proposed Monitoring

A monitoring programme will be implemented to record the success of the compensation and enhancement measures and identify the need for adaptive management and/or remedial measures, if required. A more detailed monitoring programme will be provided in the detailed BMP. Where baseline survey work will take place post agreement of the detailed BMP (e.g. post-felling within the NEAs), the monitoring programmes may be amended, if necessary.

The monitoring of hen harrier usage of the compensation and enhancement lands will aim to provide feedback on the success of the implemented prescriptions and to adapt these where required. Findings will be disseminated more widely to improve good practice across Ireland. The programme for the farm plans will be in place for the operational lifetime of the proposed wind.

It is critical that the process remains flexible, allowing alterations to prescriptions in response to the monitoring programme. The monitoring results for each year will therefore be analysed and presented in an annual report to the planning authority. Recommendations will be presented regarding any changes to management practices and/or monitoring requirements that may be considered necessary. Any updates to the detailed BMP prescriptions would be discussed and agreed with the planning authority.

An outline monitoring plan is given below, which aligns with the monitoring actions recommended for Aims 1, 2 and 3.

3.3.1 Hen Harrier

3.3.1.1 Birds

Bird monitoring has been informed by NatureScot best-practice guidance[65] and will comprise the following elements described below.

Breeding raptor surveys will be undertaken in the year prior to the Proposed Project becoming operational, and in years 1, 2, 3, 5 and every five years thereafter for the lifespan of the Proposed Project once the Proposed Project has become operational.

Vantage point (VP) surveys and carcass searches will be undertaken in years 1, 2, 3, 5, 10 and 15 once the Proposed Project has become operational.

Breeding raptor surveys

Targeted breeding raptor surveys will be undertaken during the breeding seasons (April to August inclusive) focused on nesting hen harrier within the Site using the methodology outlined in Hardey et al. (2013)[66]. This will be used to establish whether hen harrier are using the NEAs (and/or other areas within 2 km of the Site) for nesting as well as indicators of breeding success, such as fledging rates.

VP surveys

Targeted VP surveys will be undertaken to assess hen harrier usage of the Site and foraging enhancement lands in the breeding season (April to August inclusive) using the methodology

[65] NatureScot (2009). Guidance on Methods for Monitoring Bird Populations at Onshore Wind Farms. NatureScot, Battleby, Scotland.

[66] Hardey, J., Crick, H., Wernham, C., Riley, H. and Thompson, D. (2006). Raptors: a field guide to survey and monitoring. 3rd edition. The Stationery Office, Edinburgh.

outlined in NatureScot (2025)[67] guidance. This will involve six hours of survey per vantage point per month with vantage point viewsheds covering the Site plus enhancement lands.

Carcass searches

Carcass searches will be undertaken at least once a month around each turbine location during the breeding season (April to August inclusive). These surveys should be carried out by qualified ecologists, and the searches may either be human- or dog-led. Methods to correct for biases in searcher efficiency and scavenger removal of carcasses will be included as part of these searches.

Adaptive management

The results of each year's monitoring will be presented in a report that will be submitted to the planning authority.

Regarding breeding raptor and VP surveys, if the monitoring results show that the birds are not using the NEAs and foraging lands, adaptive management will be implemented to ensure any remedial actions are undertaken as required.

Regarding carcass searches, after Year 15, if no significant effects are shown (this would be demonstrated via an assessment of recorded mortality in the light of changes in current conservation status at the time of the monitoring survey, indicating that Project is contributing to the decline or hindering restoration efforts for the relevant species), the monitoring should no longer be required, subject to agreement with the planning authority.

If carcass search monitoring indicates potentially significant levels of collision mortality for birds of conservation concern, adaptive management will be implemented, which will include mitigation measures and further monitoring will also be implemented, to ensure there are no significant effects on any birds of conservation concern.

Adaptive management will be implemented following discussions and agreement with NPWS and consideration of relevant experience from other wind farm sites that is available at the time.

The effectiveness of any adaptive measures will be reviewed against monitoring results and refined as necessary in agreement with NPWS.

3.3.1.2 Nesting Habitat

Habitat surveys in the NEAs will be undertaken once every year for the first five years post-felling of conifer plantation until heather and scrub mosaic habitats have been established and then once every five years thereafter for the lifespan of the Proposed Project. Surveys will assess vegetation condition, fire risk and overall suitability for nesting hen harrier. Scoring criteria will be developed using resources available from schemes such as the Irish Hen Harrier Project[33].

Examples of such criteria that could be used are shown below but will be reviewed and discussed with NPWS and Leitrim County Council prior to the preparation of the final BMP.

1. Vegetation Establishment Indicators

Indicator 1.1 – Heather Establishment Success

Metric:

[67] NatureScot (2025). Recommended bird surveys to inform impact assessment for onshore wind farms. NatureScot, Battleby, Scotland.

- Percentage cover of *Calluna vulgaris* within monitoring quadrats.
- Sampling Protocol: 2 m × 2 m quadrats at 50 m intervals along fixed transects (covering full NEAs).
- Threshold / Trigger for Remedial Action: < 20% heather cover by Year 3 triggers reseeding or additional brash deployment.
- Time-Bound Target: ≥ 40% cover across monitored quadrats by Year 5.

Indicator 1.2 – Scrub Composition and Density

Metric:

- Proportion (%) of native desirable scrub (e.g. *Salix, Myrica gale*) vs. undesirable scrub (e.g. gorse).
- Mean scrub height (cm) in each quadrat/transect.
- Threshold / Trigger: Gorse exceeding 25% cover or > 0.5 m height in early-stage areas triggers mechanical flailing/cutting.
- Time-Bound Target: Structural mosaic (heather + open ground + scattered scrub) present by Year 6.

2. Regeneration and Habitat Quality Indicators

Indicator 2.1 – Conifer Self-Seeding Rate

Metric:

- Number of regenerating conifer seedlings per 100 m transect.
- Threshold / Trigger: 10 seedlings per transect triggers immediate seedling sweep and stump/root treatment.
- Time-Bound Target: Conifer regeneration consistently < 5 seedlings per transect by Year 4 onward.

Indicator 2.2 – Ground Layer Condition

Metric:

- Percentage of quadrats dominated by competitive grasses (e.g. *Molinia* or *Agrostis*).
- Threshold / Trigger: 30% of quadrats showing grass dominance triggers targeted grass cutting or directed grazing.
- Time-Bound Target: Grass dominance reduced to < 15% of quadrats within 2 years of intervention.

3. Hydrological and Soil Indicators

Indicator 3.1 – Soil Moisture Condition

Metric:

- Monthly recording of soil moisture using fixed dipwells or soil moisture probes.
- Threshold / Trigger: Water table consistently > 10 cm above expected level → reduce blocking.
- Water table consistently > 20 cm below expected level → install additional peat dams.
- Time-Bound Target: Stable moisture regime suitable for heath regeneration achieved by Year 3.

Indicator 3.2 – Bare Peat/Erosion Extent

Metric:

- Area (m²) of exposed bare peat mapped annually.
- Threshold / Trigger: Increase > 10% year-on-year triggers erosion control (brash mulching, coir matting).
- Time-Bound Target: Stabilisation of bare peat areas within 2 years of detection.

4. Habitat Suitability for Hen Harrier Indicators

Indicator 4.1 – Nest-Suitable Vegetation Structure

Metric:

- Proportion of vegetation plots with heather height ≥ 30–40 cm.
- Threshold / Trigger: < 20% suitable nesting cover by Year 4 triggers selective cutting to release tall stands or targeted reseeding.
- Time-Bound Target: ≥ 40% of plots offering nesting-suitable vegetation by Year 6.

Indicator 4.2 – Foraging Habitat Suitability

Metric:

- Percentage of ground layer in "foraging-favourable" condition: short heather (< 20 cm), grass-heath mix, or open wet areas.
- Threshold / Trigger: < 30% foraging-favourable ground triggers additional mowing/grazing adjustments.
- Time-Bound Target: ≥ 50% foraging-favourable habitat by Year 6.

5. Fire-Risk Indicators

Indicator 5.1 – Accumulation of Flammable Biomass

Metric:

- Presence of dry brash, rank grass or accumulated vegetation in fixed sample plots.
- Threshold / Trigger: 10% increase in flammable biomass across plots triggers targeted cutting and expansion of firebreaks.
- Time-Bound Target: Firebreaks fully established by Year 3 and maintained annually thereafter.

3.3.2 Habitats and Secondary Target Species

Within each monitoring year (1-3, 5, 10, 20 and 35), the habitats to be restored and established under the compensation measures within the enhancement lands will be surveyed. Full details can be found in the relevant sections and are summarised below:

- As listed in Section 3.2.3.1, the upland habitats, Upland blanket bog (PB2) and Cutover bog (PB4) will be surveyed using Annex I Habitat Condition Assessments[54] as well as the IVC[68].

[68] National Biodiversity Data Centre (no date) Irish Vegetation Classification – IVC Classification Explorer. Available at: https://biodiversityireland.ie/projects/ivc-classification-explorer/ [accessed: 28/01/2026].

- As listed in Section 3.2.3.2, the Wet grassland (GS4) habitat will be surveyed using the IVC[68], marsh fritillary Habitat Condition Assessment[58] and Larval Web Survey Form[61].
- As listed in Section 3.2.3.3, the Broadleaved woodland (WD1) will be surveyed using the IVC[68], as well as the Annex I Habitat Condition Assessments[62].
- As listed in Section 3.2.3.4, Hedgerows (WL1) and Treelines (WL2) will be surveyed using the Hedgerow Appraisal System[64].

Subsequent reporting will be issued in each monitoring year and will list the findings, which will likely inform future habitat management actions.

3.3.2.1 Compliance with Farm Plan

Compliance checks with farm plans would be undertaken every year for the lifespan of the Proposed Project and would comprise of two visits a year for the first three years of monitoring and once every year thereafter. This would involve monitoring of vegetation and habitats against agreed criteria, which will be developed using resources available from schemes such as the Irish Hen Harrier Project[33].

Examples of simple, objective and replicable indicators for agricultural and peatland foraging habitats that could be used are outlined below. These will be refined in consultation with NPWS and Leitrim County Council during preparation of the final BMP.

1. Grassland Structure Indicators

Indicator A1 — Sward Height and Structural Diversity

Metric:

- Mean sward height (cm) and proportion of monitoring points within target structural classes (short, medium, tussocky).
- Trigger: 60% of points falling into a single height class (i.e., overly uniform sward) triggers grazing adjustment or patch-mosaic mowing.
- Target: At least three sward height classes present across each landholding by Year 3.

2. Rush (*Juncus*) Cover Indicators

Indicator A2 — Rush Cover Proportion

Metric:

- % cover of rush in 2 m × 2 m quadrats at fixed points.
- Trigger: Rush cover exceeding 70% in > 30% of quadrats triggers mechanical flailing/strip cutting.
- Target: Rush cover maintained at 20–70% in > 70% of quadrats.

3. Hedgerow Structure Indicators

Indicator A3 — Hedgerow Density and Continuity

Metric:

- % of hedgerow length with dense structure (> 3 m height and sufficient basal thickness).
- Trigger: < 70% of hedgerow length meeting density criteria triggers coppicing, gapping-up or fencing.
- Target: Continuous, dense foraging lines along all priority hedgerows by Year 5.

4. Scrub Management Indicators

Indicator A4 — Scrub Encroachment into Grassland

Metric:

- % of grassland area with scrub height > 1 m or scrub cover > 20%.
- Trigger: Scrub exceeding thresholds triggers mechanical flailing or brush-saw thinning.
- Target: Scrub cover maintained at < 20% of grassland area unless explicitly designated for patch-scrub habitat.

5. Nutrient Indicator Species / Enrichment Indicators

Indicator A5 — Competitive Grass or Enrichment-Indicator Frequency

Metric:

- % quadrats dominated by *Molinia*, *Agrostis*, or ryegrass.
- Trigger: 30% dominance triggers nutrient reduction actions (remove feeding sites, adjust grazing, mechanical mowing).
- Target: Grass dominance reduced to < 15% of quadrats by Year 4.

6. Hydrological Stability Indicators

Indicator P1 — Water Table / Surface Moisture Condition

Metric:

- Dipwell levels or surface moisture class recorded at fixed peatland points.
- Trigger: Water table consistently > 20 cm below target → install additional peat dams; Water table consistently > 10 cm above target → notch dams or adjust blocking.
- Target: Stable moisture conditions suitable for heather/Sphagnum regeneration by Year 3.

7. Purple Moor Grass (Molinia) Dominance Indicator

Indicator P2 — Molinia Cover

Metric:

- % of monitoring quadrats where *Molinia* exceeds 50% cover.
- Trigger: 40% of quadrats dominated by *Molinia* triggers targeted cutting/flailing or adjusted summer grazing.
- Target: *Molinia* dominance reduced to < 20% of quadrats by Year 5.

8. Scrub / Woody Species Encroachment

Indicator P3 — Scrub Cover on Peatland

Metric:

- % area covered by gorse, birch, or other colonising scrub.
- Trigger: Scrub exceeding 10–15% cover triggers removal or thinning.
- Target: Open peatland maintained with scrub cover < 10% unless identified for deliberate patch-scrub heterogeneity.

9. Bare Peat Condition and Erosion

Indicator P4 — Bare Peat Extent

Metric:

- Area of bare peat mapped annually.
- Trigger: 10% increase year-on-year triggers erosion control (heather brash, coir matting, vegetation plug planting).
- Target: Stabilisation of bare peat within 2 years of first detection.

10. Peatland Vegetation Recovery

Indicator P5 — Heather/Sphagnum Presence in Monitoring Quadrats

Metric:

- % quadrats containing regenerating heather.
- Trigger: < 20% quadrats showing recovery by Year 3 triggers targeted seeding, brash-spreading, or hydrology correction.
- Target: ≥ 40% quadrats showing heather regeneration by Year 5.

3.4 Summary of Overall OBMP Programme

The overall programme set out in Table 3-9 and Table 3-10 provides a broad estimation of start and finish timelines for the various measures set out in this OBMP. A more detailed programme will be provided in the detailed BMP post-consent. This schedule will then be revised, if required, throughout the lifetime of the Proposed Project.

Table 3-9: Summary of Overall OBMP Programme – Hen Harrier

Aim	Objective	Tasks	Phase and Years																																								
			Pre -construction			Construction		Operation																																					
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1: Management of lands for nesting hen harrier	1.1: Establishment and Management of NEAs	Conifer felling			✓																																					
		Creation of NEA plans			✓																																					
		Baseline surveys			✓																																					
		Creation of heath and scrub mosaic				✓	✓																																			
		Habitat structuring / ongoing management (as required)				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Vegetation monitoring				✓	✓	✓	✓	✓					✓					✓					✓					✓					✓					✓		
2: Management of lands for foraging hen harrier	2.1: Management of Agricultural Lands	Creation of Farm Plans			✓																																				
		Grazing regime / rush / mowing management, hedgerow / tree establishment and management, scrub management, fertiliser management				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Monitoring / compliance Farm Plans[69]					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2.2: Management of Peatlands	Heather / scrub/ soil / hydrological / fire / turbary / supplementary feeding / bracken management, control of negative indicators and invasive species				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Monitoring / compliance Farm Plans					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2.3: Disturbance Management	Disturbance training implemented			✓																																				
		Limiting recreational activities, restricting access during breeding seasons, and				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

[69] After the first three years of monitoring via independent ecologist whose appointment will be agreed with NPWS, annual self-monitoring by the landowner will occur with inspection by the independent ecologist every three years.

| Aim | Objective | Tasks | Phase and Years | | |

Table 3-10: Summary of Overall OBMP Programme – Habitats and Secondary Target Species

| Aim | Objective | Task | Pre-construction | | | Construction | | Operation | | |

Appendix A Drawings

Outline Biodiversity Management Plan

Lissinagroagh Wind Farm

FutureEnergy Ireland

SLR Project No.: 501.065072.00001

30 March 2026

560000 580000 600000 620000

880000 860000 840000

501.065072.00001.0021.0 Project Site

N

LEGEND

Proposed Wind Farm Planning Application Boundary

Proposed Turbine Location

Grid Connection Infrastructure

Proposed Grid Connection

Existing Srananagh 220 kV Substation Location

Turbine Delivery Route (TDR)

TDR Accomodation Area Point of Interest

Derry/Londonderry

Ireland FuturEnergy

SLR

LISSINAGROAGH WIND FARM - EIAR

OUTLINE BIODIVERSITY MANAGEMENT PLAN

PROPOSED PROJECT SITE OVERVIEW

DRAWING 1.1

Scale 1:200,000 @ A3

Date MARCH 2026

0 5 10 Kilometres

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590000 592000 594000 596000

846000 844000 842000

501.065072.00001.0021.0 Project Site

N

Lough Adunny
Horse Lough
Posey Lough
Sandy Lough
Ballagh River
Lough Tiernan
Lough Gillaganleane
Killea
Saddle Hill
Dough Mountain 462 m
Derry/Londonderry
Bee Park
Clare's

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13 T14

R282 R283 R280 N16

0 1 2
Kilometres

LEGEND

- Proposed Wind Farm Planning Application Boundary
- Proposed Turbine Location
- Proposed Turbine Hardstand
- Proposed Substation Location
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Permanent Met Mast Location
- Proposed Permanent Access Road
- Proposed Clear Span Bridge
- Proposed Vehicle Turning Area

Grid Connection Infrastructure

- Proposed Grid Connection

Turbine Delivery Route (TDR)

- TDR Accomodation Area Point of Interest

FuturEnergy Ireland

SLR

LISSINAGROAGH WIND FARM - EIAR

OUTLINE BIODIVERSITY MANAGEMENT PLAN

PROPOSED PROJECT SITE WIND FARM DEVELOPMENT

DRAWING 1.2

Scale 1:25,000 @ A3

Date MARCH 2026

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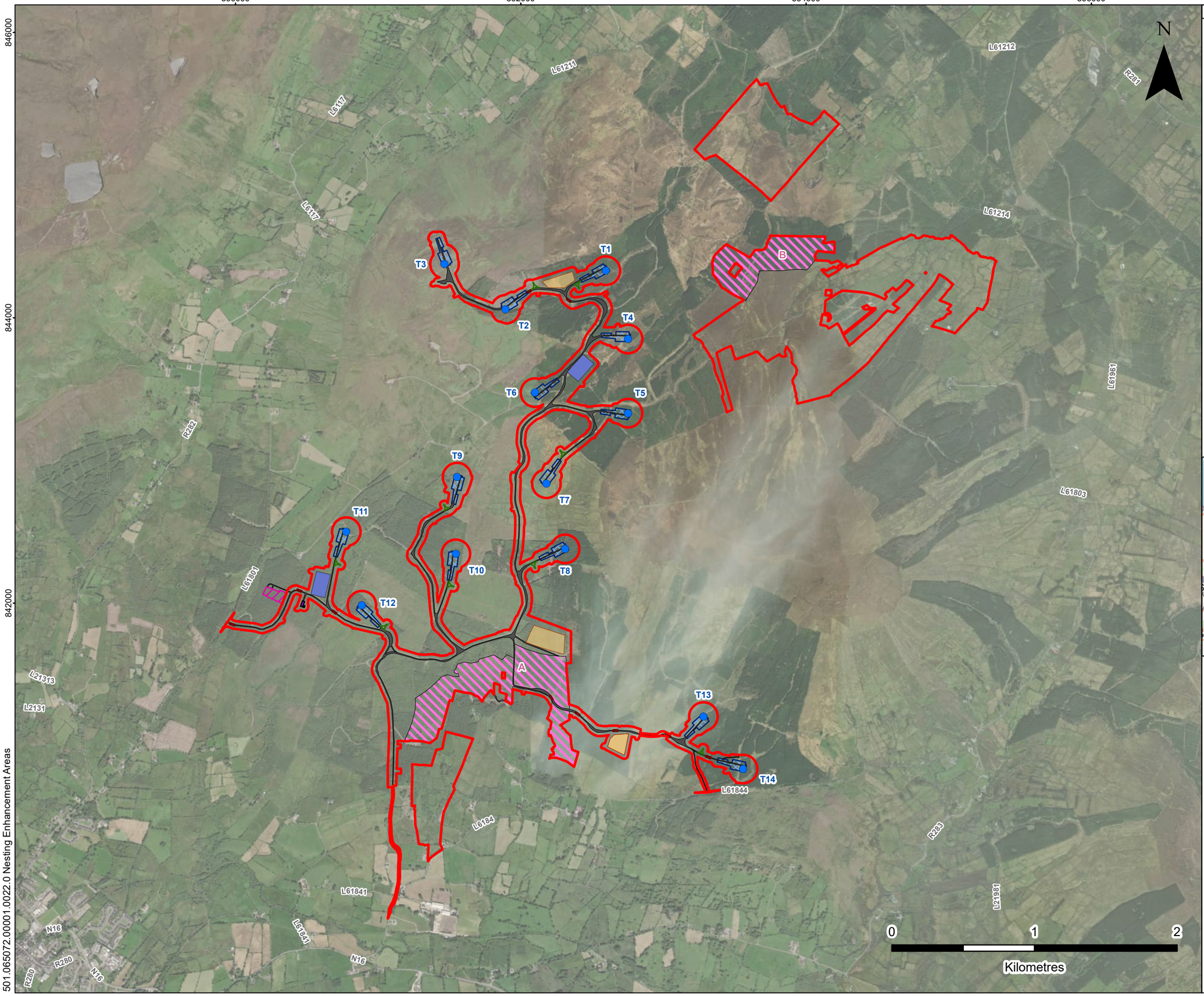

LEGEND

- Proposed Wind Farm Planning Application Boundary
- Proposed Turbine Location
- Proposed Turbine Hardstand
- Proposed Substation Location
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Permanent Met Mast Location
- Proposed Permanent Access Road
- Proposed Clear Span Bridge
- Proposed Vehicle Turning Area

Compensation Measures

- Nesting Enhancement Area



FuturEnergy Ireland

SLR

LISSINAGROAGH WIND FARM - EIAR

ORNITHOLOGY

HEN HARRIER NESTING ENHANCEMENT AREAS

DRAWING 2

Scale	Date
1:25,000 @ A3	MARCH 2026

501.065072.00001.0022.0 Nesting Enhancement Areas

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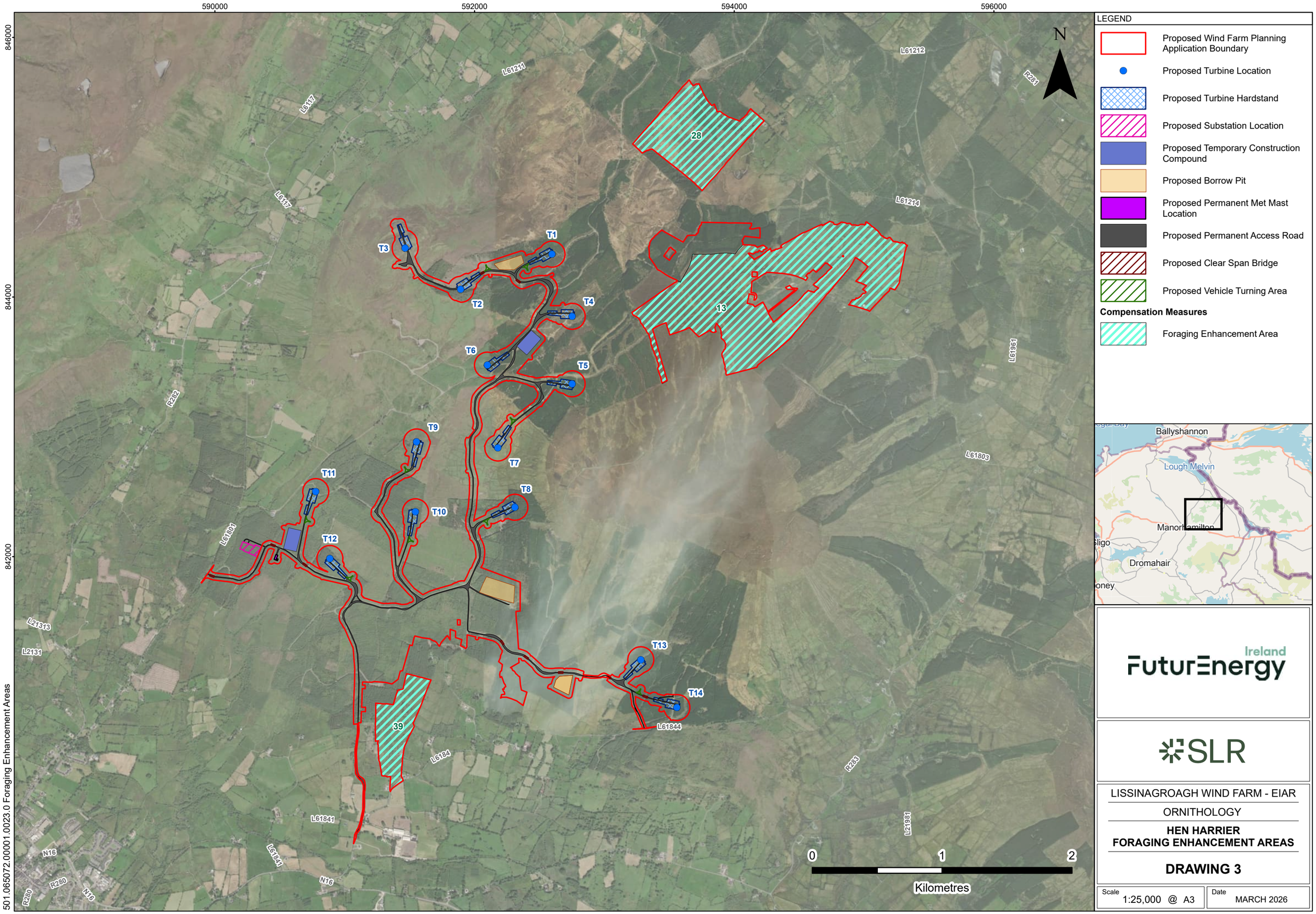

FuturEnergy Ireland

SLR

LISSINAGROAGH WIND FARM - EIAR

ORNITHOLOGY

HEN HARRIER FORAGING ENHANCEMENT AREAS

DRAWING 3

Scale 1:25,000 @ A3

Date MARCH 2026

501.065072.00001.0023.0 Foraging Enhancement Areas

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Appendix B Tobin Habitat Survey Report

Outline Biodiversity Management Plan

Lissinagroagh Wind Farm

FutureEnergy Ireland

SLR Project No.: 501.065072.00001

30 March 2026

TOBIN

10955 Future Energy Ireland Lissinagroagh Wind Farm Hen Harrier Enhancement Lands – Habitat Survey

Ireland FuturEnergy

BUILT ON KNOWLEDGE

Document Control Sheet	
Document Reference	Hen Harrier Enhancement Lands – Habitat Survey
Client:	FutureEnergy Ireland
Project Reference	10955

Rev	Description	Author	Date	Reviewer	Date	Approval	Date
D01	Draft for internal review	ÚB	13/05/2024	ÁS/JS	17/05/2024	ÁS	23/05/2024
D02	Addressing Client Comments	ÚB	08/07/2024	ÁS	09/07/2024	ÁS	09/07/2024
A01	Final Version					ÁS	09/07/2024
A02	Updates	ÚB	23/10/2024	JMM	31/10/2024	ÁS	04/11/2024

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HEALTH & SAFETY I.S. ISO 45001:2018 NSAI Certified
QUALITY I.S. EN ISO 9001:2015 NSAI Certified
ACEI ASSOCIATION OF CONSULTING ENGINEERS OF IRELAND
ENGINEERS IRELAND CPD ACCREDITED EMPLOYER

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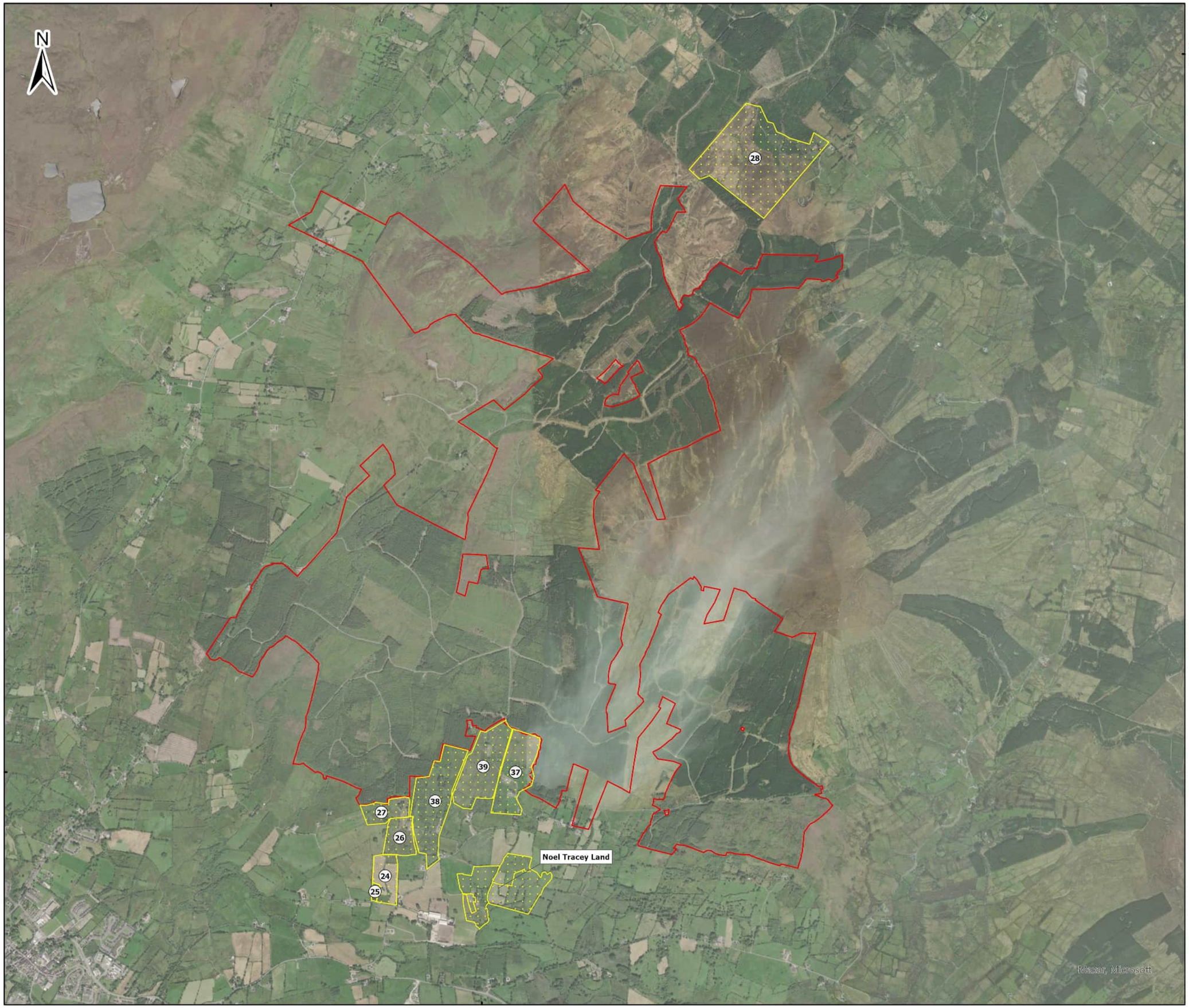
1. INTRODUCTION

TOBIN was appointed by FutureEnergy Ireland to carry out habitat surveys within potential hen harrier enhancement lands located to the north and south of the proposed Lissinagroagh Wind Farm Site.

1.1.1 Survey Area

The hen harrier enhancement lands (hereafter referred to as the Survey Area) are illustrated on Figure 1-1 below. The survey areas were obtained from shapefiles supplied by FutureEnergy Ireland. Each land Plot was given a unique identification number (ID) and the habitats have been described within this report in line with this numbering.





Legend

- Site Boundary
- Hen Harrier Enhancement Lands

0 500 1,000
Metres

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	30/10/2024	First issue	S.P	A.S

Client: FuturEnergy Ireland

Project: Lissinagroagh Wind Farm

Title: Figure 1-1 Survey Area

Scale @ A3: 1:25,000

Prepared by:	Checked by:	Date:
S.Pezzetta	A.Sands	October 2024

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Map Ref: 10955-014-HH.ENC.L-S.BO-TOB-A

Draft: A

1.2 METHODOLOGY

1.2.1 Survey Methodology

TOBIN carried out the habitat surveys from the 29th of April to the 3rd of May 2024, and on the 3rd of October 2024. The entirety of the Survey Area was surveyed. Habitats were classified using *'A Guide to Habitats in Ireland'* (Fossitt, 2000), also with reference to '*Best Practice Guidance for Habitat Survey and Mapping'*(Smith *et al.*, 2011).

A description of each habitat has been provided and includes the following details (where applicable): dominant species; vegetation, sward composition and structure; height and width; density of rush; topography of the land; whether encroachment was occurring; what land management practices were being utilised; and, what grazing regime by what species was evident, and whether linear features were stockproof. In addition, the hedgerows were described following guidelines within the *'Hedgerow Appraisal System'*(Foulkes *et al.*, 2013).

The hydrology of the land was also described, in terms of the presence of drainage diches, rivers, spring and swallow holes. Drainage ditches were described by their width, and whether any flowing water was present during the time of the survey. Rivers were described by their bank width, water width, bank depth, water depth and velocity of flow. Spring and swallow holes locations were described within habitat polygons.

Consideration of suitable habitat for hen harrier prey items was also given during the survey, with species such as meadow pipit (*Anthus pratensis*), skylark (*Alauda arvensis*) and small mammals, noted as prey items for the species (NPWS, 2022). Visual and aural records of meadow pipit and skylark were collected within the Survey Area and its surroundings, along with locations of suspected nesting areas/habitat. The surveys also assessed vegetation structure to determine suitability for small mammals, which typically prefer areas offering substantial cover. Preferred habitats for these small mammals include hedgerows, young forestry, and regions with dense vegetation cover (McCarthy *et al.,* 2021).

1.2.2 Weather Conditions

The weather conditions over the five-day survey period varied (29th of April until 3rd of May). The weather was damp, rainy, and cool on Monday (29/04/2024). Conditions dried up on Tuesday (30/04/2024), with temperature increasing steadily towards the end of the week. Thursday (02/05/2024) was the hottest day, with the highest temperatures reaching 20°C.

Weather conditions for 3rd of October were dry, cool, and averaged 15°C throughout the day.

1.2.3 Survey Limitations

No survey limitations or constraints occurred; the entire survey area was accessible and surveyed. Plot 25, areas of private residential properties, and the conifer forestry within Plot 28 were not surveyed, as requested by FutureEnergy Ireland.

1.3 PROJECT TEAM

Úna Butler M.Sc (Agr) is a qualified Ecologist with three years post-graduate experience in the environmental consultancy sector. She has been involved in a number of Screenings for

Appropriate Assessment, Natura Impact Statements and Ecological Impact Assessments predominantly for large public and private infrastructure projects. She has also carried out numerous field surveys for protected habitats and species as well as invasive species.

John Sherry (B.Sc.) is a qualified Project Ecologist/Ornithologist with TOBIN, with over five years post-graduate experience in ecology and environmental consultancy. He has been involved in the surveying and reporting of numerous large-scale renewable infrastructure projects where he has carried out Appropriate Assessment Screening reports, Natura Impact Statements, Environmental Impact Assessment Reports and Ecological Management Plans. John has a proven knowledge of field skills and has been involved with the planning and implantation of a variety of surveys including habitat surveys, non-volant mammal surveys and bat assessments. However, he has mainly been focused on ornithological surveys involving winter and breeding bird surveys associated largely with proposed wind farms or infrastructure developments.

Áine Sands (B.Sc.) is a qualified Senior Ecologist with nine years post-graduate experience in ecology and environmental consultancy. She has predominantly been involved in large public and private infrastructure projects where she has carried out numerous Screenings for Appropriate Assessments, Natura Impact Statements and Ecological Impact Assessments for the proposed developments. Áine has a strong understanding of National and European legislation associated with biodiversity and is cognisant of relevant rulings by the Court of Justice of the European Union (CJEU) associated with Appropriate Assessment. Áine also has experience with undertaking ecology surveys for protected habitats and species.

2. SURVEY RESULTS

The habitats recorded within the Survey Area have been described below, as per the unique Plot ID assigned to each land folio. Habitat maps are illustrated in Figure 2-1, which includes Plots24, 26, 27, 38, 39, 37, and the Noel Tracey Land; and Figure 2-2, which includes Plot 28.

2.1 PLOT ID 24

Habitats recorded within Plot 24 are described hereunder:

2.1.1 Improved Agricultural Grassland

Improved agricultural grassland (GA1) comprises the majority of the land cover in Plot 24. The dominant species within this habitat is perennial ryegrass (*Lolium perenne*). The average soft rush (*Juncus effusus*) density is *ca*. 20%. Vegetation was noted to be cut short to approximately 10cm and uniform in height, with some bare soil exposed, resulting from machinery access. No encroachment of scrub was noted. Intensive land management practices were observed, including recent cutting of the grass (likely for silage), and slurry spreading. It is also likely that this habitat within Plot 24 is being grazed occasionally by cattle.



Plate 2-1: Improved Agricultural Grassland (GA1) in Plot 24

2.1.2 Wet Grassland

Wet grassland (GS4) habitat was recorded to the north and south of Plot 24. The dominant species within this habitat is soft rush, with its density of land cover ranging between 60-80%. This habitat is generally described as having mixed sward heights (between 30-40cm) of short, grazed areas with soft rush tussocks featuring frequently. Encroachment of scrub was observed in areas of the habitat to the north of the plot. The habitat within this plot was described as undulating in areas. No apparent cultivation, fertilization, or mowing of land was noted within the areas of wet grassland. These wet grassland fields were being grazed by cattle during the time of the site visit, some silage and hay bales were also present within the fields. Evidence of

sheep or deer grazing was also observed. Meadow pipits were recorded in display flight towards the north of this plot.



Plate 2-2: Wet Grassland (GS4) Habitat in Plot 24

2.1.3 Hedgerows

Hedgerows (WL1) was present within Plot 24. Hawthorn (*Crataegus monogyna*) was found to be the dominant species within this habitat.

The hedgerows towards the north and south of the plot were described as 5m high and 4m wide, with mature hawthorn featuring sporadically. Bramble (*Rubus fructicosus*) and fencing are present at the base of these hedgerows. No signs of management were evident. The hedgerows were noted to be stockproof.



Plate 2-3: Hedgerows (WL1) in Plot 24

2.2 PLOT ID 26

2.2.1 Wet Grassland

Wet grassland (GS4) comprises almost the entirety of the land cover in Plot 26. No species dominates this habitat, soft rush is present in abundance, with a density of >60%. Encroachment of hedge and/or scrub towards the northwest of the plot was noted. Mixed sward heights of short, grazed areas with soft rush tussocks with an average height of 40cm are present. The plot consists of undulating areas. Low numbers of meadow pipits were recorded across the entire plot and are likely to be breeding, as a number of display flights were observed. No apparent cultivation, fertilization or mowing was evident. This field is likely to be grazed all year around, and some old silage and hay bales were present. Some evidence of sheep/deer grazing were also present.



Plate 2-4: Wet Grassland (WS1) in Plot 26

2.2.2 Hedgerows

Hedgerows (WL1) are present along the northern, southern, and eastern boundaries of Plot 26. Hawthorn featured most frequently within this habitat.

The hedgerow to the north of the plot was 5m tall, 4m wide, with good species and structural diversity present, particularly at the ground layer. Stone walls and other stonework (BL1) also feature at the base of this hedgerow. The hedgerow did not appear to be managed; it encroaches into the surrounding fields in places. The hedgerow was noted to be stockproof.

The hedgerow to the south of the plot was described as scrubby, 2-4m high and 3m wide, and encroaches on the surrounding fields. Gorse (*Ulex europaeus*) dominates this hedgerow. No signs of management were evident, this hedgerow was classified as stockproof.

The hedgerow that runs along the eastern boundary of the plot was described as being 6m high and 4m wide, with heavily vegetated stone walls and other stonework (BL1) habitat at the base and some fencing. Good species and structural diversity was noted along this feature, with some gaps in the understory. The hedgerow did not seem to be managed and was deemed to be stockproof.



Plate 2-5: Hedgerow (WL1) to the North, South and East of Plot 26

2.2.3 Drainage Ditch

A 1m wide drainage ditch (FW4) was recorded running through the centre of Plot 26. This feature was described as being heavily vegetated, mainly with soft rush. Some standing stagnant water was present in the channel at the time of the visit.



Plate 2-6: Drainage Ditch (FW4) in Plot 26

2.3 PLOT ID 27

2.3.1 Wet Grassland

Wet grassland (GS4) comprises the majority of land cover in Plot 27. Fields were described as having diverse wet grassland populations and species but are dominated by soft rush which covers 40-70% of the fields. Vegetation averaged approximately 40cm in height during the time of the survey. Fields feature mixed sward height of young rush with some dense tussocks

throughout. Encroachment of hedging and scrub was noted towards the northern and central parts of this plot. The topography within this plot was described as sloping, with a drop of approximately 3 to 5m towards the north, and 'bowl-shaped' towards the centre of the plot. No apparent cultivation, fertilisation or mowing was evident, with some areas of dense rank vegetation. Evidence of grazing by cattle during the drier months and intermittent deer/sheep grazing was also noted. Calling and displaying meadow pipit and skylark were recorded both in the southern fields of the plot, and surrounding fields outside of the survey area.

2.3.2 Oak-ash-hazel Woodland

An oak-ash-hazel woodland (WN2) was recorded amongst the wet grassland habitat towards the north of Plot 27. Trees were noted to be 5m tall and the habitat was described as being rich in species diversity, particularly on the ground layer. The woodland is accessible by livestock as some signs of poaching and grazing were evident. A dry drain and stone wall is present running through the centre of this feature.



Plate 2-7: Oak-ash-hazel Woodland (WN2) Habitat in Plot 27

2.3.3 Scrub

A patch of dense scrub (WS1) is present within the abovementioned wet grassland field. The scrub is dominated by blackthorn (*Prunus spinosa*) and bramble, reaching an average height of 3m, with a species diverse ground layer.



Plate 2-8: Scrub (WS1) Habitat in Plot 27

2.3.4 Drainage Ditches

A 1m wide drainage ditch (FW4) is present towards the centre of the plot which is heavily vegetated with soft rush, meadowsweet (*Filipendula ulmaria*) and meadow buttercup (*Ranunculus acris*). Some standing, stagnant water was also present within the channel at the time of the survey.



Plate 2-9: Drainage Ditch (FW4) Habitat in Plot 27

2.3.5 Hedgerows

Hedgerows (WL1) were present along the western, southern, eastern and central areas of Plot 27. Hawthorn, hazel (*Corylus avellana*) and blackthorn feature in abundance within these hedgerows. Hedgerows were generally 5m tall and 4m wide with good species and structural diversity, however, some areas of the hedgerows were described as gappy. Heavily vegetated stone wall feature at the base of a number of these hedgerows. No management was evident.

Hedgerows along the field boundaries were noted to be stockproof due to the presence of sheep fencing, while hedgerows in the centre of the Plot were not considered stockproof due to the absence of any barriers for livestock.

2.3.6 Treelines

A 15m tall treeline (WL2) is present towards the southern boundary of Plot 4, this mature treeline is primarily comprised of ash (*Fraxinus excelsior*), with evidence of potential die-back in some trees. The canopy is dense with gaps in the understory, the width of the treeline was noted to be 10m. This treeline did not show any signs of management and is not considered stockproof.



Plate 2-10: Treeline (WL2) Habitat in Plot 27

2.4 PLOT ID 38

2.4.1 Wet grassland

Wet grassland (GS4) comprises the majority of land cover in Plot 38. Soft rush was found to dominate the habitat, with its density in fields ranging between 40 and 80%. Other typical wet grassland species are also present. Vegetation height averaged 30-40cm, a mixed sward height of tightly grazed areas with some soft rush tussocks were noted. This habitat forms a mosaic with scrub in areas to the centre of Plot 38 and is more open to the north and south of the land parcel, where scrub encroachment was limited. The fields within this plot slope steeply southwards, with the most southern areas of the Plot being more waterlogged during the time of the survey. No apparent cultivation, fertilization or mowing was evident, with vegetation rank in places. This field is likely to be grazed by cattle in drier months, some evidence of deer/sheep grazing was also present.

A field towards the centre of the plot, located beside old pig buildings was observed to have animal waste run-off from the adjacent buildings present. The land showed more signs of poaching closer to the pig buildings.



Plate 2-11: Wet Grassland (GS4) Habitat in Plot 38

2.4.2 Scrub

Large areas of encroaching scrub (WS1) habitat is present throughout Plot 38, forming a mosaic with wet grassland (GS4). Species such as bramble and blackthorn were found in abundance. The scrub averaged a height of 4m and did not show any signs of management. This habitat is accessible by livestock, and some signs of grazing or poaching were evident.



Plate 2-12: Scrub (WS1) Habitat in Plot 38

2.4.3 Buildings and artificial surfaces

A number of buildings and artificial surfaces (BL3) habitats are present in Plot 38, including small ruins towards the north, and a dilapidated farmhouse and farm sheds towards the centre of the plot.



Plate 2-13: Buildings and Artificial Surfaces (BL3) in Plot 38

2.4.4 Treelines

Treelines (WL2) feature frequently throughout Plot 38. Treelines towards the north of the plot were described as being 5-7m high, 3-4m wide, with willow and hawthorn frequently recorded. These treelines did not show signs of management, nor were they deemed stockproof.

A treeline running from north to south of the plot with hawthorn in abundance was described as being 5m high and 4m wide, with stone walls and other stonework (BL1) and earth banks (BL2) present at the base. This treeline was observed to be stockproof.

2.4.5 Hedgerows

Hedgerows (WL1) are also present in abundance, most frequently running through the centre of Plot 38. These hedgerows were noted to be unmanaged with some large gaps between older and immature trees and were found to be between 2-3m wide, 3-4m high.

Hawthorn and willow sp. were recorded in abundance within this habitat. The base of the hedgerows were often also noted to have a diverse ground layer, with the exception of hedgerows to the very south, which were described as having poor species diversity. Stone walls (BL1) sometimes feature at the base of these hedgerows, particularly towards the southern boundary of the plot.

Hedgerows towards the centre of the plot were generally not classified as stockproof, while hedgerows to the very south, particularly bordering the adjacent road, are stockproof, due to the presence of sheep wire.



Plate 2-14: Hedgerows to the Centre (Left) and North (Right) of Plot 38 Drainage Ditches

2.4.6 Drainage Ditches

A heavily vegetated drainage ditch (FW4) is present along the eastern boundary of Plot 38. The drainage ditch is 40m long and 2m wide with 1.5m high banks. The drain was heavily vegetated and dry during the time of the survey.

A heavily vegetated drainage ditch is present towards the southeastern boundary of Plot 38. This ditch was described as being 2m wide with 2m high banks. The depth of the water was 30cm and the wet width was 30cm. There was no flow of water along the main channel of the drainage ditch, however the connecting drainage ditch at the southern end had a slow flow of water which seemed to disappear underground. Water could be heard flowing down a crevice in the land, likely into a swallow hole.



Plate 2-15: Drainage Ditches (FW4 (Left) and Swallow Hole (Right)

2.5 PLOT ID 39

2.5.1 Wet Grassland

Wet grassland (GS4) comprises the majority of the landcover in Plot 39. The wet grassland is generally dominated by soft rush, with an average density of >60%. The habitat is also populated by other typical wet grassland species, with *Sphagnum sp.* present in wetter areas. Average sward heights were generally between 30-40cm, with some small areas of dense tussocks. The wet grassland habitats in this plot were generally found to have no evidence of cultivation, fertilization, or mowing with vegetation rank in places. These areas are likely to be grazed during the drier months, with old cattle dung present. Passing deer/sheep are also likely to graze sporadically. Poaching of the soil was observed. Meadow pipits were noted to be displaying within the wet grassland habitat of this plot.

The wet grassland to the south of the plot was covered in a lattice of shallow, heavily vegetated channels or historic drains. Very little, to no water was observed in these.

The wet grassland to the north had a number of suspected sinkholes present. Stream flow from the conifer forest outside of the survey boundary, under the R283 road and enter the site at two points at the northern boundary. These flowing streams seem to disappear and re-emerge a number of times.



Plate 2-16: Wet Grassland (GS4) in Plot 39

2.5.2 Eroding Upland Rivers

The IE_WE_35O080400, which is a tributary of the Mt. Dough River, enters Plot 39 from the northern boundary, travels south and then east, before entering the next plot. The water was noted to be peat stained. The banks were noted to be eroded at points likely due to access of sheep and other grazers.

Where the river first enters the Plot, the banks are 1.5m wide, 0.5m high with an average depth of 20cm. The wet width was 1m and the water was moderate to fast flowing, during the time of the survey.

As the river flows south and then east through the plot, the bank height averages 1.5m high. the water depth was noted to be 10cm, wet width was 30-40cm and the water levels were very low with a slow flow, compared to immediately upstream.



Plate 2-17: Eroding Upland Rivers (FW1), Fast Flowing Upstream (L) and Slow Flowing Downstream (R)

2.5.3 Scrub

A patch of scrub (WS1) is present towards the north of Plot 39. The scrub was recorded as being 5m high with blackthorn, hawthorn and willow featuring abundantly. The vegetation was dense with no management evident.

2.5.4 Hedgerows

Hedgerows (WL1) feature sporadically throughout Plot 39 and are generally 3-5m in height and 2-4m wide. Hawthorn is present abundantly throughout these features. Hedgerows towards the centre of the plot are gappy, unmanaged and were not deemed stockproof. Hedgerows along the boundaries of fields are gappy, unmanaged, with a significant, species rich earth banks at the base. Hedgerows along the field boundaries are stockproof due to the presence of sheep wire. Stone walls are also often present at the base of these hedgerows.

2.5.5 Treelines

Treelines (WL2) also feature sporadically within Plot 39, with hawthorn and goat willow (*Salix caprea*) present in abundance. Treelines are generally 5-8m high and 3-4 m wide. No management was evident. Treelines are gappy and are mostly not deemed to be stockproof.



Plate 2-18: Hedgerows (WL1) (L) and Treelines (WL2) (R) in Plot 39

2.6 PLOT ID 37

2.6.1 Wet Grassland

Wet grassland (GS4) dominates Plot 37. Some areas grade into upland blanket bog (PB4). The wet grassland is generally dominated by soft rush with an average density of >60%, but also purple moor grass (*Molinia caerulea*), where the habitat has begun to grade into bog. Other typical wet grassland species are present also, with *sphagnum sp*. present in wetter areas. Average sward heights are generally between 30-50cm, some small areas of dense tussocks are also present. The wet grassland habitats in this plot were generally found to have no evidence of cultivation, fertilization, or mowing with vegetation rank in places. These areas are likely to be grazed during the drier months by cattle. Wet grassland within this plot is also likely to be grazed by sheep and passing deer. Meadow pipits were recorded to be displaying in this area and some nests were observed.

Two fields to the very south of the plot were being grazed by donkeys and sheep during the site visit. Soft rush density is much lower here (10%), while vegetation height averaged 10cm. This is likely due to more intensive grazing practices.



Plate 2-19: Wet Grassland (GS4) Habitat with Dense Hummocks Towards the North of the Site (L) and More Intensely Grazed to the South of the Site (R)

2.6.2 Upland Blanket Bog

Upland bog (PB2) is present at the very northern boundary of Plot 37. No species was found to dominate this habitat, purple moor grass (*Molinia caerulea*) is present in abundance, with an average height of 40cm. Tussocks/hummocks of purple moor grass, moss and rush sp. were noted throughout. A scattering of short, stunted trees are also present within the habitat. This habitat was described as a mosaic of poor-quality upland blanket bog grading into wet grassland in areas. *Sphagnum sp.* is more abundant where flushed depressions occur in the wet grassland. No land management practices were evident. These areas are likely grazed during the drier months, with old cattle dung present. Deer and sheep grazing is also likely. Meadow pipit were also observed to be displaying in this area during the site visit.

2.6.3 Treelines

Very few treelines (WL2) were recorded within this plot. Two treelines were recorded adjacent to a house towards the centre of the plot. Trees stand between 5-8m in height, and are dominated by hawthorn, while goat willow also features abundantly. A treeline of large, 18m tall, European Larch is present adjacent to the house.



Plate 2-20: Treelines (WL2) in Plot 37

2.7 PLOT ID 28

2.7.1 Wet Heath

Vast areas of wet heath (HH3) grading into upland bog (PB2) were recorded towards the northeast, northwest and south of Plot 28. Ling dominates this habitat, with other typical bog and heath species present also. Vegetation structure is diverse and averaged 30cm in height. A scattering of stunted/immature Sitka spruce (*Picea sitchensis*) are also present. The land is undulating and gradually slopes towards a number of small streams. *Sphagnum sp.* is more abundant where flushed depressions occur in the wet heath habitat. Past turf cutting, in the form of vegetated turf banks were evident in areas, however no signs of agricultural management or burning were present. Low occurrences of grazing are likely throughout this area, possibly by sheep and deer. Calling and displaying meadow pipits and skylark were noted throughout these areas during the survey.



Plate 2-21: Wet Heath (PB2) Habitat in Plot 28

2.7.2 Wet Grassland

Wet grassland (GS4) is present in smaller areas towards the south and east of Plot 28, this habitat was observed to be grading into wet heath (HH3) in areas. Soft rush dominates this habitat with a 70% land cover density. Vegetation heights averaged 40cm. *Sphagnum sp.* is more abundant where flushed depressions occur in the wet grassland. A scattering of short, stunted trees are also present. Low levels of grazing were evident; however, this habitat may be used occasionally by sheep or deer. Meadow pipits were noted to be displaying in these areas, there is also probable nesting of this species in the surrounds.

2.7.3 Eroding/Upland Rivers

The Gillaganleane River (EPA Code: IE_NW_35L660960) which travels through the centre of the plot, was found to have bank widths varying between 30cm to 1.5m, wet widths varying from 30cm to 1.5m and the watercourse was noted to have a moderate flow meandering downhill. Two channels of this river flow separately out of the plot, via the southeastern boundary.

The river (IE_NW_35L660960) towards the eastern boundary, which is shown on EPA maps, was found to be absent. Instead, a spring with a moderate flow was found.



Plate 2-22 Eroding Upland Rivers (FW1) (L) and Spring Where EPA River is Mapped (R) in Plot 28

2.8 NOEL TRACEY LAND

Noel Tracey's land is located approximately 370m south of the proposed Lissinagroagh Wind Farm Site.

2.8.1 Wet Grassland

Wet grassland (GS4) comprises the majority of land cover in the Noel Tracey Land (see Plate 2-23). Soft rush dominates the habitat, with its density in fields ranging between 70 and 80%. Other typical wet grassland species are also present. Vegetation height averages 20-30cm, although the sward height is quite heterogeneous, with areas of soft rush tussocks interspersed by grazed grasses. Some encroachment of scrub from hedgerows was noted along the eastern boundary, while trees sporadically occur throughout the fields. Low numbers of meadow pipits were recorded across the entire wet grassland habitat.

The wet grassland to the north of the site is undulating, with an abundance of small hills and dips. The land to the south of the site is more of a low lying profile, with gentle sloping. Wet grassland habitat is heavily grazed by sheep and cattle with some dumping of farm waste also evident.



Plate 2-23: High Rush Density Cover in Wet Grassland (GS4) Within the Noel Tracey Land

2.8.2 Hedgerow

Hedgerows (WL1) are present throughout the Noel Tracey land, in a higher density towards the northeast of the site. Some hedgerows that appear on aerial imagery were found to be absent during the site visit, which suggests they may have been removed recently. Two meadow pipits were heard calling in the hedgerow to the west of the site during the site visit.

Hedgerows within the site are generally dominated by hawthorn, bramble or gorse, reach up to 5m in height, and are no more than 4m in width. Some hedgerows (particularly towards the east of the site) are dense, opaque, and poorly shaped, this is likely due to livestock access. Ash trees (up to 14m high) are rarely present amongst other semi-translucent hedgerows within the site, with gaps of up to 10m between trees. Many of the hedgerows also have stone walls at their base but are not stockproof. Few hedgerows within the site show any signs of active management (see Plate 2-24).



Plate 2-24: Scrubby, Dense, Low, Hedgerow (Left) and Mature Ash Trees Growing Sporadically Amongst Semi-translucent Hedgerows (Right)

2.8.3 Treelines

Treelines (WL2) feature frequently throughout the site, particularly towards the south and eastern boundary, and generally stand between 7-14m in height. Species that feature abundantly within these treelines include bramble, hawthorn and blackthorn. Some of the vegetation within the treelines encroaches onto the adjacent lands. Treelines are generally top heavy due to livestock access at the base and show little sign of active management (see Plate 2-25). In some treelines, trees are separated by gaps of up to 10m. Although some stone walls and wire fencing exists at the base of some of these treelines, the majority of these treelines are not stockproof.



Plate 2-25: Treelines (WL2) in the Noel Tracey Land

2.8.4 Dry Riverbeds

Aerial imagery shows two streams entering the site: the Mt_Dough (EPA Code: 35M62), with a north south orientation; and the Moneenshinnagh 35 (EPA Code: 35M60), with a northeast – southwest orientation. These two streams join just outside the southwest end of the Noel Tracey Land, and form part of the Owenmore (Manorhamilton)_020 WFD river water body (IE_WE_35O080400; *Good* 2016-2021 WFD water quality status[1]). However, during the habitat survey, neither of these small/medium sized channels (Strahler/stream order: 3; average bank width: 2.5m) carry any water, exposing a dry substrate of large boulders and cobble (see Plate 2-26). Therefore, the dry riverbeds were not mapped as watercourses on the habitat map.



Plate 2-26: Dry Riverbeds Running From North to South Within the Site

2.8.5 Eroding / Upland Rivers

Downstream of the confluence of the two streams described in Section 2.8.4, an eroding/upland river (FW1) rises (see Plate 2-27). The reach upstream of the confluence is not part of the WFD monitoring network, but it appears to be a tributary of the Moneenshinnagh 35, flowing in a northwest – southeast orientation just upstream of the confluence. Upon joining with the Moneenshinnagh 35, it flows out of the site from the southern boundary. The stream is heavily shaded by riparian vegetation, bounding a 3-4m channel. The substrate comprises large boulders, cobbles and pebbles, supporting a fast rippling and gliding flow, at the time of the survey.

[1] Available at www.catchments.ie. Accessed in October 2024



Plate 2-27: Upland Eroding River (FW1) at the Southern Boundary of the Site

2.8.6 Stone Walls

Standalone stone walls (BL1) are restricted to the northeast of the site, approximately 50cm in width, and 30-100cm in height, in general. Although most of the stone walls are not fenced/stockproof, there is one fenced section (see Plate 2-28).

As mentioned above in Section 2.8.2 and 2.8.3, stone walls also frequently feature at the base of hedgerows and treelines within the site.



Plate 2-28: Stone Walls and Other Stonework (BL3) Within the Noel Tracey Land

2.8.7 Drainage Ditches

Two drainage ditches (FW4) are present towards the west of the site. These linear habitats are approximately 30cm deep, 40cm wide, and their margins are heavily vegetated with soft rush and perennial ryegrass (see Plate 2-29). Neither of the two drainage ditches contained any water at the time the survey.



Plate 2-29: Drainage Ditches Recorded Within the Site

2.8.8 Third Schedule Invasive Species

A large infestation of Japanese knotweed (*Fallopia Japonica*) is present within and adjacent to the farm buildings, towards the east of the site, covering approximately 60m^2 (see Plate 2-30). Japanese knotweed is listed in the Third Schedule of the European Communities (Birds and Habitats). Its robust root system can extend up to 2m deep and up to 7m horizontally from the main plant (Smith *et al.*, 2007).



Plate 2-30: Infestation of Japanese Knotweed Towards the East of the Site

8°8'24"W
8°7'48"W
8°7'12"W
54°19'0"N
54°18'40"N
841300
840680
840060
590880
591600
592320
N
39
37
38
27
26
24
25
Maxar, Microsoft



Legend

- Site Boundary
- Hen Harrier Enhancement Lands

Habitats

- FW1 - Eroding/ upland rivers
- FW4 - Drainage ditches
- WL1 - Hedgerows
- WL2 - Treelines
- BL1 - Stone walls and other stonework
- Dry Riverbeds
- BL3 - Buildings and artifical surfaces
- GA1 - Improved agricultural grassland
- GS4 - Wet grassland
- PB2 - Upland blanket bog
- WD1 - (Mixed) broadleaved woodland
- WD3 - (Mixed) conifer woodland
- WN2 - Oak-ash-hazel woodland
- WS1 - Scrub
- WS2 - Immature woodland

0 100 200
Metres

NOTES

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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	04/11/2024	First issue	S.P	A.S

Client: Future Energy Ireland

Project: Lissinagroagh Wind Farm

Title: Figure 2-1 Hen Harrier Enhancement Land Habitats to the South of Lissinagroagh Wind Farm

Scale @ A3: 1:6,000

Prepared by:	Checked by:	Date:
S.Pezzetta	A.Sands	November 2024

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Map Ref: 10955-015-HH.ENC.L..S-HAB-TOB-A

Draft: A

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8°6'0"W
8°5'24"W
54°21'40"N
54°21'20"N
54°21'0"N
845640
845020
593040
593760
594480
N
28
Maxar, Microsoft



Legend

- Site Boundary
- Hen Harrier Enhancement Lands

Habitats

- FW1 - Eroding/ upland rivers
- GS4 - Wet grassland
- HH3 - Wet heath

0 100 200
Metres

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Rev	Date	Description	By	Chkd.
A	30/10/2024	First issue	S.P	A.S

Client: FuturEnergy Ireland

Project: Lissinagroagh Wind Farm

Title: Figure 2-2
Hen Harrier Enhancement Land Habitats to the North of Lissinagroagh Wind Farm

Scale @ A3: 1:6,000

Prepared by:	Checked by:	Date:
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Map Ref: 10955-016-HH.ENC.L..N-HAB-TOB-A

Draft: A

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8°7'12"W

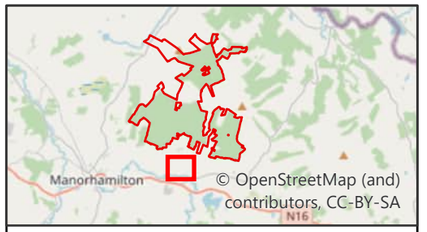
54°18'40"N

54°18'20"N

840060

591600





Legend

Hen Harrier Enhancement Lands - Noel Tracy lands

Invasive Species

Japanese Knotweed

0 75 150

Metres

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A	27/11/2024	First issue	S.P	A.S
Rev	Date	Description	By	Chkd.

Client: Ireland FuturEnergy

Project: Lissinagroagh Wind Farm

Title: Invasive species

Scale @ A3:	1:3,000	
Prepared by:	Checked by:	Date:
S.Pezzetta	A.Sands	November 2024

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Map Ref:	Draft:
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3. CONCLUSION

Habitats within Plot 24 were found to be dominated by intensely managed improved agricultural grassland (GA1) and is dominated by perennial ryegrass. Wet grassland (GS4) habitat dominated Plots 26, 27, 37 and 39 and were generally dominated by soft rush, which formed areas or dense tussocks or areas of rank vegetation in some places or grazed, low sward heights in others. Plot 38 is largely comprised of a mosaic/patchwork of wet grassland (GS4) and scrub (WS1) featuring rush, bramble, and blackthorn in abundance. Plot 28 has the most open habitat with wet heath (HH3) grading into upland bog (PB2) in areas. The Noel Tracey Land is dominated by intensely grazed, wet grassland habitat with dense tussocks of soft rush featuring frequently throughout. Dry riverbeds intersect the wet grassland habitat.

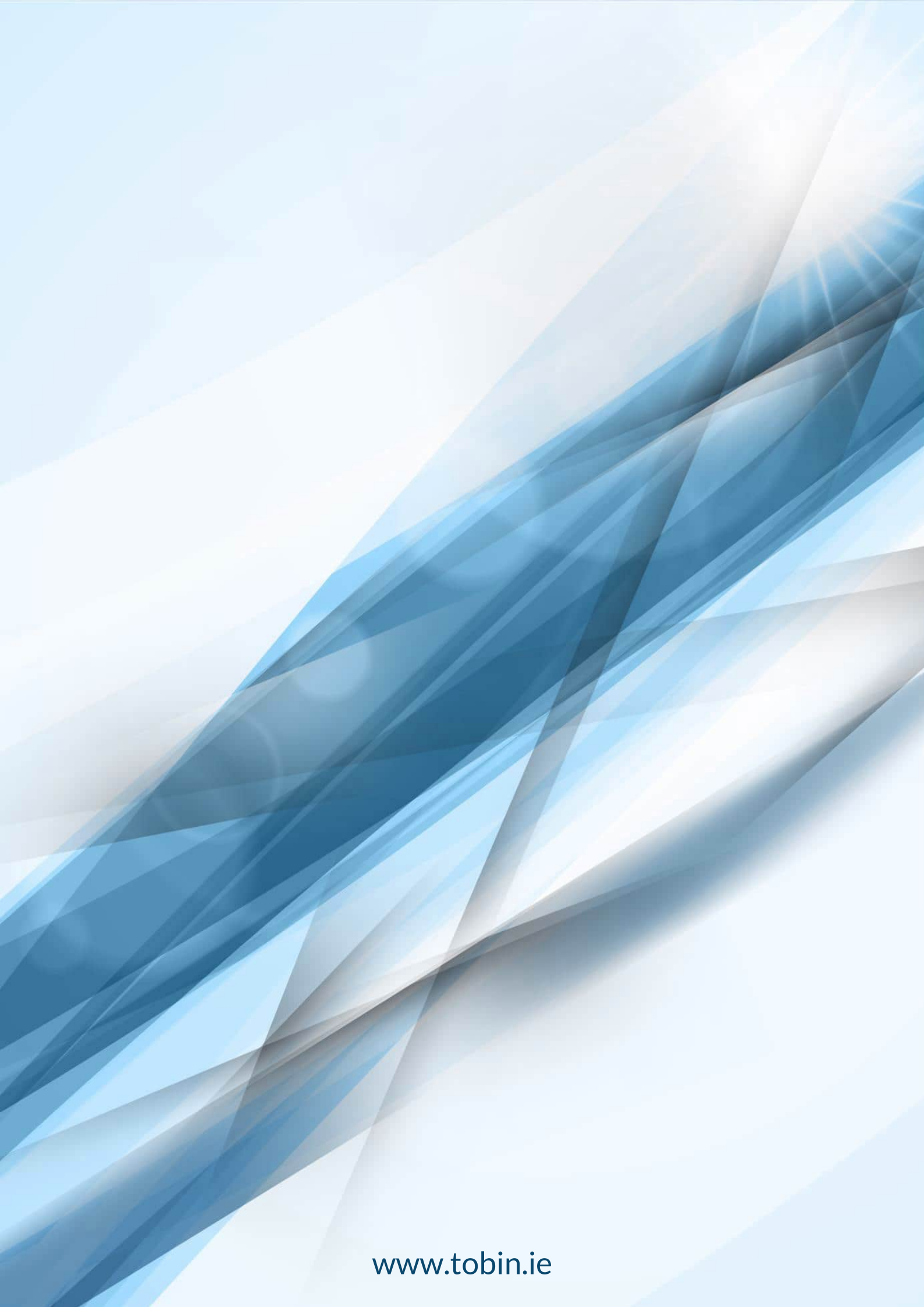
Meadow pipits were recorded displaying and calling throughout all plots surveyed, while skylark were observed occasionally, but more frequently in Plot 28.

Lands were generally sloping with few major drainage features present, but a number of sink holes were observed, particularly in Plots 26, 27, 37 and 39. The Noel Tracey Land features significant dry river beds running from the north to the south of the site.

Land management was generally low (with the exception of Plot 24); however, grazing was more intense in areas, particularly in the lands to the south of Plot 27. Grazing species were most frequently named as cattle, sheep, and deer, with some donkeys kept in Plot 27.

4. REFERENCES

- Fossitt, J.A., 2000. A Guide to Habitats in Ireland, Heritage Council of Ireland series, Heritage Council/Chomhairle Oidhreachta: Kilkenny.
- Foulkes, N., Fuller, J., Little, D., McCourt, S. and Murphy, P. (2013). Hedgerow Appraisal System-Best Practise Guidance on Hedgerow Survey, Data Collation and Appraisal. Woodlands of Ireland, Dublin. Unpublished Report [pdf].
- McCarthy, A., Caravaggi, A., Fernández Bellon, D., Irwin, S., Lusby & O'Halloran, J. (2021) Bird and small mammal community composition and abundance in upland open habitats and early conifer forests. *European Journal of Wildlife Research* 67, 1-13.
- NPWS (2022). Conservation Objectives Supporting Document: Breeding Hen Harrier. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.
- Smith, J.M.D., Ward, J.P., Child, L.E., Owen, M.R. (2007). A Simulation Model of Rhizome Networks for Fallopia Japonica (Japanese Knotweed) in the United Kingdom.
- Smith, G. F., O'Donoghue, P., O'Hora, K., & Delaney, E. (2011). Best Practice Guidance for Habitat Survey and Mapping. Ireland's Heritage Council: Kilkenny, Ireland.



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Appendix C Bird Surveyors Ltd Habitat Survey Report

Outline Biodiversity Management Plan

Lissinagroagh Wind Farm

FutureEnergy Ireland

SLR Project No.: 501.065072.00001

30 March 2026

Lissinagroagh Hen Harrier Enhancement Lands - Habitat Survey



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1.0 Introduction

Bird Surveyors Ltd was appointed by SLR Environmental Consulting (Ireland) Ltd ("SLR") to carry out habitat surveys within potential hen harrier *Circus cyaneus* enhancement lands located to the northeast of the proposed Lissinagroagh Wind Farm Site.

Background

Habitat surveys of land adjacent to the proposed Lissinagroagh Windfarm are being undertaken as part of the hen harrier management/mitigation plans for the area. Before any habitat management actions can be implemented, a comprehensive baseline habitat assessment must be carried out. This involves mapping and surveying the area and conducting surveys to identify existing habitat types, vegetation cover, and key ecological features (e.g., potential breeding sites or foraging areas). Through these surveys it is necessary to identify areas which can be optimised for the target species. This requires an assessment of the current habitat utility; existing habitat use and future utility and evaluating current conditions to inform the selection of management techniques.

Survey Site

The site surveyed here (hereafter "Site"; Folio 13; Figure 1) is part of a complex of lands associated with the development of the Lissinagroagh Windfarm by Future Energy Ireland (FEI). The Site is situated to the north of Doagh Mountain either side of the Killea Road in the townland of Killea, Co. Leitrim. The altitude is between 140m and 370m.

Purpose of Report

This report has these main aims:

- To provide baseline data on habitats to establish the opportunities for habitat and landscape management for the hen harrier;
- To identify spatial and temporal pressures, threats and constraints for hen harrier foraging habitats; and
- To identify management units and other mitigatory/compensatory opportunities and needs.

2.0 Methodology

Vegetation and botanical surveys and habitat mapping were completed by botanist Melanie Flexen in April 2024.

Surveys to identify the current suitability of the habitat management area were completed by ornithologists Marc Ruddock, Douglas Ruddock, Craig Swenarton and James Irons across a range of weather conditions. There was multiple survey visits completed between August 2023 and July 2024.

The report was prepared by Marc Ruddock and habitat reporting and mapping was prepared by Melanie Flexen.

Habitat Surveys

The methodology used the best practice guidelines for habitat surveys and mapping in Ireland (Smith et al., 2011). A preliminary habitat map was created prior to the fieldwork. Polygons were digitised using QGIS software then subsequently ground-truthed and amended during the field survey using QField on a rugged tablet. All polygons were classified using the national standard scheme for describing

habitats in Ireland 'A Guide to Habitats in Ireland' (Fossitt, 2000). More than one habitat type was used if occurring in a mosaic. The minimum mapping area used was 0.04ha. Linear features including hedges, lines of trees and watercourses were also mapped. Target notes were recorded on the habitats and notable features and photographs were taken.

Surveys to Identify Current Suitability of Habitat Management Area

Comprehensive fieldwork surveys were carried out to establish the suitability of the habitat management area and identify where and management changes could be implemented. Habitats and points of interest were scanned from a distance with binoculars (Leica, Duovid 8+12x42) and telescope (Leica, APO Televid, 20-60x zoom) during walkover and transect surveys. Closer examination of features identified were undertaken, to examine in further detail such as tracks and signs (e.g. faecal material or pawprints or hoofprints etc). A range of locations and features were photographed using a Canon EOS R6 + 150-600mm RF lens or on QGIS rugged tablet. The location of features or specific points of interest were further plotted using a handheld Global Positioning System (Garmin 64SX) if needed.

Where key observations were made these were mapped and annotated and subsequently transferred to a project geographical information system (GIS) in ArcGIS 10.5 and used in the preparation of reports. Habitat or management features such as roads, boundaries, drains, rivers, hedges, disturbances were also mapped and annotated, and further mapping of e.g. visible drains or linear features were plotted on maps. Additional photographs were taken and georeferenced where required on target note maps. There was no hydrological or LiDaR survey conducted as part of the fieldwork.

3.0 Survey Results

Habitats Overview

The Site is surrounded by large blocks of commercial conifer plantation. The land encompasses a range of habitats. There are agricultural fields to the east of the Site which are extensively grazed by cattle in larger units of several fields. These are mainly semi-improved wet grassland and poor fen/flush, sloping down towards the river from the road. Some fields nearer the road are cut for silage/hay. Fields are surrounded by generally unmanaged hedges, lines of trees, or earth banks with occasional small shrubs/trees. Two main streams cross this area, flowing into the Straduffy River which forms the north boundary. Semi-natural woodland and scrub occurs in the small valleys.

The western half of the Site is mainly upland blanket bog on higher ground, much of which has been cut for peat in the past. Sheep grazing occurs over the moorland areas. Heavier grazing intensity occurs nearer the road. The higher altitude area of moorland is crossed by the deep gully of the Straduffy River. Areas of heathland, scrub grassland and bracken occur along this river valley. There are a range of minor tarmacadam roads bisecting the survey area forming and servicing network of access points into various paddocks and field parcels within the land folio. Surrounding the survey parcel is the wider complex of mountains south-west of Kiltyclogher and northeast of Manorhamilton and contains Dough Mountain and Saddle Hill and to the east is Thur Mountain and to the west is Crocknagapple. A nearby operational windfarm is located at the south side of Saddle Hill.

There are extensive conifer plantations immediately adjacent to the north, north-east and west of the Site and smaller plantations centrally within the Site. To the south-east the Site is partially bounded by

coniferous plantations and also some mixed woodland and improved / semi-improved pastures. At the north-west and the south-west corner of the Site are two areas of peatland and heath, with the former bounded by conifers and the latter moorland extending more widely to the summit of Dough Mountain. The Site is comprised of a range of habitats, predominantly moorlands and peatland in the west and grasslands in the east. Habitats are shown in Figure 2 and linear features have been shown separately in Figure 3.

Habitat Descriptions

Peatland

Upland blanket bog (PB2)

The uncut peatland to the north and south of the road is active blanket bog dominated by mature heather *Calluna vulgaris.* Cover of heather is generally 60-70% and height 30-40cm, up to 50cm occasionally. Cover of *Sphagnum* is up to 20%. Other species present include crowberry *Empetrum nigrum*, cross-leaved heath *Erica tetralix*, hare's tail cotton-grass *Eriophorum vaginatum*, reindeer lichen *Cladonia portentosa* and woolly fringe-moss *Racomitrium lanuginosum.* Sheep grazing is light in the uncut areas with only a few sheep paths. There are occasional small self-seeded conifers.



Photo 1. Intact upland blanket bog in west of Site



Photo 2. Upland blanket bog on highest altitude part of Site

Cutover bog (PB4)

The area of old cutover bog to the north of the road is quite disturbed, trampled and grazed by sheep. Heather cover is often <50%, bushes are very mature (c.40-50cm) and often degenerate or dying. Cover of *Sphagnum* is often low (<10%) and patches of soft rush occur.

There is an area of fairly recently created cutover blanket bog (1.3 ha) to the south-east of the old quarry. It appears that tractor driven machinery ('sausage machine') has been used to extract peat as lines through the peat are visible and there is also vehicle disturbance evident. The area is fairly well vegetated with cotton-grasses, *Sphagnum* and sparse cover of short heather. Sheep trampling is evident, and animals are likely to congregate in the area due to shorter vegetation compared to surrounding habitat. Higher altitude land above the road has a considerable area of old hand cutting with large vertical banks. Heather in these areas is mature, and often over 50cm. Very little grazing occurs except along the lower edges near to fields (western side) where sheep use the area leading to trampling and degradation of the habitat.



Photo 3. Mechanically cutover blanket bog



Photo 4. Old hand-cut banks on blanket bog on higher altitude land

Poor fen and flush (PF2)

There are several wet flushes running through the blanket bog habitat which are dominated by soft rush *Juncus effusus* and/or sharp-flowered rush *Juncus acutiflorus,* over a carpet of *Sphagnum*.

Poor fen habitat within the enclosed fields is dominated by sharp-flowered rush and purple-moor grass *Molinia caerulea* with frequent sweet-vernal grass *Anthoxanthum odoratum*, devil's bit scabious, *Sphagnum* moss and common haircap moss *Polytrichum commune.* It often occurs in mosaic with wet grassland on the Site. Most of the habitat is lightly cattle grazed.

The strip of steeping sloping fields between forestry blocks to the south of Lislea Road, also has marsh violet *Viola palustris* and other mosses including *Hylocomium splendens*. This vegetation is sheep grazed and likely to have been derived from wet heath/blanket bog habitat.

The area immediately to the east of the water treatment site is mainly poor fen with patches of degraded blanket bog, poor wet grassland, and small drains and flushes. The flush vegetation includes sharp-flowered rush, sedges, water horsetail *Equisetum fluviatile*, marsh marigold *Caltha palustris,* hare's tail cotton-grass *Eriophorum vaginatum,* lesser spearwort and marsh cinquefoil *Comarum palustre*. These fields are very heavily sheep-grazed and on an area that was once blanket bog.



Photo 5. Poor flush with rushes within blanket bog



Photo 6. Poor fen within fields with a carpet of Sphagnum moss

Grassland

Wet grassland (GS4)

Lower altitude fields to south of the Killea Road are mainly wet grassland. This varies from lower quality grassland to vegetation of higher conservation value.

Most of the sloping fields away from the road contain sharp-flowered rush, sedges *Carex* spp. and grasses along with frequent herbs including devil's bit scabious *Succisa pratensis*, meadowsweet *Filipendula ulmaria* and selfheal *Prunella vulgaris*. Cattle grazing was of low intensity at time of the survey.

Fields near the road which are cut for silage/hay also contain frequent herb species, e.g. lesser spearwort *Ranunculus flammula*, bugle *Ajuga reptans*, ragged robin *Silene flos-cuculi* etc. These cut fields appear to be subject to higher nutrient inputs with devil's bit scabious and sedges occasional or rare. Other field areas dominated by soft rush are of poor quality with few indicator species and are

often rush-topped. The wet grassland occurs in a mosaic with poor fen vegetation containing *Sphagnum*, particularly in the eastern block of fields. This area also has remnants of heath and bog vegetation.



Photo 7. Wet grassland with good species diversity



Photo 8. Poor wet grassland dominated by soft rush

Acid grassland (GS3)

Species-poor acid grassland is heavily sheep grazed and occurs on the steep slopes of central river valley, along with degraded heath and poor fen vegetation.



Photo 9. Valley with acid grassland, rushes, heath and scrub along stream

Heath

Dry siliceous heath (HH1)

Dry heath on valley slopes to north of road is badly degraded by sheep. Heather bushes are degenerate and occur with patches of acid grassland. The dry heath south of the road is less grazed and has a good cover of tall heather, particularly on steep gully slopes.



Photo 10. Dry heath on gully slopes

Wet heath (HH3)

Wet heath (and/or degraded blanket bog) occurs on the slopes of the western stream valley and has mature or degenerate heather of variable cover, with patches of tussocky soft rush. A peat slippage occurs on the slope in one area and some heather here appears to have been burnt in recent years.



Photo 11. Wet heath on valley slopes

Bracken (HD1)

Occasional small patches of dense bracken occur on steep slopes of valley.

Woodland and scrub

Semi-natural woodland (WN)

Drier areas of oak-ash-hazel woodland (WN2) with mature broadleaved trees (10m+) occur in the small steep stream valleys. Trees include ash *Fraxinus excelsior*, hazel *Corylus avellana*, sycamore *Acer pseudoplatanus,* holly *Ilex aquifolium* and birch *Betula* sp. Damper areas of wet woodland (WN4) have alder *Alnus glutinosa* and grey/goat willow *Salix cinerea/caprea*. Ground flora is often species-rich including ferns, primrose *Primula vulgaris*, opposite-leaved golden saxifrage *Chrysosplenium oppositifolium* and celandine *Ranunculus ficaria*.

Along the river to the north-east forming the Site boundary, there is a strip of riparian woodland (WN5) which includes mature ash, alder, willow and holly. Areas of dense scrub (WS1) across the Site are dominated by willow, mostly around 4-5m tall with occasional mature trees. These usually occur along the stream valleys with scattered bushes elsewhere.



Photo 12. Semi-natural broadleaved woodland in stream valley



Photo 13. Willow scrub in steep sided valley

Highly modified/non-native woodland (WD)

There are areas of conifer plantation (WD4) including mature cypress and spruce within the Site alongside the stream at the west boundary. Some small blocks of conifer woodland (WD3) occur next to the road/new house, one area of which has been felled (WS5).

Field boundaries

Most of the hedgerows (WL1) within the Site are found in the north-eastern block of agricultural land. These are generally overgrown and unmanaged, around 4-6m tall, but sometimes greater in height (c.8m) so could be also described as lines of trees (WL2) or sometimes narrow strips of scrub/woodland. The exceptions are some roadside hedges which are side flailed or cut short (1-2m). The dominant shrub species is willow, along with holly and some hawthorn *Crataegus monogyna*. Taller trees include birch, alder, ash and occasional conifers. Roadside hedges also contain non-native species, i.e. fuchsia *Fuchsia magellanicum* and snowberry *Symphoricarpos albus.*

Many boundaries are not stockproof so allow cattle to roam freely across blocks of land. Some areas have mainly earth banks as field boundaries with no shrubs or only scattered shrubs and trees. (N.B. These are not shown on the habitat map). There are a few treelines (WL2) where there are lines of mature trees forming the field boundary, including beech *Fagus sylvatica* or conifers.



Photo 14. Overgrown, unmanaged willow hedge



Photo 15. Line of mature birch trees

Other habitats

Eroding/upland rivers (FW1)

A few small rocky streams cross the Site, as already described.

Drainage ditches (FW4)

There are a small number of artificial drainage ditches through the peatland areas.



Photo 16. Drain in blanket bog

Spoil and bare ground (ED2)

A small area of bare shale is present on steep ground near to the quarry, possibly due to quarrying activities or erection of new fencing causing erosion.

Recolonising bare ground (ED3)

The small old quarry by the road has some bare ground and rock but has mostly recolonised with dry heath, acid grassland and gorse *Ulex europaeus*.

Active quarries (ED4)

The larger old quarry has remained mostly unvegetated and has bare rock, sands and gravel. (Note that a colony of sand martins are nesting in the quarry face).



Photo 17. Old unvegetated quarry

Stonewalls and other stonework (BL1)

The old ruins of cottages are of interest botanically and have been target noted. Numerous ferns and bryophytes are present on the old stone walls along with herbs including navelwort *Umbellicus rupestris and* herb robert *Geranium robertianum.*



Photo 18. Ruins of cottages

Roads and buildings (BL3)

This includes buildings, artificial surfaces, roads and tracks.

Invasive species

Rhododendron is present in the blanket bog in the west of the site with two mature bushes noted. However, it did not appear to be spreading. There are also a number of young spruce *Picea* sp. present across the bog and a few mature conifers. There is a patch of Japanese knotweed *Reynoutria japonica* present by the road at east end of site, adjacent to the Site boundary.



Photo 19. Rhododendron bush on blanket bog

Spatial and temporal pressures, threats and constraints for hen harrier foraging habitats

During the habitat surveys and during additional walkover and vantage point field surveys additional observations of pressures, threats and constraints were reviewed. These were considered both from existing land uses observations, and potential for the restoration and optimisation of the management area for hen harrier foraging.

Peatlands

Upland blanket bog (PB2)

There is only one part of the survey area, at the west, which is comprised of relatively intact blanket bog, but there are still drains recorded within and surrounding this area. The surrounding habitat e.g. conifers and associated plantation and forest boundary drainage may also compromise the water levels here. Within the areas of upland blanket bog on the Site key pressures for foraging hen harrier in these habitats include:

- Over grazing (sheep)
- Grazing / browsing (deer)
- Trampling and compaction (sheep / deer)
- Self-seeded conifers
- Self-seeded rhododendron
- Artificial drains and drainage
- Fly-tipping and littering (along juxtaposition with roads)
- Boundary composition
- Forest edge effects

Cutover bog (PB4)

The areas of cutover bog have been heavily modified in the past and in some parts of the survey area there is ongoing mechanised extraction, and grazing pressure is particularly high in some parts of these habitats resulting in very short swards and cover and concentration of over-grazing closer to the roads and fields and/or supplementary feeding sites. Key pressures for foraging hen harrier in these habitats include:

- Turf banks (old hand cut)
- Turf cutover (recent mechanical cutting)
- Vehicle disturbance (turf cutting)
- Vehicle compaction (turf cutting)
- Vehicle compaction (quads)
- Supplementary feeding of stock
- Trampling and compaction (sheep, deer)
- Disturbance (livestock; sheep)
- Over-grazing (sheep)
- Grazing / browsing (deer)
- Self-seeded conifers
- Fly-tipping and littering (along juxtaposition with roads)
- Poor sward height
- Poor sward cover
- Erosion and slippages
- Artificial drains and drainage
- Boundary composition
- Forest edge effects

Poor fen and flush (PF2)

These areas appear to have been largely reclaimed from blanket bog and or wet heath habitats over time through artificial drainage and are very heavily grazed, predominantly evidenced by sheep. There is generally poor heterogeneity of sward types and structure and in many places are dominated by rushes. Whilst rushes can provide good winter roosting habitats for hen harrier, generally these are poor for foraging birds and may require mechanical management and increased heterogeneity of swards. This can occur through creation of linear strips within the rush sward or creation of native hedgerow or boundary management. Restoration through drain blocking and removal of adjacent isolated conifer blocks and associated draining would optimise the area to the east of the Site. Key pressures for foraging hen harrier in these habitats include:

- Vehicle disturbance (farm vehicles)
- Vehicle compaction (farm vehicles)
- Vehicle compaction (farm vehicles)
- Access tracks and laneways (farm vehicles)
- Supplementary feeding of stock
- Trampling and compaction (sheep, cattle)
- Disturbance (livestock; sheep; cattle)
- Over-grazing (sheep)
- Over-grazing (cattle)
- Self-seeded conifers
- Fly-tipping and littering (along juxtaposition with roads)
- Low sward height
- Low sward cover
- Erosion and slippages
- Artificial drains and drainage
- Boundary composition

- Forest edge effects

Grassland

Wet grassland (GS4)

These areas are predominantly located at the eastern and north-eastern parts of the survey area and are interspersed with a range of other habitat types. Many of the fields are bounded by earthen and stone bunded drains, overgrown hedges and various tree lines and small woodland parcel and have varied botanical composition with occasional biodiverse areas. Many parts of this habitat are fertilised and mechanically mowed for silage with occasional longer margins left depending on topography and with some electric wire fencing. During field surveys in July 2024 there were around 80-100 bales recorded stored nearby presumably derived from a single recent cut. Many of these areas of grassland are bounded by conifer forest plantations. Key pressures for foraging hen harrier in these habitats include:

- Vehicle disturbance (farm vehicles)
- Vehicle compaction (farm vehicles)
- Vehicle compaction (farm vehicles)
- Access tracks and laneways (farm vehicles)
- Mechanical cutting of vegetation (silage)
- Mechanical cutting of vegetation (rush topping)
- Loss of prey / habitats due to mechanical cutting
- Supplementary application of fertilisers
- Supplementary feeding of stock
- Trampling and compaction (cattle)
- Disturbance (cattle)
- Over-grazing (cattle)
- Fly-tipping and littering (along juxtaposition with roads)
- Invasive species (fuchsia / snowberry)
- Temporal loss of vegetation (silage)
- Homogeneity of swards
- Low sward height
- Low sward cover
- Rush cover
- Low hedgerow and treeline diversity
- Artificial drains and drainage
- Boundary composition
- Forest edge effects

Acid grassland (GS3)

These areas are interspersed throughout the other habitat types mainly within the degraded heath and poor fen vegetation regions. These areas are typically heavily overgrazed by sheep and where they are located within the river gully are heavily dominated by developing native scrub and woodland. Key pressures for foraging hen harrier in these habitats include:

- Supplementary feeding of stock

- Trampling and compaction (sheep)
- Disturbance (sheep)
- Over-grazing (sheep)
- Self-seeded conifers
- Developing scrub
- Homogeneity of swards
- Low sward height
- Low sward cover
- Rush cover
- Artificial drains and drainage
- Boundary composition
- Forest edge effects

Heath

Dry siliceous heath (HH1)

These areas are generally located on steeper sided slopes, valleys and largely dependent on topography. In some areas past, and existing drainage is leader to drier habitats and more dry heath areas than may have originally been wet heath and/or blanket bog. The heath habitats, especially to the north of the main road through the site are heavily overgrazed by sheep. Key pressures for foraging hen harrier in these habitats include:

- Supplementary feeding of stock
- Trampling and compaction (sheep)
- Disturbance (sheep)
- Over-grazing (sheep)
- Self-seeded conifers
- Developing scrub
- Degenerate sward (heather)
- High sward height (inaccessible or under-grazed)
- Low sward height (overgrazed)
- Low sward cover (overgrazed)
- Artificial drains and drainage
- Boundary composition
- Forest edge effects

Wet heath (HH3)

Like the areas of dry heath these areas are primarily located along the river corridor at the western part of the site and a small remnant patch in the east within poor fen habitat and occurred in a mosaic interspersed with the other habitat types in the west. The drainage in these habitats is more naturalised, and heath has remained wetter although more widely the drainage has modified the original blanket bog. Grazing, peat slippage and burning of vegetation occurs more generally was recorded across the habitat. Key pressures for foraging hen harrier in these habitats include:

- Peat slippage
- Heather burning and fire

- Supplementary feeding of stock
- Trampling and compaction (sheep)
- Disturbance (sheep)
- Over-grazing (sheep)
- Self-seeded conifers
- Developing scrub
- Degenerate sward (heather)
- Low sward height (overgrazed)
- Low sward cover (overgrazed)
- Artificial drains and drainage
- Boundary composition
- Forest edge effects

Bracken (HD1)

This habitat only occurs only occasionally across the Site, and mostly within the river corridor mosaic of habitats. Bracken can exclude extensive areas of foraging habitat seasonally, as it grows and senesces seasonally. It can be 2-3m tall during the mid-summer months and prevent access for foraging birds including hen harrier. These areas are interspersed throughout the other habitat types at the western parts of the site. Key pressures for foraging hen harrier in these habitats include:

- Disturbance (sheep)
- Over-grazing (sheep)
- Self-seeded conifers
- Developing scrub
- Degenerate sward (heather)
- High sward height (inaccessible or under-grazed)
- Artificial drains and drainage
- Boundary composition
- Forest edge effects

Woodland and scrub

Woodland habitats in their early stages of development are highly utilised by foraging (and nesting) hen harrier. Developing scrub and young woodland sites are used by hen harriers from when they are 3-4m in height up to 7-10m tall before canopy closure limits suitability and typically avoid habitats once they are >5m (Madders, 2003). Within the management area there are a range of small woodland parcels and more extensively within and surrounding the site it is heavily dominated by coniferous plantation woodlands.

Semi-natural woodland (WN)

These habitats occur within various mosaics along the river corridors and also within and surrounding boundaries of fields in the eastern part of the site. Two areas of larger native woodland occur at the east and these areas comprise of older trees with well-developed canopies. Key pressures for foraging hen harrier in these habitats include:

- Lack of developing scrub
- Encroachment of scrub

- Expansion of scrub
- Maturation of scrub woodland
- Hedge composition and structure

Highly modified/non-native woodland (WD)

There are only small areas of coniferous woodland within the management area, but rather these areas represent a negative adjacent and circumferential effect all around the management area. Key pressures for foraging hen harrier in these habitats include:

- Self-seeded conifers
- Drainage of peatlands
- Drying of peatlands
- Encroachment of scrub
- Maturation of conifer woodland
- Forestry disturbance
- Forest edge effects

Field boundaries

Foraging hen harriers can benefit from linear features across a range of habitats, and these can be of varied compositions and structures. The quality and type of these features can be managed to optimise the area for hen harrier. There are a range of linear features and boundaries within and surrounding the management area (Figure 3) and several types of boundary features are evident including:

- Eroding/upland rivers (FW1)
- Drainage ditches (FW4)
- Spoil and bare ground (ED2)
- Recolonising bare ground (ED3)
- Active quarries (ED4)
- Stonewalls and other stonework (BL1)
- Roads and buildings (BL3)

Key pressures for foraging hen harrier in these habitats include:

- Overgrown hedgerows
- Over-grazing
- Fragmentation through fencing
- Traffic
- Quarrying
- Deer trampling
- Forest edge effects
- Modification of watercourses

Invasive species

There are key invasive species occurring at these lands including rhododendron, Japanese knotweed, and non-native conifers species the latter which appear to have self-seeded from adjacent plantations across a range of the extant open habitats. Deriving from several of residential properties and occurring predominately along the roadside verges and hedges there are also invasive fuchsia and snowberry occurring extensively.

The self-seeded rhododendron and conifers typically occur on the open moorland habitats and likely have derived from the adjacent conifer plantations and associated afforestation and forestry activities over the years. The fuchsia and snowberry typically occur in areas closer to dwellings and human habitations in the area and likely to have derived from ornamental and garden plantings in the area. Whilst vibrant in colour and the nectar of the former and berries of the latter may confer some wildlife benefits for bees and birds respectively, these are invading widely.

Management units and management opportunities and needs

Defining management units within a hen harrier habitat management program requires a multi-faceted approach, considering habitat requirements, human impacts, and stakeholder involvement. Through habitat restoration, effective land use management, and compensatory measures for unavoidable habitat loss, a robust conservation strategy can be developed to safeguard hen harrier populations.

This section provides further observations on aspects within the landscape that could offer further management opportunities and enhancement of the area within Folio 13. Sources of disturbance or displacement were also recorded during all surveys and attempts made to understand the potential reaction or responses of birds, and whether they might be directly impacted by any extant disturbance events and how these factors might be reversed.

There are a range of key potential habitat management opportunities at the Site, which include but are not limited to:

- Reduce sheep grazing on those areas of heath, blanket bog and poor fen which are negatively impacted by current grazing levels;
- Manage and reduce cattle (and sheep) grazing on grassland and moorland habitats;
- Manage some of the overgrown hedges in a rotation by coppicing to create a denser structure, fill gaps and reduce height;
- Creation of new (native species) hedgerows along pre-existing linear features (e.g. fences);
- Remove small conifers and *Rhododendron* from blanket bog habitat;
- Control any Japanese knotweed that may be encroaching onto the land;
- Remove invasive fuchsia and snowberry from hedgerows and replace with native species;
- Blocking and damming of small artificial drains which are within blanket bog habitat;
- Creation of wet features such as scrapes and dams to increase invertebrate and bird diversity;
- Cessation of peat cutting and restoration and revegetation of turbary areas;
- Protect and optimise areas of deep heather including with the usage of temporary fencing where required;
- Manage wet grassland with abundant *Succisa pratensis* as potential habitat for breeding marsh fritillary butterfly and other invertebrates;
- Maintain light cattle grazing to ensure a mix of tall tussocky vegetation and shorter areas and not cut all the rushes in the wet grassland fields;
- Protection and improvement of riparian woodland corridors, heath and scrub proliferation along watercourses;
- Retain old, ruined buildings and optimise and restore linear features or habitat features of interest;
- Manage human and machinery disturbance and timing of activities throughout the year;
- Reduce conifer forest edges at parcel interfaces with neighbouring lands and/or replant these with native woodland and scrub.

Generally, within each management units (Figure 4) there is a requirement to implement specific management measures and with reference to habitat types occurring (Figure 2) and linear features present (Figure 3). These are summarised in Table 1-1 below.

Some of these management units overlap with Dough Mountain NHA boundary, which is shown in Figure 5.

Table 1-1. Summary of potential management measures at each management unit

Management Unit No.	Area (ha)	Habitat types present	Potential management measures																						
			Nest protection measures	Drain blocking	Cessation of turf cutting	Re-profiling of old embankments	Naturalisation of watercourses	Creation of new / enhancement	Creation of new scrub	Planting of native grasses	Removal of conifers	Removal of invasive species	Reduction in grazing intensity	Access management	Deer management	Selective thinning of conifers along	Control of bracken	Selective thinning of encroachin	Community engagement	Rush management	Re-locating livestock	Transition from silage production
1	7.3	Cutover bog with a strip of blanket bog to the west and some parcels of dry heath with good heather coverage	✓	✓				✓	✓		✓	✓	✓	✓											
2	8.6	Cutover bog with large intact piece of blanket bog		✓			✓	✓	✓		✓	✓	✓	✓	✓										
3	10.4	Cutover bog with flushes of poor fen		✓			✓	✓			✓	✓	✓	✓		✓									
4	9.9	River corridor with heath, bracken, scrub, grassland, intact blanket bog and fen					✓	✓	✓	✓			✓				✓	✓							
5	19.7	Cutover bog and small section of coniferous woodland		✓	✓	✓		✓	✓		✓	✓		✓		✓									
6	8.3	Poor fen and wet grassland		✓				✓	✓				✓			✓		✓							
7	0.5	Poor fen and wet grassland		✓					✓					✓				✓							
8	2.4	Poor fen and wet grassland with adjacent conifer forest plantation, dwelling and a water treatment plant		✓					✓	✓	✓							✓	✓						
9	13.7	Wet grassland poor fen		✓					✓	✓			✓			✓		✓	✓	✓	✓	✓			
10	9.7	Wet grassland and riparian corridor						✓					✓	✓		✓		✓				✓			
11	9.6	Wet grassland and farm buildings		✓			✓	✓	✓			✓	✓			✓		✓				✓			
12	5.6	Poor fen and wet grassland mosaic, and wet heath		✓			✓		✓					✓				✓							

4.0 Figures

Figure 1. *Aerial imagery of the habitat management area (Folio 13).*

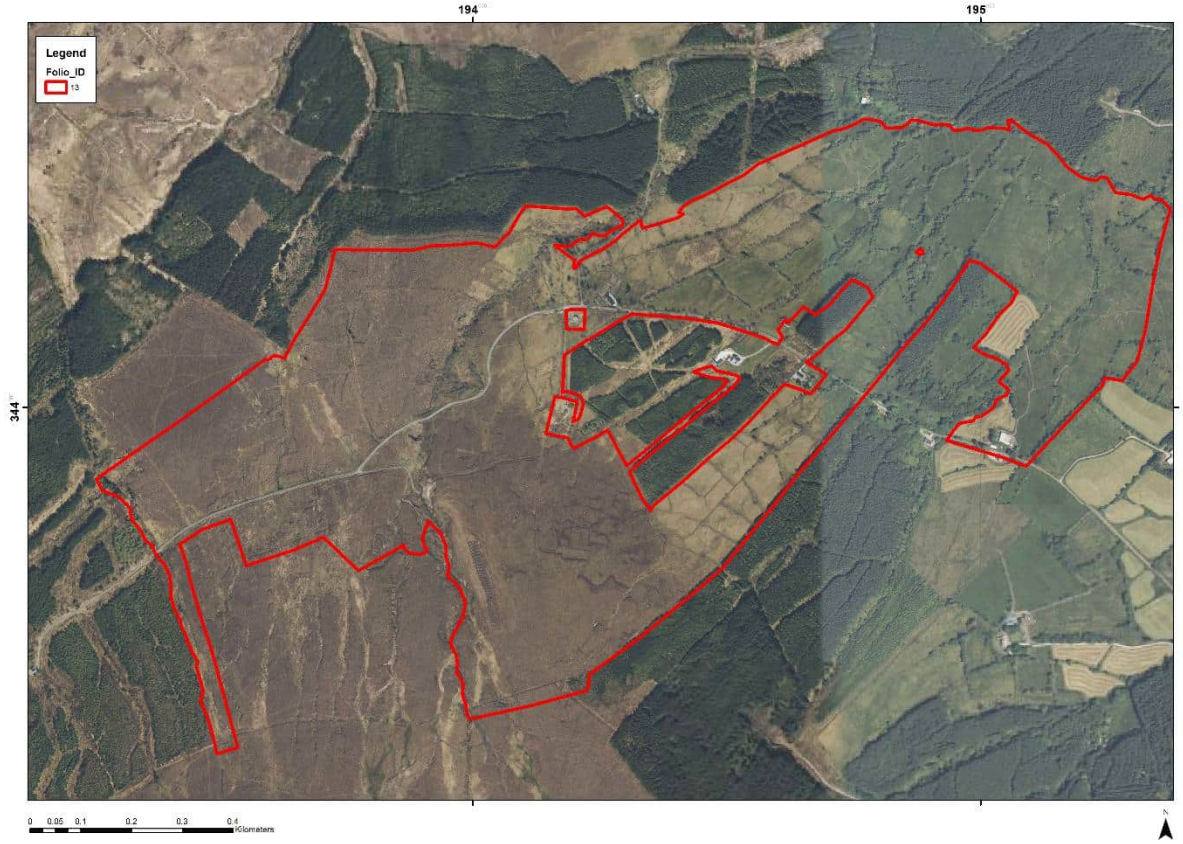


Figure 2. *Habitat map showing details of habitat types (Fossitt, 2000) at the habitat management area.*

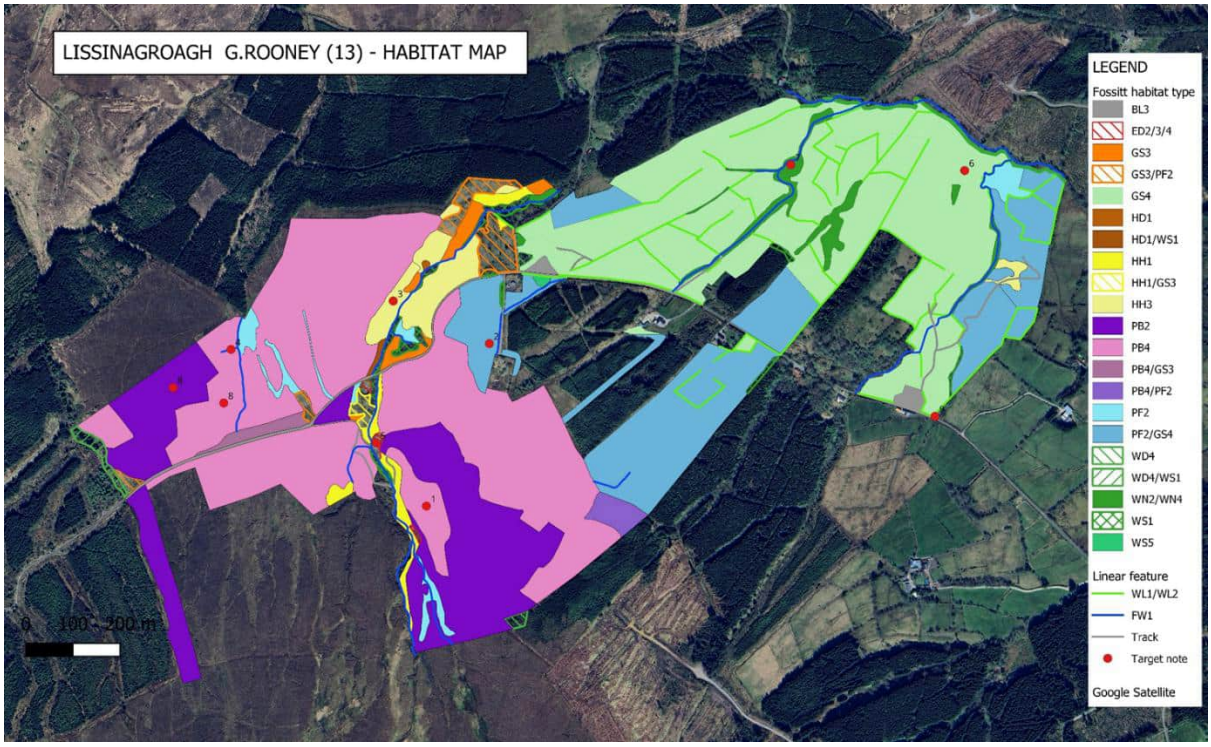


Figure 3. *Linear features observed throughout the habitat management area at Folio 13 including fences, hedges, scrub, tracks, roads, woodland edge, drains and watercourses/rivers.*

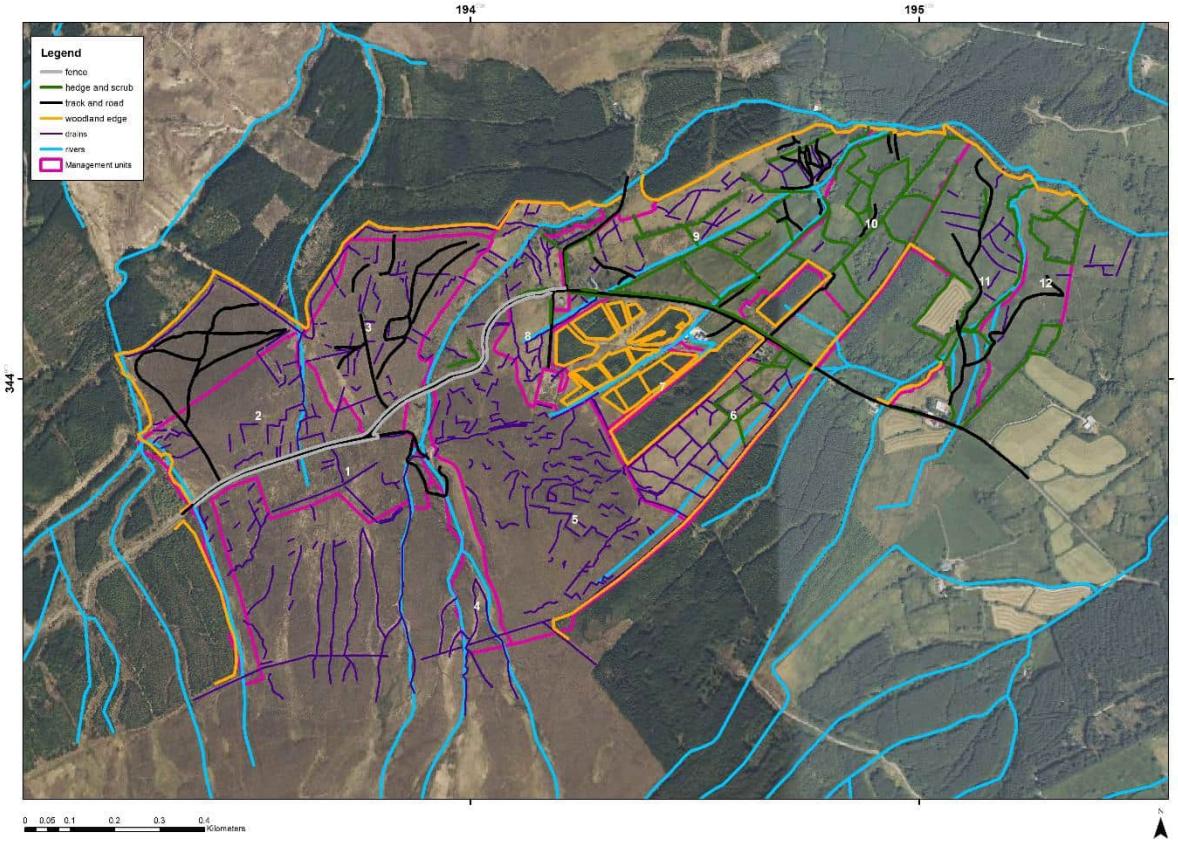


Figure 4. *Management units defined across Folio 13*

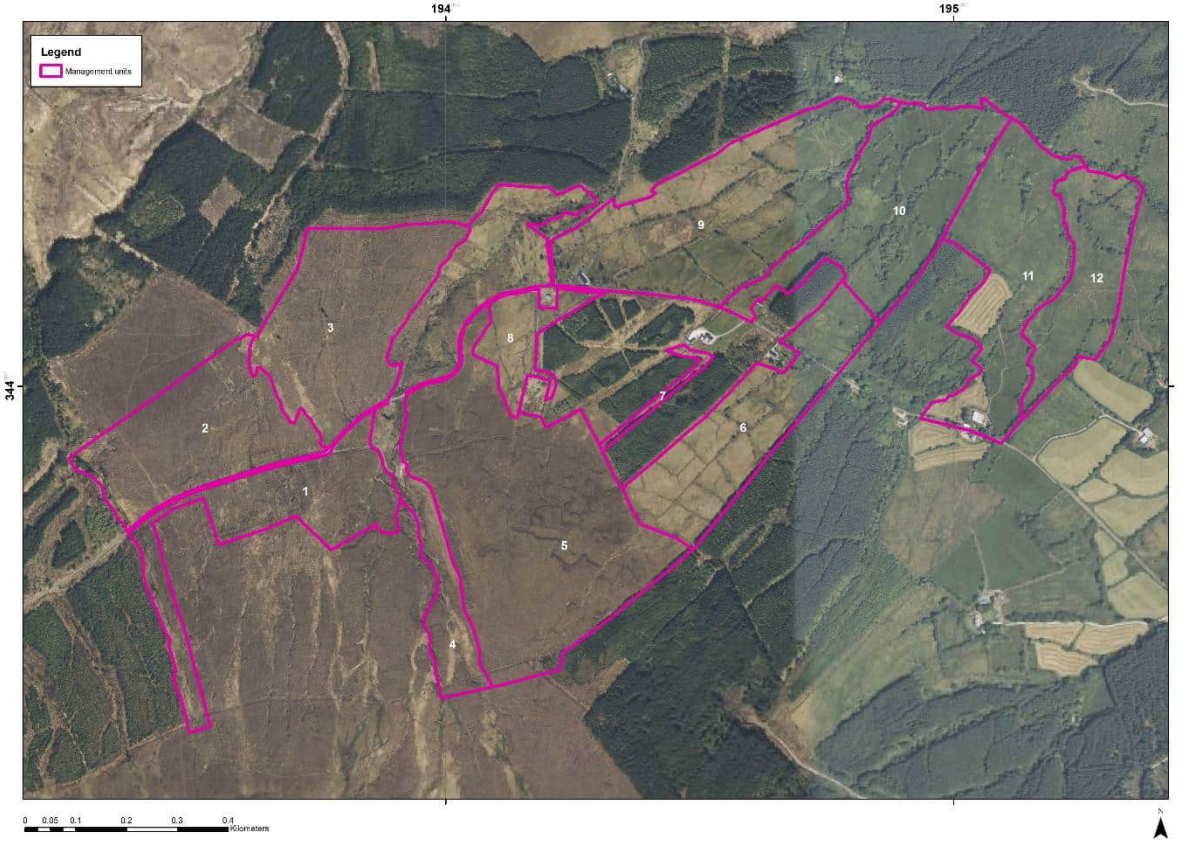
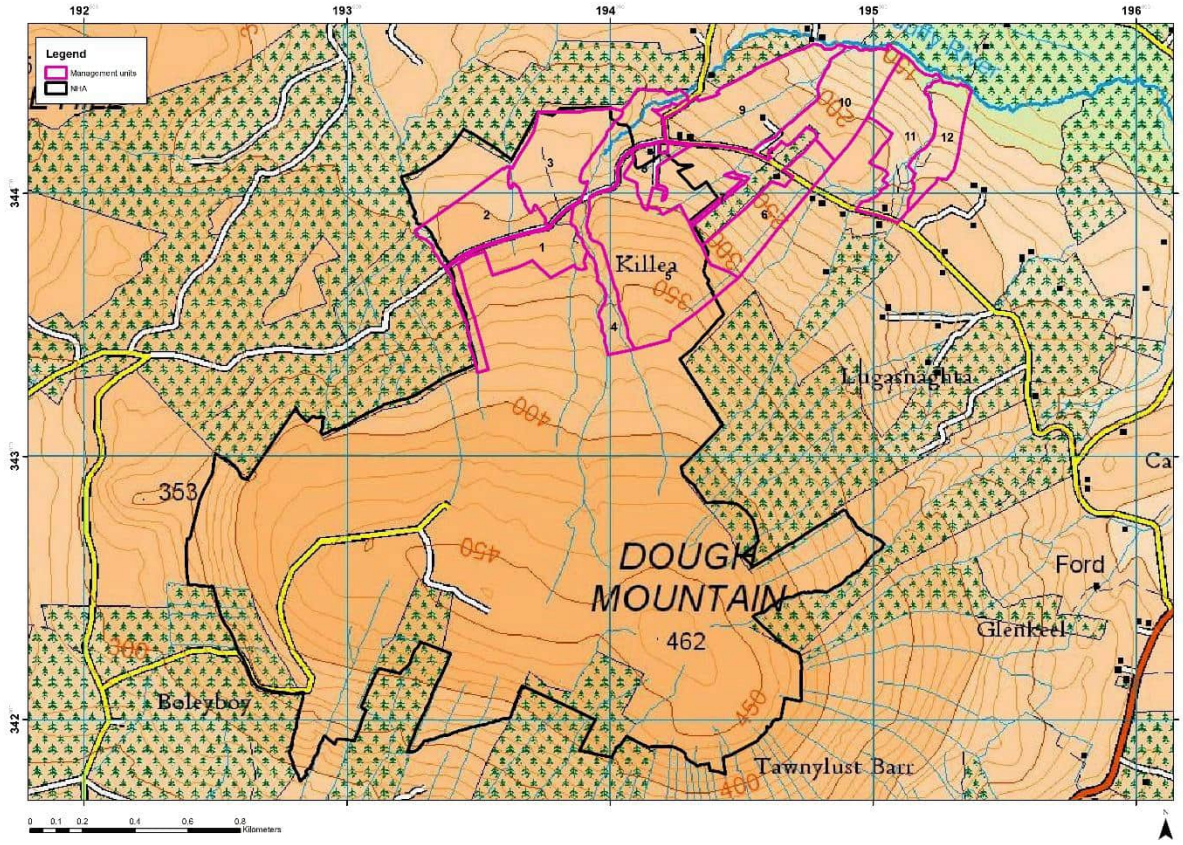


Figure 5. Management units MU1, MU2, MU3, MU4, MU5 and MU8 overlaps with the NHA boundary.



5.0 References

Fossitt, J. A. (2000). A Guide to habitats in Ireland. Heritage Council, Kilkenny.

Smith, G. F., O'Donoghue, P., O'Hora, K. & Delaney, E. (2011) Best practice guidance for habitat survey and mapping. Heritage Council, Kilkenny.

Appendix D Lissinagroagh Biodiversity Exhibit

Outline Biodiversity Management Plan

Lissinagroagh Wind Farm

FutureEnergy Ireland

SLR Project No.: 501.065072.00001

30 March 2026

Exhibit: Biodiversity Enhancement Measures

This exhibit outlines a comprehensive list of measures aimed at enhancing the biodiversity value and providing a foraging habitat for the hen harrier on the land subject to the Option Agreement between the Landowner and the Grantee. The Grantee may request the implementation of any of the following measures, as described herein, during the option period and the subsequent lease term. The actual measures to be implemented on the lands shall be further refined and detailed in the Biodiversity Farm Plan (the farm plan), which will be drafted after a detailed survey of the lands is conducted.

1. Works for Biodiversity Conservation / Enhancement:

The Grantor agrees, upon request by the Grantee, to carry out any works required for the purposes of conserving or improving biodiversity, in accordance with the Grantee's reasonable directions. The cost of such works, if necessary, shall be borne by the Grantee. Failure to implement such works may lead to non-payment of the lease rent and/or termination of the lease.

2. Access for Monitoring and Implementation:

The Grantor shall allow access to the Property by the Grantee or their appointed agents for the purposes of survey, monitoring and/or implementation of measures for conserving or improving biodiversity within the Property.

3. Land (Habitat) Management Measures:

The Grantor shall implement the following land management measures, which may include;

a. **Grassland Management:** Possible changes to the length of time lands are grazed, and reduction or increase in stocking density as deemed appropriate for biodiversity conservation. A stocking density of between 0.10LU and 1.40LU per hectare may be sought during the months of September to March. Advice on such requirements will be set out in the farm plan to prevent poaching or churning of lands.

b. **Rush Management:** No spraying rushes with glyphosate or other herbicides. This is important for ground nesting species such as hen harrier.

c. **Delayed Topping/Mowing:** To preserve habitats for nesting birds and other wildlife during the period 1 March – 31 August Inclusive. This is particularly important for ground nesting species such as hen harrier.

d. **Hedgerow Management:** Encouraging the establishment and preservation of hedgerows for nesting and sheltering wildlife. This may include additional planting (gapping up) of hedgerows to encourage dense growth and the exclusion of mechanical management of hedgerows such as use of a flail.

e. **Scrub Development:** Encouraging the growth of scrubland to provide diverse habitats for various species. Allowing hedgerows at suitable locations, to be agreed with the landowner, to expand into small pockets of scrub woodland. Scrub encroachment into grasslands would be discouraged through the continued use of grazing animals.

f. **Reduction in Fertilizer Application:** Reducing or ceasing the use of fertilizers in certain areas to promote biodiversity. The requirements for reduction or cessation of the application of fertilisers would be determined by soil testing and survey carried out to prepare the individual farm plan. The aim of this measure would be to allow a diversity of grassland species including soft rush to be present in the grassland sward. This measure would also assist in meeting the requirements of the Nitrates Directive and improve the quality of surface water run-off to streams and drains locally.

g. **Planting of Native Trees and Fruit Trees:** Adding native trees to gap up hedgerows or creating small orchards to support wildlife. This would be a measure that would be subject to suitable soil and land availability to develop small orchards or woodlands on the landholding and subject to the landowners agreement to implement same.

4. Prohibited Activities:

The Grantor shall not carry out or permit any of the following activities on the Property:

a. Burning Areas of Vegetation.

b. Removal of Hedgerows.

c. Planting of Conifers.

d. Land Drainage.

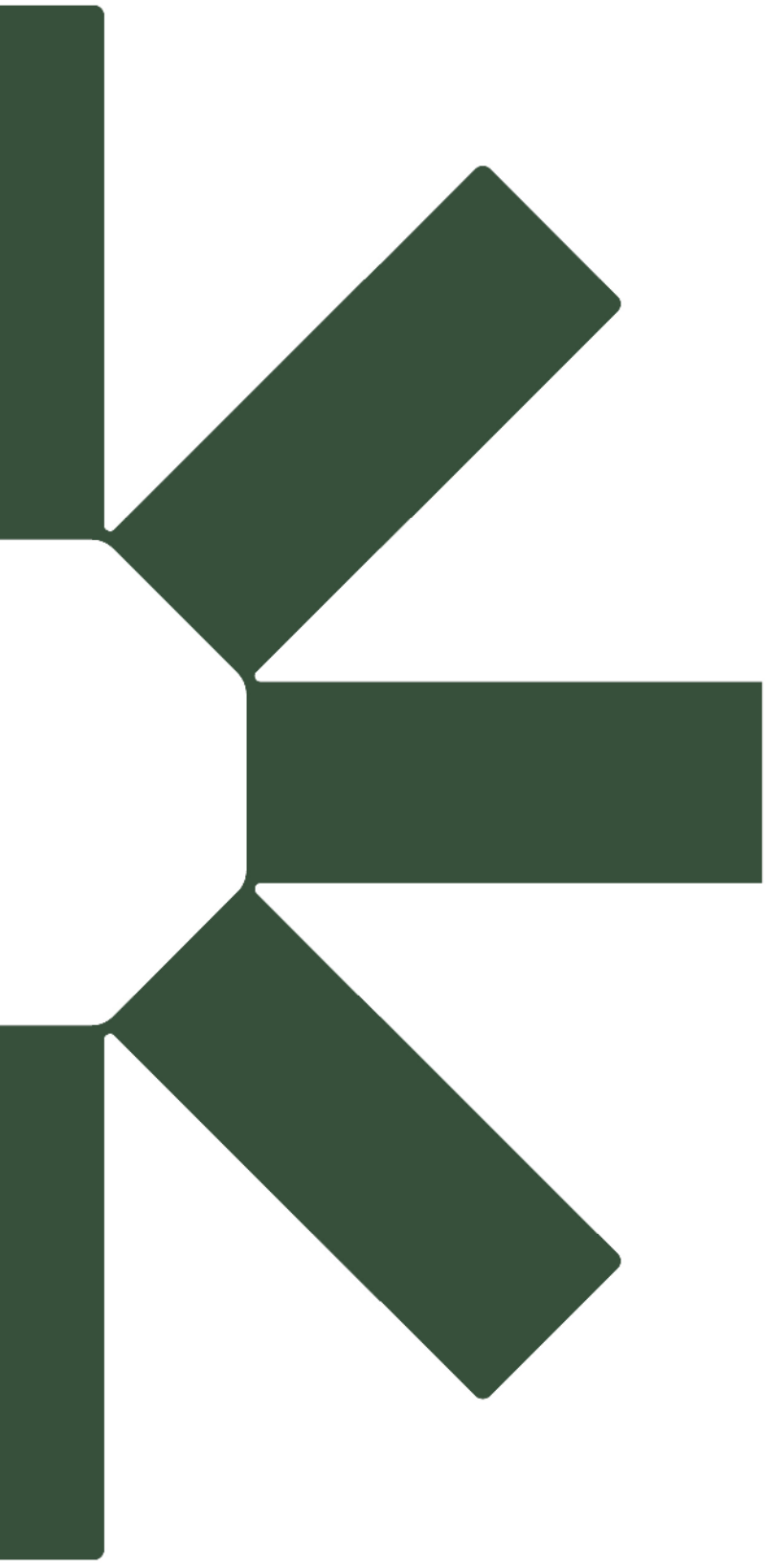
e. Organizing, Allowing, or Engaging in Recreational Activities Involving Off-road or Racing Vehicles.

f. Unapproved Use of Herbicides, Pesticides, or Rodenticides.

g. Turf Cutting.

5. Non-interference with Biodiversity Management:

The Grantor shall not do or permit to be done anything upon the Property that would interfere or be likely to interfere with the Grantor's management of lands for biodiversity granted by the lease agreement.



Making Sustainability Happen

Appendix 6-14

Avian Collision Risk Report

Avian Collision Risk Report

Lissinagroagh Wind Farm

FuturEnergy Ireland DAC

27-28 Herbert Place, Dublin 2, D02 DC98

Prepared by:

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SLR Project No.: 501.065072.00001

Client Reference No: IR.008820

26 January 2026

Revision: 1

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
0	6 August 2025	Jonathon Dunn	Michael Austin	Duncan Watson
1	26 January 2026	Jonathon Dunn	Michael Austin	Duncan Watson
	Click to enter a date.			
	Click to enter a date.			
	Click to enter a date.			

Basis of Report

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Executive Summary

The aim of this report is to describe the collision risk modelling process undertaken for the Lissinagroagh Wind Farm project in Co. Leitrim, and to provide outputs such that any potentially significant collision-related effects on birds can be identified in the accompanying Environmental Impact Assessment (EIA) and Natura Impact Statement (NIS) reports. Modelling was undertaken based on ornithological data collected by MKO over the period from September 2020 to September 2025 for 12 bird species and one candidate turbine model, the Nordex N163-7.2. The model chosen was a random (i.e. non-directional) model and was implemented following NatureScot (2024) best-practice guidance. In general, the probability of collision risk for the candidate turbine model was highest for common snipe, followed by common kestrel. The probability of collision risk was relatively low for other species such as hen harrier and white-tailed eagle. While the model outputs provide a theoretical estimate of collision risk, they do not directly reflect whether collision is likely to have significant effects on avian populations, which is addressed within the accompanying EIA and NIS reports. Furthermore, the modelling is subject to various limitations and qualifications, which are discussed in the report.

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Appendices

Appendix A NatureScot Spreadsheets – Nordex N163

Acronyms and Abbreviations

CIEEM	Chartered Institute of Ecology and Environmental Management
CRM	Collision Risk Model
EIA	Environmental Impact Assessment
FEI	FuturEnergy Ireland DAC
GIS	Geographical Information Systems
HB	Height Band
MW	Megawatt
NIS	Natura Impact Statement
NS	NatureScot
PCH	Potential Collision Height
SCI	Special Conservation Interest
SPA	Special Protection Area
The Project	Lissinagroagh Wind Farm
VP	Vantage Point
WP	Wind Farm Polygon

1.0 Introduction

This report presents the results of Collision Risk Modelling (CRM) undertaken for 12 bird species to inform the assessment of potential ornithological impacts relating to the proposed Lissinagroagh Wind Farm (hereafter “the Project”), which has a layout comprising 14 turbines in one array.

As agreed with FuturEnergy Ireland DAC (hereafter “FEI”), modelling was based on the use of one turbine model: the Nordex N163 7.2 MW turbine type with a rotor diameter of 163 m, tip height of 185 m, and hub height of 103.5 m. This turbine was chosen as it represents the worst-case of the various candidate turbine models under consideration in that it has the longest rotor, lowest ground clearance and equal highest tip height.

The CRM was undertaken in accordance with current NatureScot (NS) (formerly Scottish Natural Heritage) guidance[1], which is recognised as standard best practice guidance through the UK and Ireland to inform impact assessment for onshore wind farms. Further details regarding the methodology used, including details of assumptions used and any corrections applied, are provided in section 2.0. The modelling results are presented in section 3.0 and copies of the modelling calculations for each species modelled are included in Appendix A.

[1] NatureScot (2024). Guidance on using an updated collision risk model to assess bird collision risk at onshore wind farms. NatureScot, Battleby, Scotland.

2.0 Methods

2.1 Statement of Authority

The modelling and report writing were conducted by Dr Jonathon Dunn MCIEEM. Jonathon is an Associate Ornithologist with SLR and has over 10 years' experience in the environmental sector and has completed CRM training delivered by the Chartered Institute of Ecology and Environmental Management (CIEEM). He has conducted CRMs for several onshore wind farms in Ireland.

Quality assurance and technical review were provided by Michael Austin MCIEEM. Michael is an Associate Ornithologist with SLR and has over 10 years' experience undertaking CRM. He was trained in CRM at RPS and has taken a lead role in CRM at SLR having conducted many CRMs for onshore wind farms in the UK and Ireland.

The approval review was undertaken by Duncan Watson CEnv, MCIEEM. Duncan is a Technical Director with SLR and has over 27 years' experience with ecological impact assessments for renewable energy projects, with a particular focus on ornithology. He has managed, undertaken or technically reviewed the assessments at over 90 proposed wind farms, ensuring robust CRM as part of the review process, where relevant.

2.2 Primary Target Species

Target species for the surveys were defined by legal and/ or conservation status and vulnerability to impacts caused by wind turbines, as defined in NS (2025) guidance[2]. Bird species of high conservation importance are those which are Annex I species and other species of high conservation importance which are potentially vulnerable to impacts from wind farm developments. The following species were therefore considered relevant as primary target species:

- Annex I raptor species;
- All red-listed non-passerine species; and
- Special Conservation Interests (SCIs) of Special Protection Areas (SPAs) within 20 km of the Project.

2.3 Overview of CRM Process

As per current NS guidance, the updated Band CRM (Band 2024[3]) was used to estimate collision risk based on recorded primary target species activity levels and flight behaviour, proposed turbine numbers and specifications, and the relevant species biometrics and flight characteristics. Modelling collision risk under the Band CRM[3] is summarised below:

- Stage A uses bird survey data to establish the density of flying birds in the vicinity of the turbines, and the proportion flying at a risk height, between the lowest and highest points of the rotors;
- Stage B provides an estimate, based on the bird density and proportion at risk height, of the potential number of bird passages through rotors in the period in question;

[2] NatureScot (2025). Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms. Version 2. Note that the 2017 version of this guidance was used to determine target species at the time of survey, but the text on the definition of target species remains the same in the 2025 update.

[3] Band, W. 2024. Using a collision risk model to assess bird collision risks for onshore wind farms. NatureScot Research Report 909.

- Stage C calculates the probability of collision during a single bird rotor transit;
- Stage D estimates the potential collision rate for a bird species, assuming current levels of bird use of the site, allowing for the proportion of time that turbines are not operational; and
- Stage E takes account of the proportion of birds likely to avoid the wind farm or its turbines, either because they have been displaced from the site or because they take evasive action or are attracted to the wind farm, e.g. in response to changing habitats.

A full description of the different stages of the CRM is given in NS (2024)[1] guidance.

We have employed a non-directional (i.e. randomly distributed flights) CRM. The alternative modelling approach would be a directional (i.e. non-randomly distribute flights) CRM. The difference between the two modelling approaches depends on flight distributions and bird behaviours. Thus, if birds are regularly making flights along a defined axis, e.g. between nesting and foraging grounds, or as part of migration, then a directional CRM is appropriate. As we have no evidence of this for the Project, a non-directional CRM is the correct choice of model.

The modelling was carried out using the spreadsheet supplied with the NS (2024)[1] guidance.

The data used for the different stages of CRM are outlined below.

2.4 Stage A

2.4.1 Viewshed Data

Four vantage points (VPs) were used for flight activity surveys.

Viewshed data, i.e., the area visible from each VP within the wind farm polygon (WP)[4], are summarised in Table 2-1. These VP locations and viewshed data are shown within the accompanying EIA report.

For the Nordex N163, based on an offset of 22 m (i.e. the lowest height swept by the turbine rotors), the combined viewshed area (minus overlap) from VPs 1 - 4 (6,994,217 m^2) represents 78.7% of the WP (8,884,205 m^2) (Table 2-1).

Table 2-1: VP Viewshed Data

VP / Viewshed Number	ITM Coordinates (x,y)	Area of visibility[5] (m^2)
VP 1	592932, 842222	1,792,183
VP 2	592617, 842416	2,890,444
VP 3	593500, 843676	2,118,268
VP 4	590414, 840986	1,086,620
VPs 1-4 viewshed combined (minus overlap)		6,994,217

[4] The wind farm polygon (WP) includes the area within 500 m plus rotor blade length, extending from within the centre of each turbine tower, also known as 'the turbine envelope'. Thus, the size of the WP considers both rotor blade length and potential spatial errors in flight recording accuracy.

[5] Areas calculated in GIS using an offset of 22 m above ground level for the Nordex 163 candidate turbine

2.4.2 Seasonal Definitions

The periods used in the flight activity survey design broadly equate to the breeding and non-breeding season periods for most bird species, defined by NatureScot (2025) guidance[2] as April – August (breeding season) and September – March (non-breeding season). There was a slight discrepancy in that the MKO surveys considered September part of the breeding season and are included this way in their baseline bird reports; however, for the purposes of this CRM, we have considered September's survey effort and flight activity results as part of the non-breeding season.

For golden plover *Pluvialis apricaria*, there was evidence of raised flight activity during migration periods. Consequently, the spring and autumn migration seasons were also considered for this species, with spring defined as March to May inclusive, and autumn as September to November inclusive.

2.4.3 Flight Activity Survey Data

Flight activity data from the four VPs described in Section 2.4.1 were collected during baseline surveys carried out by MKO over a period of five years, between September 2020 to September 2025. Survey data comprise five complete breeding periods and two complete non-breeding periods, plus four additional partially completed non-breeding seasons (i.e. September 2022, September 2023, September 2024 and September 2025).

The total number of hours of survey at each VP are as shown in Table 2-2 (MKO, 2025[6]; MKO, 2025[7]; MKO, 2023[8]; MKO, 2023[9]; MKO, 2024[10]; MKO, 2025[11]; MKO, 2025[12]), which are far in excess of the minimum of 144 hours per VP over a two-year period required by NS guidance[2]. It is acknowledged that the number of survey hours for each individual breeding season falls short of the 36 hours per season requirement. This is because September's survey effort and flight activity results have been considered as part of the non-breeding season for the purposes of the CRM (see Section 2.4.2). Overall, however, survey coverage during the breeding season greatly exceeds the minimum of 72 hours per VP per season required by the same NS guidance.

Consequently, September 2022, 2023, 2024 and 2025 are the only survey months for the non-breeding seasons in those survey years. The flight activity data from these months are not representative of full non-breeding seasons; however, when non-breeding seasons comprising September only were excluded from the subsequent analysis, the resulting average CRM estimates were virtually identical, and so the data are presented to provide a fuller picture of flight activity across the entire survey period.

[6] MKO (2025). Lissinagroagh Wind Farm, Co. Leitrim. Winter Season 2020-2021. MKO, Galway, Ireland.

[7] MKO (2025). Lissinagroagh Wind Farm, Co. Leitrim. Breeding Season 2021. MKO, Galway, Ireland.

[8] MKO (2023). Lissinagroagh Wind Farm, Co. Leitrim. Winter Bird Survey Report 2021/22. MKO, Galway, Ireland.

[9] MKO (2023). Lissinagroagh Wind Farm, Co. Leitrim. Breeding Bird Survey Report 2022. MKO, Galway, Ireland.

[10] MKO (2024). Lissinagroagh Wind Farm, Co. Leitrim. Breeding Bird Survey Report 2023. MKO, Galway, Ireland.

[11] MKO (2025). Lissinagroagh Wind Farm, Co. Leitrim. Breeding Bird Survey Report 2024. MKO, Galway, Ireland.

[12] MKO (2025). Lissinagroagh Wind Farm, Co. Leitrim. Breeding Bird Survey Report 2025. MKO, Galway, Ireland.

Table 2-2: VP Surveys undertaken at the Project Site, Sep 2020 to Sep 2025

VP Number	Hours of Survey Completed per Survey Period											
	Sep 2020 – Mar 2021	Apr – Aug 2021	Sep 2021 – Mar 2022	Apr – Aug 2022	Sep 2022	Apr – Aug 2023	Sep 2023	Apr – Aug 2024	Sep 2024	Apr – Aug 2025	Sep 2025	Total
1	42	30	42	27	6	30	6	31	0	30.5	6	250.50
2	42	30	42	31	9	30	6	30	0	25	6	251.00
3	43	30	48	30	6	27	6	30	6	25	6	257.00
4	42	30	42	27	6	30	6	30	0	25	6	244.00

The raw number of flight lines (i.e. including those inside and outside the WP, and those within, below and above potential collision height (PCH)), cumulative number of birds and flying time in each height category (also known as 'height band' or HB, see Section 2.4.6) per VP for each survey period is shown in Table 2-3. Note that only data for survey periods and VPs where flight activity was recorded for the relevant species are shown for brevity. Survey periods have been abbreviated, such that 'B' = breeding season and 'NB' = non-breeding season, with survey year given by the suffix.

Table 2-3: Details of Raw Flight Lines Recorded, both Inside and Outside the WP

Species	Survey Period	VP No.	No. of Flight Lines	No. of Birds	Total Flying Time (s)	Time in height category (s)			
						HB1	HB2	HB3	HB4
Black-headed gull *Chroicocephalus ridibundus*	B22	VP3	1	28	210	0	0	90	120
	B23	VP1	3	91	3835	350	3010	475	0
		VP4	5	190	1510	20	460	1040	0
	NB23_24	VP3	3	24	535	0	85	450	0
	B24	VP2	1	3	95	0	0	80	15
		VP4	1	13	55	0	10	45	0
	B25	VP2	1	3	240	0	0	240	0
	NB25_26	VP4	1	3	50	0	0	50	0
Cormorant *Phalacrocorax carbo*	B23	VP4	1	3	250	0	0	250	0
	B24	VP3	1	2	90	0	0	70	20
	B25	VP4	1	1	42	0	0	42	0
Golden plover	NB20_21	VP3	1	6	20	0	0	20	0
	B21	VP1	4	194	1901	0	715	1186	0
	NB21_22	VP1	7	345	806	8	35	763	0
		VP2	4	110	52	52	18	0	34
		VP3	1	12	15	0	15	0	0
		VP1	2	22	435	40	100	295	0

Species	Survey Period	VP No.	No. of Flight Lines	No. of Birds	Total Flying Time (s)	Time in height category (s)			
						HB1	HB2	HB3	HB4
	NB22_23	VP4	1	8	75	0	0	75	0
	B24	VP2	1	15	140	0	90	50	0
	NB24_25	VP3	1	12	18	0	0	18	0
Hen harrier *Circus cyaneus*	NB20_21	VP2	2	2	30	30	0	0	0
		VP3	2	2	82	75	7	0	0
		VP4	1	1	18	18	0	0	0
	B21	VP1	8	8	604	361	223	20	0
		VP3	14	14	1645	622	668	325	30
	NB21_22	VP1	2	2	80	0	50	30	0
		VP2	21	36	1862	489	713	710	0
		VP3	2	2	93	93	0	0	0
		VP4	7	7	676	203	130	343	0
	B22	VP1	6	6	502	437	65	0	0
		VP2	5	6	1002	631	116	105	150
		VP3	12	12	567	387	180	0	0
	NB22_23	VP1	1	1	160	150	10	0	0
	B23	VP1	12	12	1526	46	180	1000	180
		VP2	13	13	3345	1515	1280	550	0
		VP3	1	1	110	90	20	0	0
		VP4	8	8	330	42	268	20	0
	B24	VP1	5	5	400	295	95	10	0
		VP2	11	11	1845	1045	440	360	0
		VP3	1	1	55	0	55	0	0
	B25	VP1	3	3	193	64	40	89	0
		VP3	1	1	110	0	0	30	80
	NB25_26	VP1	1	1	66	30	15	21	0
		VP3	2	2	32	12	2	18	0
Herring gull *Larus argentatus*	B23	VP1	2	23	1025	0	0	1025	0
	B23	VP3	1	1	40	0	10	30	0
	NB23_24	VP4	1	7	320	0	0	320	0
	B25	VP2	2	2	290	35	255	0	0
Kestrel *Falco tinnunculus*	NB20_21	VP1	1	1	170	0	60	110	0
		VP2	1	1	190	0	160	30	0

Species	Survey Period	VP No.	No. of Flight Lines	No. of Birds	Total Flying Time (s)	Time in height category (s)			
						HB1	HB2	HB3	HB4
	B21	VP3	3	3	630	430	150	50	0
	NB21_22	VP2	3	3	265	5	93	167	0
		VP3	4	4	1038	61	339	643	0
	B22	VP1	2	2	350	100	250	0	0
		VP2	4	5	803	190	243	310	60
		VP3	1	1	240	0	60	180	0
	NB22_23	VP2	1	1	60	0	60	0	0
		VP3	1	1	36	16	20	0	0
		VP4	1	1	200	25	105	70	0
	B23	VP2	1	1	590	60	180	250	0
		VP3	1	1	350	40	260	50	0
		VP4	3	3	1110	130	420	560	0
	NB23_24	VP1	1	1	30	0	20	10	0
		VP2	1	1	100	0	0	100	0
		VP4	1	1	475	0	350	125	0
	B24	VP1	10	10	2510	135	1005	1290	0
		VP2	11	11	5075	315	1370	3390	0
		VP3	2	2	390	5	85	300	0
		VP4	5	5	4135	70	1615	2450	0
	B25	VP1	5	5	69	38	31	0	0
		VP2	2	2	175	45	80	50	0
		VP3	4	4	65	5	55	5	0
	NB25_26	VP1	4	4	806	55	135	566	50
		VP4	1	1	7	7	0	0	0
Lesser black-backed gull *Larus fuscus*	B21	VP3	1	2	28	3	25	0	0
		VP4	1	4	51	0	0	51	0
	B22	VP1	1	6	470	0	230	140	0
		VP2	2	7	60	0	20	40	0
		VP3	2	45	900	70	380	370	80
		VP4	3	34	565	0	50	515	0
	B23	VP1	6	71	4522	420	2782	1360	60
		VP2	4	26	805	68	97	640	0
		VP3	3	44	1120	0	200	920	0
		VP4	3	11	611	0	51	360	200
	NB23_24	VP3	3	62	800	0	180	620	0

Species	Survey Period	VP No.	No. of Flight Lines	No. of Birds	Total Flying Time (s)	Time in height category (s)			
						HB1	HB2	HB3	HB4
	B24	VP1	7	29	975	15	225	710	25
		VP2	9	45	705	0	130	575	0
		VP3	1	2	80	0	0	80	0
		VP4	10	30	590	0	50	540	0
	B25	VP1	2	5	155	0	0	45	110
		VP3	5	14	330	0	100	210	20
		VP4	8	38	765	0	70	250	445
Little egret *Egretta garzetta*	B23	VP3	2	5	320	0	170	150	0
Mallard *Anas platyrhynchos*	B23	VP4	1	13	320	0	0	320	0
	NB25_26	VP4	1	3	14	0	14	0	0
Merlin *Falco columbarius*	NB20_21	VP3	1	1	9	9	0	0	0
	NB22_23	VP4	1	1	28	28	0	0	0
	B23	VP4	1	1	130	60	70	0	0
	B24	VP3	5	5	635	535	100	0	0
	B25	VP3	3	3	85	65	20	0	0
Peregrine falcon *Falco peregrinus*	NB20_21	VP2	1	1	60	0	0	40	20
	B25	VP2	1	1	135	0	0	135	0
		VP3	1	1	50	0	0	20	30
Red grouse *Lagopus lagopus hibernica*	NB22_23	VP3	1	1	8	8	0	0	0
Snipe *Gallinago gallingo*	B21	VP1	1	1	7	7	0	0	0
	NB21_22	VP1	4	5	68	0	18	50	0
		VP2	2	2	11	5	6	0	0
		VP3	3	4	17	10	7	0	0
		VP4	1	1	3	0	3	0	0
	B22	VP4	4	18	460	35	410	15	0
	NB22_23	VP1	1	2	45	0	45	0	0
		VP3	1	6	27	10	17	0	0
	B23	VP1	2	6	200	35	145	20	0
		VP4	2	17	1150	150	720	260	0
	NB23_24	VP3	2	8	120	80	35	0	0

Species	Survey Period	VP No.	No. of Flight Lines	No. of Birds	Total Flying Time (s)	Time in height category (s)			
						HB1	HB2	HB3	HB4
	B24	VP1	18	45	2390	440	510	1440	0
		VP2	6	10	1630	85	415	1130	0
		VP3	34	87	2210	295	465	1460	0
		VP4	16	27	4105	25	1190	2895	0
	B25	VP1	9	20	2595	20	315	860	1400
		VP2	9	16	3105	35	245	2275	550
		VP3	22	68	7066	171	850	4855	1190
		VP4	9	13	2640	0	820	1690	130
	NB25_26	VP1	1	6	46	0	0	46	0
		VP3	1	1	5	2	3	0	0
White-tailed eagle *Haliaeetus albicilla*	B23	VP2	1	1	1050	0	0	450	600
	B24	VP2	1	1	670	0	0	270	400
	B25	VP1	2	2	820	0	700	120	0
Whooper swan *Cygnus cygnus*	NB21_22	VP1	1	8	50	0	0	50	0
Woodcock *Scolopax rusticola*	NB20_21[13]	VP4	4	-	-	-	-	-	-
	NB21_22	VP4	3	3	13	5	8	0	0
	B22	VP3	1	1	5	5	0	0	0
	B23	VP4	1	1	5	0	5	0	0

2.4.4 Flight Selection for CRM

To select flights liable to incur a potential risk of collision, i.e., within the areas occupied by proposed turbines, the CRM used only observations collected within the WP[4]. It is known that bird detection rates vary between species. To ensure the CRM used robust measures of flight activity, a 2 km distance truncation was used in the viewshed from each VP, i.e., only flights within 2 km of each VP were included (as per NS 2025 guidance[2]).

Analysis in Excel and GIS identified those flights described in Table 2-3 that were within the WP.

Where flights occurred both within and outside the WP, the proportion of each flight line inside vs. outside the WP was also calculated using GIS.

This was undertaken for all primary target species regardless of the number of flight lines or cumulative numbers of birds.

[13] Flight details were not recorded. These flight lines were outside of the WP so were not at collision risk, so the lack of details does not affect the CRM assessment.

2.4.5 Bird Density

Flying time estimated to occur within each of the survey recording height bands was used to determine the period that target species were at risk of collision with the rotors.

This was undertaken as follows. First, the time spent flying was estimated from interval data for flight lines that entered the WP. Second, these flight times were then multiplied by the proportion of each flight line length within the WP. Third, these flight times were then multiplied by the total number of individuals recorded per flight line to identify the total flying time in bird-seconds.

The total flying time (aggregated across all survey height bands) of species taken forward to CRM is given in Table 2-4, split by survey period and VP number. As this step only involves flights within the WP, there may be some differences in Table 2-4 vs. Table 2-3, which displays all flights, regardless of whether they were within the WP or not. This step resulted in the removal of little egret, mallard, whooper swan and woodcock from further consideration, none of which were recorded within the WP. Collision risk for these species, based on the recorded flight data, is therefore zero.

2.4.5.1 Total Flying Time

Table 2-4: Total Flying Time within the WP

Species	Survey Period	VP No.	Total Flying Time within the WP (bird-secs)
Black-headed gull	B23	VP1	2707.97
		VP4	885.43
	NB23_24	VP3	1795.94
	B24	VP2	153.70
		VP4	43.59
Cormorant	B23	VP4	250.89
Golden plover	NB21_22	VP1	405.26
		VP2	1151.73
	NB22_23	VP1	1985.50
	B24	VP2	858.74
	NB24_25	VP3	68.29
Hen harrier	NB20_21	VP2	30.00
		VP4	3.98
	B21	VP1	140.70
		VP2	2698.64
		VP3	810.20
		VP4	1095.22
	NB21_22	VP1	8.99
		VP2	3405.69
		VP4	93.39
	B22	VP1	247.52

Species	Survey Period	VP No.	Total Flying Time within the WP (bird-secs)
		VP2	345.32
		VP3	248.53
	B23	VP1	583.03
		VP2	398.62
		VP4	127.07
	B24	VP1	171.39
		VP2	1522.27
		VP3	55.00
	B25	VP1	33.85
	NB25_26	VP1	9.92
Herring gull	B23	VP1	1175.23
	B25	VP2	158.83
Kestrel	B21	VP3	22.87
	NB21_22	VP2	257.39
		VP3	183.27
	B22	VP2	742.64
	NB22_23	VP2	60.00
		VP3	36.00
	B23	VP2	490.00
	B24	VP1	22.59
		VP2	79.78
		VP3	1001.41
	B25	VP2	4264.51
	NB25_26	VP1	9.02
Lesser black-backed gull	B22	VP1	588.88
		VP2	178.90
		VP4	185.14
	B23	VP1	5684.64
		VP2	2760.06
		VP3	987.45
	B24	VP1	662.83
		VP2	609.54
		VP4	286.31
	B25	VP1	155.91
		VP3	287.52

Species	Survey Period	VP No.	Total Flying Time within the WP (bird-secs)
		VP4	75.98
Merlin	NB20_21	VP3	1.54
	B24	VP3	61.18
Peregrine falcon	B25	VP2	135.00
		VP3	22.34
Red grouse	NB22_23	VP3	0.57
Snipe	B21	VP1	7.00
		VP2	9.00
	NB21_22	VP1	28.07
		VP2	11.00
		VP3	0.12
	B22	VP3	207.72
	NB22_23	VP1	80.01
	B23	VP1	125.91
		VP2	360.02
		VP3	29.24
		VP4	700.62
	B24	VP1	576.38
		VP2	3200.62
		VP3	74.19
	B25	VP1	2513.26
		VP2	14472.77
		VP3	62.89
	NB25_26	VP1	0.05
		VP3	7.00
White-tailed eagle	B23	VP2	519.04
	B24	VP2	408.44
	B25	VP1	171.33

2.4.5.2 Bird Density Results

Next, bird density was calculated by dividing flying time by the period of the watch in seconds multiplied by the area of the WP visible within each viewshed. This was undertaken using the flight time data in Table 2-4, the total survey effort given in Section 2.4.3 and viewshed data given in Section 2.4.1.

These data were calculated for each month, VP number and survey period per species. They were then averaged across all VPs, as outlined in NS (2024) guidance[1] for each species, season and month, to provide a mean figure of bird density per month, per season, along with the standard deviation.

As there were significant differences in the area covered by the VPs, with the viewshed from VP4 covering a much smaller area than those for other VPs (see Table 2-1), the mean density figure was weighted by the area observed and the duration of the VP watches as recommended by NS (2024) guidance[1].

This was calculated using the following formula where b_i = the number of flight seconds from each vantage point, t_i = the time in seconds that the vantage point was watched and A_i was the area of the vantage point viewshed in km^2:

$$\frac{\sum b_{i'} \frac{\sqrt{t_i . A_i}}{t_i . A_i}}{\sum \sqrt{t_i . A_i}}$$

In most instances, this only resulted in relatively minor differences in bird density compared to those given by the straight mean.

There were no notable differences between underlying habitats in each VP viewshed (i.e. variations of conifer plantation, improved agricultural and wet grasslands and peatland habitats were present in all viewsheds), so a turbine-weighted average bird density was not used.

The results of this process are given in Table 2-5. Note that months are represented numerically from 1 (January) to 12 (December), and that only months with a mean density of >0 birds/km^2 are shown for brevity.

Table 2-5: Bird Density Results

Species	Survey Period	Month	Bird Density (birds / km^2)		
			Mean	Standard Deviation	Weighted Mean
Black-headed gull	B23	5	0.00577323	0.011546461	0.004347777
		8	0.019317223	0.03393302	0.016588289
	NB23_24	9	0.009812879	0.019625759	0.010318023
	B24	4	0.000615437	0.001230874	0.000755919
		7	0.000464321	0.000928642	0.000349677
Cormorant	B23	5	0.002672377	0.005344754	0.002012548
Golden plover	NB21_22	3	0.000944253	0.001888506	0.000913249
		10	0.000492259	0.000607549	0.000502767
		11	0.00429999	0.008599979	0.005281524
		12	0.001492508	0.002985016	0.001443502
	NB22_23	9	0.012822516	0.025645033	0.011600898
	B24	4	0.003438612	0.006877225	0.004223525
	NB24_25	9	0.001492593	0	0.001492593
Hen harrier	NB20_21	1	0.00016247	0.000226562	0.000179437
	B21	4	0.015838306	0.014290584	0.015178728
		5	0.0034729	0.003704201	0.003714045
		6	0.00344351	0.005844399	0.00412242
		7	0.004092997	0.003379653	0.003751847

Species	Survey Period	Month	Bird Density (birds / km^2)		
			Mean	Standard Deviation	Weighted Mean
		8	0.000959575	0.00125771	0.000824578
	NB21_22	3	0.000892877	0.001634682	0.000684841
		9	0.013797126	0.027169566	0.016870545
	B22	5	0.000250368	0.000350243	0.000236164
		6	0.001778032	0.002400829	0.002216307
		7	0.000449023	0.000835207	0.000466028
		8	0.001505624	0.003011247	0.00142122
	B23	5	0.000133154	0.000266309	0.000163549
		6	0.015061026	0	0.015061026
		7	0.003423637	0.003130454	0.00352949
	B24	4	0.002952957	0.003259696	0.003366295
		5	0.003738453	0.006671496	0.004510408
		6	0.000811477	0.001622954	0.000977766
	B25	6	0.000126154	0.000252308	0.000118348
		7	0.000207334	0	0.000207334
		8	3.74648831246462e-05	7.49297662492923e-05	3.62347382243621e-05
	NB25_26	9	0.000125649	0.000145144	0.000126716
Herring gull	B23	8	0.00758973	0.01517946	0.006455684
	B25	5	7.59333435476 83e-05	0.000151867	9.32662193662064e-05
		6	0.000516976	0.001033952	0.000641064
Kestrel	B21	8	0.000124946	0.000249893	0.000131378
	NB21_2	11	0.001763767	0.002073692	0.001989337
		12	0.000268285	0.00053657	0.000329525
	B22	7	0.000748602	0.001497204	0.000899492
		8	0.001265588	0.002531177	0.00163871
	NB22_23	9	0.000356872	0.000416376	0.000418866
	B23	8	0.001962085	0.00392417	0.002119458
	B23_24	9	0.000465346	0.000607512	0.000533477
	B24	4	0.000777645	0.00155529	0.000955154
		5	0.013086502	0.02225801	0.015671746
		6	0.001852504	0.002108459	0.002093208
		7	0.004680376	0.005828078	0.005312112
		8	0.003074996	0.004554962	0.003147378
	B25	4	0.000480511	0.000961021	0.000590194

Species	Survey Period	Month	Bird Density (birds / km^2)		
			Mean	Standard Deviation	Weighted Mean
		8	0.000203293	0.000406586	0.000249697
	NB25_26	9	0.001683931	0.003367863	0.00162864
Lesser black-backed gull	B22	5	0.000716351	0.001432703	0.001006672
		7	0.000788824	0.001577649	0.000649738
		8	0.00380303	0.007606061	0.003589838
	B23	8	0.051360818	0.066266752	0.047238626
	B24	4	0.002995965	0.003582047	0.002516014
		5	0.003540231	0.004102569	0.003913869
		6	9.338646076804 67e-05	0.000186773	0.000112523
		7	0.002515983	0.002332409	0.002419019
		8	0.0006255	0.001250999	0.000471059
	B25	4	0.001568422	0.001951653	0.001396719
		5	0.000425469	0.000504457	0.000373434
		6	0.001286126	0.002572251	0.001365283
Merlin	NB20_21	2	8.423339853434 77e-06	1.684667970686 695e-05	8.856953109084 65e-06
	B24	4	0.000192103	0.000384205	0.000201991
		5	7.448243869366 52e-05	0.000148965	7.831661531394 41e-05
		7	6.769708654857 28e-05	0.000135394	7.118196957681 35e-05
Peregrine falcon	B25	4	0.000122067	0.000244133	0.00012835
		8	0.000498992	0.000997983	0.000612894
Red grouse	NB22_23	9	3.134134392530 2e-06	6.268268785060 4e-06	3.082728293180 76e-06
Snipe	B21	4	8.124490294614 59e-05	9.500070423619 25e-05	8.798681911870 35e-05
	NB21_22	2	6.515968473537 66e-07	1.303193694707 53e-06	6.851394842731 41e-07
		3	2.402552841170 58e-05	4.805105682341 15e-05	2.950970019946 59e-05
		10	0.000181263	0.000362525	0.000158097
		12	2.002127367642 15e-05	4.004254735284 29e-05	2.459141683288 83e-05
	B22	8	0.001134955	0.00226991	0.001164724
	NB22_23	9	0.000516727	0.001033453	0.000467497
	B23	5	0.007462586	0.014925172	0.005620019

Species	Survey Period	Month	Bird Density (birds / km^2)		
			Mean	Standard Deviation	Weighted Mean
		8	0.002361279	0.002690143	0.002369528
	B24	4	0.001096465	0.001515622	0.001270211
		5	0.012012764	0.024025528	0.01475485
		7	0.003834544	0.006632272	0.003742817
	B25	4	0.074236754	0.10940276	0.086935091
		5	0.000290366	0.000580733	0.000305314
	NB25_26	9	2.58138559034482e-07	5.162771180689 64e-07	2.71426910560043e-07
White-tailed eagle	B23	8	0.002078354	0.004156708	0.002245053
	B24	8	0.00163551	0.003271019	0.002008838
	B25	8	0.001021378	0.002042755	0.000987841

2.4.6 Proportion of Birds Flying at Risk Height

The baseline surveys prior to the breeding 2023 season utilised the following four height bands:

1. 0-10 m;
2. 10 – 25 m;
3. 25 – 175 m; and
4. >175 m.

All subsequent surveys, i.e. from the breeding season 2023 onwards, used the following height bands:

1. 0-15 m;
2. 15 – 25 m;
3. 25 – 175 m; and
4. >175 m.

The potential collision height (PCH) for the Nordex N163 turbine is 22 m to 185 m, based on a tip height of 185 m, hub height of 103.5 m and rotor diameter of 163 m. As such, all flight lines with a PCH of 22 to 185 m must be included for CRM.

To account for a rotor diameter of 163 m, the model adjusted the occupancy by rotor diameter as a proportion of survey risk height as described in NS (2024) guidance[1]. This assumes that in each of the height ranges within which flight height was classified, flight heights were distributed uniformly.

Thus, the proportion of flights within each of the relevant height bands within the WP that are considered to have occurred at PCH has been calculated, as shown in Table 2-6.

For example, using the set of height bands for all surveys prior to the 2023 breeding season, 3 m of the 22-185 m PCH span falls within the 10-25 m height range (height band 2), so 3/15 of birds flying within that height range would be at rotor risk height. All of the 150 m height range for height band 3 falls with PCH. The remaining 10 m of the PCH span is within the >175 m height range (height band 4). As this height band does not have an upper limit it is not possible to determine the proportion of flights occurring within the range 175 m – 185 m

using an even distribution of flights. The difference between 175 m and 185 m is very small and likely to be indeterminable in the field, even to the best surveyors. Therefore, for the CRM, flights above 175 m were treated as flights above 185 m (see Section 3.1 for further discussion on this as a limitation), i.e. none of the birds flying >175 m were assumed to be at PCH. As none of the PCH span falls within the 0-10 m height range (height band 1), none of the birds flying within that height range would be at PCH.

The proportion of birds flying at PCH was calculated differently for the breeding 2023 season onwards, as height bands 1 and 2 changed from 0-10 m and 10-25 m to 0-15 m and 15-25 m, respectively.

Note that data have been aggregated by year and season as has been done in NS (2024) guidance[1]. Only seasons where flight time is >0 have been included in Table 2-6 for brevity.

Table 2-6: Proportion of Flights at PCH

Species	Season	Duration of flights observed within WP across all viewsheds (bird-secs)	% of flight durations observed within WP				% of flight durations at PCH (22 – 185 m) within WP
			Height band 1 (0 – 10 m pre breeding 2023, and 0-15 m thereafter)	Height band 2 (10 – 25 m pre-breeding 2023, and 15 – 25 m thereafter)	Height band 3 (25 - 175 m)	Height band 4 (>175 m)	
Black-headed gull	B23	3593.40	0.00	53.20	46.80	0.00	62.76
	NB23_24	1795.94	0.00	16.12	83.88	0.00	88.72
	B24	197.29	0.00	4.02	83.68	12.30	84.89
Cormorant	B23	250.89	0.00	0.00	100.00	0.00	100.00
Golden plover	NB21_22	1556.99	6.80	0.00	93.20	0.00	93.20
	NB22_23	1985.50	0.72	1.79	97.49	0.00	97.85
	B24	858.74	0.00	64.29	35.71	0.00	55.00
	NB24_25	68.29	0.00	0.00	100.00	0.00	100.00
Hen harrier	NB20_21	33.98	100.00	0.00	0.00	0.00	0.00
	B21	4744.76	62.90	30.90	6.20	0.00	12.38
	NB21_22	3508.06	30.73	34.42	34.85	0.00	41.73
	B22	841.37	67.78	21.82	4.44	5.95	8.81
	B23	1108.72	4.01	26.48	55.03	14.48	62.98
	B24	1748.65	61.32	25.30	13.38	0.00	20.97
	B25	33.85	76.29	7.35	16.36	0.00	18.57
	NB25_26	15.21	0.00	21.26	78.74	0.00	85.12
Herring gull	B23	1175.23	0.00	0.00	100.00	0.00	100.00
	B25	158.83	14.34	85.66	0.00	0.00	25.70
Kestrel	B21	22.87	100.00	0.00	0.00	0.00	0.00
	NB21_22	440.66	1.13	52.38	46.48	0.00	56.96
	B22	742.64	37.04	35.99	23.79	3.18	30.98
	NB22_23	96.00	16.67	83.33	0.00	0.00	16.67

Species	Season	Duration of flights observed within WP across all viewsheds (bird-secs)	% of flight durations observed within WP				% of flight durations at PCH (22 – 185 m) within WP
			Height band 1 (0 – 10 m pre breeding 2023, and 0-15 m thereafter)	Height band 2 (10 – 25 m pre-breeding 2023, and 15 – 25 m thereafter)	Height band 3 (25 - 175 m)	Height band 4 (>175 m)	
	B23	490.00	12.24	36.73	51.02	0.00	62.04
	NB23_24	102.37	0.00	14.71	85.29	0.00	89.70
	B24	5274.94	7.02	30.66	62.32	0.00	71.52
	B25	175.00	25.71	45.71	28.57	0.00	42.29
	NB25_26	260.75	6.08	15.70	68.33	9.89	73.04
Lesser black-backed gull	B22	952.92	0.00	39.44	60.56	0.00	68.45
	B23	9432.16	0.00	25.35	73.35	1.30	80.96
	B24	1558.69	0.42	12.36	85.21	2.01	88.92
	B25	519.41	0.00	53.12	19.48	27.40	35.42
Merlin	NB20_21	1.54	100.00	0.00	0.00	0.00	0.00
	B24	61.18	84.11	15.89	0.00	0.00	4.77
Peregrine falcon	B25	157.34	0.00	0.00	91.48	8.52	91.48
Red grouse	NB22_23	0.57	100.00	0.00	0.00	0.00	0.00
Snipe	B21	16.00	43.75	0.00	56.25	0.00	56.25
	NB21_22	39.19	12.76	15.62	71.62	0.00	74.75
	B22	207.72	20.00	80.00	0.00	0.00	16.00
	NB22_23	80.01	0.00	100.00	0.00	0.00	20.00
	B23	1215.79	12.77	67.67	19.56	0.00	39.86
	B24	3851.19	16.93	21.39	61.67	0.00	68.09
	B25	17048.92	0.44	7.93	67.47	24.16	69.85
	NB25_26	0.05	40.00	60.00	0.00	0.00	18.00
White-tailed eagle	B23	519.04	0.00	0.00	42.86	57.14	42.86
	B24	408.44	0.00	0.00	40.30	59.70	40.30
	B25	171.33	0.00	79.65	20.35	0.00	44.25

2.5 Stages B - D

For Stages B-D, the following parameters were entered into the NS (2024) guidance[1] modelling spreadsheet:

- Day time bird density for each month aggregated by each survey year, season and VP (taken from Section 2.4.5);
- The proportion of flights at risk height aggregated by each survey year and season (taken from Section 2.4.6);

- Species-specific bird parameters (Table 2-7); and
- Wind farm parameters (Table 2-8).

2.5.1 Bird Parameters

Measurements and flight speeds of the species for which CRM was undertaken were derived from British Trust for Ornithology (BTO)[14], Cochran & Applegate (1986)[15], Cramp & Simmons (1977-1994)[16], Provan & Whitfield (2007)[17], Bruderer & Boldt (2001)[18] and Alerstram et al. (2007)[19]. The avoidance rates for these species are taken from NS (2025)[20]. Where species do not have a defined avoidance rate, the default avoidance rate of 98% has been applied.

Flight type was determined based on knowledge of the bird and empirical data collected during surveys. In the absence of any additional data, flapping flights were selected as a precaution, as this option results in a higher probability of collision than gliding flight.

The theoretical time that birds could be active with potential for turbine collisions was assumed to be the period between sunrise and sunset within each survey period using the latitude of the Project and was calculated using NS's (2024) guidance[1] spreadsheet.

For waders (i.e., snipe and golden plover), which could be active nocturnally, an additional 25% of nocturnal hours were added to the daylight hours to give a more accurate representation of the available hours in which collision could occur for these species (as per Band, 2024[3]).

Details of these species-specific parameters are given in Table 2-7.

Table 2-7: Bird Biometrics, Flight Speed, Flight Type, Nocturnal Activity Factor and Avoidance Rates used in CRM

Common Name	Bird Length (m)	Wingspan (m)	Flight Speed (m/s)	Flight Type (0 or 1)[21]	Nocturnal Activity Factor (1-5)[22]	Avoidance Rate (%)
Black-headed gull	0.355	1.05	11.9	0	1	99.2
Kestrel	0.34	0.755	12.7	0	1	95.0
Snipe	0.26	0.455	16.0	0	2	98.0

[14] https://www.bto.org/understanding-birds/birdfacts [Accessed in November 2025].

[15] William W. Cochran and Roger D. Applegate. (1986). TheCondor 88:398-401 The Cooper Ornithological Society

[16] Cramp, S. and Simmon, S.E.L. (197-1994). Birds of the Western Palearctic. Oxford University Press.

[17] Provan, S. and Whitfield, D.P. (2007) Avian flight speeds and biometrics for use in collision risk modelling. Report to Scottish Natural Heritage.

[18] Bruderer, B. and Bolt, A. (2001) Flight characteristics of birds: 1. Radar measurements of speeds, Ibis, 143. 178 – 204.

[19] Alerstam T, Rosén M, Bäckman J, Ericson PG, Hellgren O. (2007). Flight speeds among bird species: allometric and phylogenetic effects. PLoS Biol.

[20] SNH (2025) Avoidance rates for the onshore SNH wind farm collision risk model. https://www.nature.scot/doc/wind-farm-impacts-birds-use-avoidance-rates-naturescot-wind-farm-collision-risk-model#:~:text=2.%20Recommended%20avoidance%20rates%20%20%20Species%20,%20SNH%20%282013% [Accessed in November 2025].

[21] Key: 0=flapping and 1=gliding

[22] Key: 1=0%, 2=25%, 3=50%, 4=75% and 5=100% of daytime activity

Common Name	Bird Length (m)	Wingspan (m)	Flight Speed (m/s)	Flight Type (0 or 1)[21]	Nocturnal Activity Factor (1-5)[22]	Avoidance Rate (%)
Golden plover	0.275	0.715	13.7	0	2	98.0
Cormorant	0.9	1.45	14.5	0	1	98.0
Hen harrier	0.48	1.1	8	0	1	99.0
Herring gull	0.61	1.465	12.8	0	1	99.5
Lesser black-backed gull	0.6	1.45	13.1	0	1	99.5
Merlin	0.275	0.56	13.47	0	1	98.0
Peregrine falcon	0.42	1.025	12.1	0	1	98.0
Red grouse	0.395	0.605	12.5	0	1	98.0
White-tailed eagle	0.8	2.2	13.6	0	1	95.0

2.5.2 Wind Farm Parameters

The wind turbine parameters used in the CRM are detailed in Table 2-8, based on information provided by FEI.

The proportion of time turbines are predicted to be operational per month was calculated based on the proportion of time available multiplied by the proportion of time the turbines were expected to be above cut-in and below cut-out speeds, using values supplied by FEI.

The Project was not considered to be a large array[23] and so no 'large array correction' was applied.

Table 2-8: Wind Farm and Turbine Parameters

Parameter	Value
Wind farm width (km)	2
Number of turbines	14
Rotor radius / diameter (m)	81.5 / 163
Hub height (m)	103.5
Maximum blade chord width (m)	4.15
Blade pitch (°)	15

[23] There is no fixed numerical threshold defining a "large array" in NatureScot's collision-risk-modelling guidance. As a practical rule of thumb, wind farms with around 40 or more turbines are often treated as large arrays, while wind farms of 20–40 turbines may also fall into this category where multiple turbine rows are present and where the product of turbine number and per-turbine collision probability is sufficiently high that ignoring density-depletion effects would overestimate collision risk. This typically occurs where the layout creates a meaningful likelihood that birds encounter more than one rotor while traversing the site. As the current project comprises 14 turbines arranged without multiple turbine rows, it does not meet these conditions and should not be considered a large array.

Parameter	Value
Rotation speed (r.p.m)	8.8
Turbine operation time (%) (calculated per month but mean value over whole year given here)	86

3.0 Results

Table 3-1 summarises the predicted collision rates for the 12 species under consideration, using the avoidance rates and other parameters given in Table 2-7, for the candidate turbine model. Copies of the NS model calculations for each species are included in Appendix A.

In addition to collision risk estimates for each period of analysis, mean annual risk estimates have also been presented. For resident species, mean annual risk estimates are based on all breeding and non-breeding season data, and for non-resident species, mean annual risk estimates are based on all instances of the relevant season. For example, for lesser black-backed gull, which is predominantly a summer visitor, only the breeding seasons have been considered.

To calculate mean annual collision risk estimates for resident species, the modelled predictions were averaged for each season type (e.g. breeding vs. non-breeding season). These seasonal averages were then summed to create annual averages.

Note that the NS spreadsheet output is restricted to two decimal places for monthly collision estimates and one decimal place for aggregated collision risk estimates. Therefore, it is possible in some cases that collision estimates presented below as zero collisions per year are in fact negligible, non-zero values. Where possible we have summed the monthly collision estimates (two decimal places) to give the period of analysis collision estimate, rather than use the per period estimate given in the spreadsheet (one decimal place).

Table 3-1: Summary of CRM Outputs

Common Name	Collision Estimates Per Period			Mean (Standard Deviation) Collision Estimates Per Year		
	Period	Collisions Per Year	No. Years Per Collision	Period	Collisions Per Year	No. Years Per Collision
Black-headed gull	NB20_21	0.00	N/A	All breeding and non-breeding seasons	0.04 (0.09)	23.26 (10.65)
	B21	0.00	N/A			
	NB21_22	0.00	N/A			
	B22	0.00	N/A			
	NB22_23	0.00	N/A			
	B23	0.13	7.69			
	NB23_24	0.09	11.11			
	B24	0.01	100			
	NB24_25	0.00	N/A			
	B25	0.00	N/A			
	NB25_26	0.00	N/A			
Cormorant	NB20_21	0.00	N/A	All breeding and non-breeding seasons	0.02 (0.04)	55.56 (24.85)
	B21	0.00	N/A			
	NB21_22	0.00	N/A			
	B22	0.00	N/A			
	NB22_23	0.00	N/A			
	B23	0.09	11.11			

Common Name	Collision Estimates Per Period			Mean (Standard Deviation) Collision Estimates Per Year		
	Period	Collisions Per Year	No. Years Per Collision	Period	Collisions Per Year	No. Years Per Collision
	NB23_24	0.00	N/A			
	B24	0.00	N/A			
	NB24_25	0.00	N/A			
	B25	0.00	N/A			
	NB25_26	0.00	N/A			
Golden plover	NB20_21	0.00	N/A	All non-breeding seasons	0.10 (0.14)	10.34 (7.03)
	NB21_22	0.20	5.00			
	NB22_23	0.34	2.94			
	NB23_24	0.00	N/A			
	NB24_25	0.04	25.00			
	NB25_26	0.00	N/A			
	Autumn_20	0.00	N/A	All autumn seasons (September to November inclusive[24])	0.09 (0.14)	11.54 (7.38)
	Autumn_21	0.14	7.14			
	Autumn_22	0.34	2.94			
	Autumn_23	0.00	N/A			
	Autumn_24	0.04	25.00			
	Autumn_25	0.00	N/A			
	Spring_21	0.00	N/A	All spring seasons (March to May inclusive)[25]	0.02 (0.03)	50.00 (32.44)
	Spring_22	0.03	33.33			
	Spring_23	0.00	N/A			
	Spring_24	0.07	14.20			
	Spring_25	0.00	N/A			
Hen harrier	NB20_21	0.00	N/A	All breeding and non-breeding seasons	0.06 (0.11)	16.30 (9.15)
	B21	0.05	20.00			
	NB21_22	0.08	12.50			
	B22	0.00	N/A			
	NB22_23	0.00	N/A			
	B23	0.18	5.56			
	NB23_24	0.00	N/A			
	B24	0.01	100.00			
	NB24_25	0.00	N/A			

[24] Only in 2020 and 2021; otherwise, September only

[25] Only in 2021 and 2022; otherwise, April to May

Common Name	Collision Estimates Per Period			Mean (Standard Deviation) Collision Estimates Per Year		
	Period	Collisions Per Year	No. Years Per Collision	Period	Collisions Per Year	No. Years Per Collision
	B25	0.00	N/A			
	NB25_26	0.00	N/A			
Herring gull	NB20_21	0.00	N/A	All breeding and non-breeding seasons	0.01 (0.02)	100.00 (44.72)
	B21	0.00	N/A			
	NB21_22	0.00	N/A			
	B22	0.00	N/A			
	NB22_23	0.00	N/A			
	B23	0.05	20.00			
	NB23_24	0.00	N/A			
	B24	0.00	N/A			
	NB24_25	0.00	N/A			
	B25	0.00	N/A			
	NB25_26	0.00	N/A			
Kestrel	NB20_21	0.00	N/A	All breeding and non-breeding seasons	0.34 (0.64)	2.96 (1.56)
	B21	0.00	N/A			
	NB21_22	0.06	16.67			
	B22	0.05	20.00			
	NB22_23	0.00	N/A			
	B23	0.08	12.50			
	NB23_24	0.03	33.33			
	B24	1.39	0.72			
	NB24_25	0.00	N/A			
	B25	0.03	33.33			
	NB25_26	0.08	12.50			
Lesser black-backed gull	B21	0.00	N/A	All breeding seasons	0.08 (0.12)	12.50 (8.30)
	B22	0.03	33.33			
	B23	0.29	3.45			
	B24	0.07	14.29			
	B25	0.01	100.00			
Merlin	NB20_21	0.00	N/A	All breeding and non-breeding seasons	0.00	N/A
	B21	0.00	N/A			
	NB21_22	0.00	N/A			
	B22	0.00	N/A			
	NB22_23	0.00	N/A			

Common Name	Collision Estimates Per Period			Mean (Standard Deviation) Collision Estimates Per Year		
	Period	Collisions Per Year	No. Years Per Collision	Period	Collisions Per Year	No. Years Per Collision
	B23	0.00	N/A			
	NB23_24	0.00	N/A			
	B24	0.00	N/A			
	NB24_25	0.00	N/A			
	B25	0.00	N/A			
	NB25_26	0.00	N/A			
Peregrine falcon	NB20_21	0.00	N/A	All breeding and non-breeding seasons	0.00 (0.00)	500.00 (223.61)
	B21	0.00	N/A			
	NB21_22	0.00	N/A			
	B22	0.00	N/A			
	NB22_23	0.00	N/A			
	B23	0.00	N/A			
	NB23_24	0.00	N/A			
	B24	0.00	N/A			
	NB24_25	0.00	N/A			
	B25	0.01	100.00			
	NB25_26	0.00	N/A			
Red grouse	NB20_21	0.00	N/A	All breeding and non-breeding seasons	0.00	N/A
	B21	0.00	N/A			
	NB21_22	0.00	N/A			
	B22	0.00	N/A			
	NB22_23	0.00	N/A			
	B23	0.00	N/A			
	NB23_24	0.00	N/A			
	B24	0.00	N/A			
	NB24_25	0.00	N/A			
	B25	0.00	N/A			
	NB25_26	0.00	N/A			
Snipe	NB20_21	0.00	N/A	All breeding and non-breeding seasons	0.54 (0.89)	1.87 (1.12)
	B21	0.00	N/A			
	NB21_22	0.00	N/A			
	B22	0.01	100.00			
	NB22_23	0.00	N/A			
	B23	0.11	9.09			

Common Name	Collision Estimates Per Period			Mean (Standard Deviation) Collision Estimates Per Year		
	Period	Collisions Per Year	No. Years Per Collision	Period	Collisions Per Year	No. Years Per Collision
	NB23_24	0.00	N/A			
	B24	0.46	2.17			
	NB24_25	0.00	N/A			
	B25	2.10	0.47			
	NB25_26	0.00	N/A			
White-tailed eagle	NB20_21	0.00	N/A	All breeding and non-breeding seasons	0.04 (0.04)	25.00 (24.62)
	B21	0.00	N/A			
	NB21_22	0.00	N/A			
	B22	0.00	N/A			
	NB22_23	0.00	N/A			
	B23	0.09	11.11			
	NB23_24	0.00	N/A			
	B24	0.07	14.29			
	NB24_25	0.00	N/A			
	B25	0.04	25.00			
	NB25_26	0.00	N/A			

3.1 Limitations and Uncertainty in Outputs

It should be acknowledged that there are several limitations and uncertainties in the collision risk outputs. While the results presented here are ‘best estimates’, there is natural variability in the data, with collision risk estimates differing per period of analysis for many species. To this end we have presented measures of variability (standard deviation) for our collision risk estimates for each species.

Some likely sources of variability or uncertainty in the data are as follows:

- Uncertainty in flight activity data including imprecision on flight height estimates and lack of detailed knowledge regarding night-time behaviour for some species; and
- Inherent limitations within the collision-risk model itself including the variability of bird dimensions and flight speed, and the simplification in shape of a bird and turbine blades.

Finally, it should be acknowledged that the collision risk outputs presented here do not directly identify whether collision is likely to have significant effects on avian populations. Further assessment to contextualise the outputs presented here is provided in the EIAR and NIS.

Appendix A NatureScot Spreadsheets – Nordex N163

Avian Collision Risk Report

Lissinagroagh Wind Farm

FuturEnergy Ireland DAC

SLR Project No.: 501.065072.00001

26 January 2026

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

		Value	Units
Bird data			
Species name		**Black-headed gull**	
Bird length	L	0.355	m
Wingspan	W	1.05	m
Bird flight speed	v	11.9	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

		Value	Units
Windfarm data			
Site name		**Lissinagroagh**	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

		Value	Units
Turbine data			
Model		**N163**	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2					0.004348			0.016588					0.0017
Proportion at rotor risk height	Q_{2R}	62.76%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	11.9	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	103.9	0.0	0.0	369.4	0.0	0.0	0.0	0.0	**473**

Stage C

No of blades	b	3		Bird length	l	0.355	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	1.05	m
Rotor radius	R	81.5	m	Bird flight speed	v	11.9	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					
		Single transit risk	upwind	6.74%			
			downwind	2.88%			
			weighted mean	**4.81%**			

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.00	4.07	0.00	0.00	12.58	0.00	0.00	0.00	0.00	**17**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

	large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
Avoidance rates modelled		Collision rates allowing for avoidance												
	100.00%	0.00	0.00	0.00	0.00	4.07	0.00	0.00	12.58	0.00	0.00	0.00	0.00	**16.6**
	100.00%	0.00	0.00	0.00	0.00	4.07	0.00	0.00	12.58	0.00	0.00	0.00	0.00	**16.6**
	100.00%	0.00	0.00	0.00	0.00	4.07	0.00	0.00	12.58	0.00	0.00	0.00	0.00	**16.6**
99.20%	100.00%	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.10	0.00	0.00	0.00	0.00	**0.1**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Black-headed gull	
Bird length	L	0.355	m
Wingspan	W	1.05	m
Bird flight speed	v	11.9	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2				0.000756			0.00035						0.0001
Proportion at rotor risk height	Q_{2R}	84.89%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	11.9	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	20.7	0.0	0.0	11.8	0.0	0.0	0.0	0.0	0.0	**32**

Stage C

No of blades	b	3		Bird length	l	0.355	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	1.05	m
Rotor radius	R	81.5	m	Bird flight speed	v	11.9	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	6.74%
	downwind	2.88%
	weighted mean	**4.81%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
	Collision rates before avoidance													year total
		0.00	0.00	0.00	0.87	0.00	0.00	0.36	0.00	0.00	0.00	0.00	0.00	**1**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

Avoidance rates modelled		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
		100.00%	0.00	0.00	0.00	0.87	0.00	0.00	0.36	0.00	0.00	0.00	0.00	0.00	**1.2**
		100.00%	0.00	0.00	0.00	0.87	0.00	0.00	0.36	0.00	0.00	0.00	0.00	0.00	**1.2**
		100.00%	0.00	0.00	0.00	0.87	0.00	0.00	0.36	0.00	0.00	0.00	0.00	0.00	**1.2**
	99.20%	100.00%	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Black-headed gull	
Bird length	L	0.355	m
Wingspan	W	1.05	m
Bird flight speed	v	11.9	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A	birds/km^2									0.010318				0.0009
Proportion at rotor risk height	Q_{2R}	88.72%													
At latitude 54.3		Daylight hours per month	246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month	497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	11.9	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	269.4	0.0	0.0	0.0	**269**

Stage C

No of blades	b	3		Bird length	l	0.355	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	1.05	m
Rotor radius	R	81.5	m	Bird flight speed	v	11.9	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	6.74%
	downwind	2.88%
	weighted mean	**4.81%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.18	0.00	0.00	0.00	**11**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

Avoidance rates modelled		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.18	0.00	0.00	0.00	**11.2**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.18	0.00	0.00	0.00	**11.2**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.18	0.00	0.00	0.00	**11.2**
	99.20%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	**0.1**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

		Value	Units
Bird data			
Species name		**Cormorant**	
Bird length	L	0.9	m
Wingspan	W	1.45	m
Bird flight speed	v	14.5	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

		Value	Units
Windfarm data			
Site name		**Lissinagroagh**	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

		Value	Units
Turbine data			
Model		**N163**	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2					0.002013								0.0002
Proportion at rotor risk height	Q_{2R}	100.00%														
At latitude 54.3		**Daylight hours per month**		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

No of turbines	T	14														
Rotor radius	R	81.5	m													
		Total rotor frontal area m^2	292141													
Nocturnal activity factor	f_{night}	0%														
Bird flight speed	v	14.5	m s^{-1}													
		Projected number of rotor transits		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
				0.0	0.0	0.0	0.0	93.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**93**

Stage C

No of blades	b	3		Bird length	l	0.9	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	1.45	m
Rotor radius	R	81.5	m	Bird flight speed	v	14.5	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	**upwind**	7.74%
	downwind	4.36%
	weighted mean	**6.05%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
Collision rates before avoidance													
	0.00	0.00	0.00	0.00	4.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**5**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

Avoidance rates modelled		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
		100.00%	0.00	0.00	0.00	0.00	4.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**4.6**
		100.00%	0.00	0.00	0.00	0.00	4.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**4.6**
		100.00%	0.00	0.00	0.00	0.00	4.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**4.6**
	98.00%	100.00%	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.1**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Golden plover	
Bird length	L	0.275	m
Wingspan	W	0.715	m
Bird flight speed	v	13.7	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		2	
Nocturnal activity factor	f_{night}	25%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2									0	0.000503	0.005282		0.0005
Proportion at rotor risk height	Q_{2R}	93.20%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	25%															
Bird flight speed	v	13.7	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.9	162.3	0.0	**180**

Stage C

No of blades	b	3		Bird length	l	0.275	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.715	m
Rotor radius	R	81.5	m	Bird flight speed	v	13.7	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	5.95%
	downwind	2.43%
	weighted mean	**4.19%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
	Collision rates before avoidance													year total
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68	6.32	0.00	**7**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

	large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
Avoidance rates modelled		Collision rates allowing for avoidance												
	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68	6.32	0.00	**7.0**
	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68	6.32	0.00	**7.0**
98.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.13	0.00	**0.1**
99.80%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
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		Value	Units
Bird data			
Species name		**Golden plover**	
Bird length	L	0.275	m
Wingspan	W	0.715	m
Bird flight speed	v	13.7	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		2	
Nocturnal activity factor	f_{night}	25%	

		Value	Units
Windfarm data			
Site name		**Lissinagroagh**	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

		Value	Units
Turbine data			
Model		**N163**	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2									0.011601	0	0		0.0010
Proportion at rotor risk height	Q_{2R}	97.85%														
At latitude 54.3		**Daylight hours per month**		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	25%															
Bird flight speed	v	13.7	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	469.1	0.0	0.0	0.0	**469**

Stage C

No of blades	b	3		Bird length	l	0.275	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.715	m
Rotor radius	R	81.5	m	Bird flight speed	v	13.7	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	**upwind**	5.95%
	downwind	2.43%
	weighted mean	**4.19%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
Collision rates before avoidance													
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.95	0.00	0.00	0.00	**17**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

Avoidance rates modelled		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.95	0.00	0.00	0.00	**16.9**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.95	0.00	0.00	0.00	**16.9**
	98.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.00	0.00	0.00	**0.3**
	99.80%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

		Value	Units
Bird data			
Species name		**Golden plover**	
Bird length	L	0.275	m
Wingspan	W	0.715	m
Bird flight speed	v	13.7	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		2	
Nocturnal activity factor	f_{night}	25%	

		Value	Units
Windfarm data			
Site name		**Lissinagroagh**	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

		Value	Units
Turbine data			
Model		**N163**	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2									0.001493	0	0		0.0001
Proportion at rotor risk height	Q_{2R}	100.00%														
At latitude 54.3		**Daylight hours per month**		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

No of turbines	T	14														
Rotor radius	R	81.5	m													
		Total rotor frontal area m^2	292141													
Nocturnal activity factor	f_{night}	25%														
Bird flight speed	v	13.7	m s^{-1}													
		Projected number of rotor transits		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61.7	0.0	0.0	0.0	**62**

Stage C

No of blades	b	3		Bird length	l	0.275	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.715	m
Rotor radius	R	81.5	m	Bird flight speed	v	13.7	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					
		Single transit risk	**upwind**	5.95%			
			downwind	2.43%			
			weighted mean	**4.19%**			

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.23	0.00	0.00	0.00	**2**

Stage E

Allow for large array correction?		No														
Width of windfarm	w	3	km													
			large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
				Collision rates allowing for avoidance												
Avoidance rates modelled			100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.23	0.00	0.00	0.00	**2.2**
			100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.23	0.00	0.00	0.00	**2.2**
		98.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	**0.0**
		99.80%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

		Value	Units
Bird data			
Species name		**Golden plover**	
Bird length	L	0.275	m
Wingspan	W	0.715	m
Bird flight speed	v	13.7	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		2	
Nocturnal activity factor	f_{night}	25%	

		Value	Units
Windfarm data			
Site name		**Lissinagroagh**	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

		Value	Units
Turbine data			
Model		**N163**	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2				0.003439									0.0003
Proportion at rotor risk height	Q_{2R}	55.00%														
At latitude 54.3		**Daylight hours per month**		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	25%															
Bird flight speed	v	13.7	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	82.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**83**

Stage C

No of blades	b	3		Bird length	l	0.275	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.715	m
Rotor radius	R	81.5	m	Bird flight speed	v	13.7	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	**upwind**	5.95%
	downwind	2.43%
	weighted mean	**4.19%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
Collision rates before avoidance													
	0.00	0.00	0.00	3.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**3**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

Avoidance rates modelled		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
		100.00%	0.00	0.00	0.00	3.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**3.0**
		100.00%	0.00	0.00	0.00	3.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**3.0**
	98.00%	100.00%	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.1**
	99.80%	100.00%	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

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		Value	Units
Bird data			
Species name		**Golden plover**	
Bird length	L	0.275	m
Wingspan	W	0.715	m
Bird flight speed	v	13.7	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		2	
Nocturnal activity factor	f_{night}	25%	

		Value	Units
Windfarm data			
Site name		**Lissinagroagh**	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

		Value	Units
Turbine data			
Model		**N163**	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2			0.000913							0.000503	0.005282	0.001444	0.0007
Proportion at rotor risk height	Q_{2R}	93.20%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	25%															
Bird flight speed	v	13.7	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	34.6	0.0	0.0	0.0	0.0	0.0	0.0	17.9	162.3	42.7	**257**

Stage C

No of blades	b	3		Bird length	l	0.275	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.715	m
Rotor radius	R	81.5	m	Bird flight speed	v	13.7	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk upwind	5.95%
downwind	2.43%
weighted mean	**4.19%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.68	6.32	1.61	**10**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
Avoidance rates modelled			Collision rates allowing for avoidance												
		100.00%	0.00	0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.68	6.32	1.61	**9.9**
		100.00%	0.00	0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.68	6.32	1.61	**9.9**
98.00%		100.00%	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.13	0.03	**0.2**
99.80%		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	**0.0**

COLLISION RISK MODEL

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		Value	Units
Bird data			
Species name		**Golden plover**	
Bird length	L	0.275	m
Wingspan	W	0.715	m
Bird flight speed	v	13.7	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		2	
Nocturnal activity factor	f_{night}	25%	

		Value	Units
Windfarm data			
Site name		**Lissinagroagh**	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

		Value	Units
Turbine data			
Model		**N163**	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2									0.011601				0.0010
Proportion at rotor risk height	Q_{2R}	97.85%														
At latitude 54.3		**Daylight hours per month**		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

No of turbines	T	14														
Rotor radius	R	81.5	m													
		Total rotor frontal area m^2	292141													
Nocturnal activity factor	f_{night}	25%														
Bird flight speed	v	13.7	m s^{-1}													
		Projected number of rotor transits		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	469.1	0.0	0.0	0.0	**469**

Stage C

No of blades	b	3		Bird length	l	0.275	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.715	m
Rotor radius	R	81.5	m	Bird flight speed	v	13.7	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	**upwind**	5.95%
	downwind	2.43%
	weighted mean	**4.19%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.95	0.00	0.00	0.00	**17**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
Avoidance rates modelled			**Collision rates allowing for avoidance**												
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.95	0.00	0.00	0.00	**16.9**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.95	0.00	0.00	0.00	**16.9**
98.00%		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.00	0.00	0.00	**0.3**
99.80%		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
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		Value	Units
Bird data			
Species name		**Golden plover**	
Bird length	L	0.275	m
Wingspan	W	0.715	m
Bird flight speed	v	13.7	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		2	
Nocturnal activity factor	f_{night}	25%	

		Value	Units
Windfarm data			
Site name		**Lissinagroagh**	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

		Value	Units
Turbine data			
Model		**N163**	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2									0.001493				0.0001
Proportion at rotor risk height	Q_{2R}	100.00%														
At latitude 54.3		**Daylight hours per month**		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	25%															
Bird flight speed	v	13.7	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61.7	0.0	0.0	0.0	**62**

Stage C

No of blades	b	3		Bird length	l	0.275	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.715	m
Rotor radius	R	81.5	m	Bird flight speed	v	13.7	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	**upwind**	5.95%
	downwind	2.43%
	weighted mean	**4.19%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
Collision rates before avoidance													
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.23	0.00	0.00	0.00	**2**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
Avoidance rates modelled		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.23	0.00	0.00	0.00	**2.2**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.23	0.00	0.00	0.00	**2.2**
	98.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	**0.0**
	99.80%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

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		Value	Units
Bird data			
Species name		**Golden plover**	
Bird length	L	0.275	m
Wingspan	W	0.715	m
Bird flight speed	v	13.7	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		2	
Nocturnal activity factor	f_{night}	25%	

		Value	Units
Windfarm data			
Site name		**Lissinagroagh**	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

		Value	Units
Turbine data			
Model		**N163**	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2			0.000913	0	0								0.0001
Proportion at rotor risk height	Q_{2R}	93.20%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

No of turbines	T	14														
Rotor radius	R	81.5	m													
		Total rotor frontal area m^2	292141													
Nocturnal activity factor	f_{night}	25%														
Bird flight speed	v	13.7	m s^{-1}	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
		Projected number of rotor transits		0.0	0.0	34.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**35**

Stage C

No of blades	b	3		Bird length	l	0.275	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.715	m
Rotor radius	R	81.5	m	Bird flight speed	v	13.7	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					
		Single transit risk	upwind	5.95%			
			downwind	2.43%			
			weighted mean	**4.19%**			

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
	large array correction		Collision rates allowing for avoidance												
Avoidance rates modelled		100.00%	0.00	0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1.3**
		100.00%	0.00	0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1.3**
98.00%		100.00%	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**
99.80%		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

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		Value	Units
Bird data			
Species name		**Golden plover**	
Bird length	L	0.275	m
Wingspan	W	0.715	m
Bird flight speed	v	13.7	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		2	
Nocturnal activity factor	f_{night}	25%	

		Value	Units
Windfarm data			
Site name		**Lissinagroagh**	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

		Value	Units
Turbine data			
Model		**N163**	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2			0	0.004224	0								0.0004
Proportion at rotor risk height	Q_{2R}	55.00%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	25%															
Bird flight speed	v	13.7	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	101.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**102**

Stage C

No of blades	b	3		Bird length	l	0.275	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.715	m
Rotor radius	R	81.5	m	Bird flight speed	v	13.7	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	5.95%
	downwind	2.43%
	weighted mean	**4.19%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	3.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**4**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
Avoidance rates modelled			Collision rates allowing for avoidance												
		100.00%	0.00	0.00	0.00	3.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**3.7**
		100.00%	0.00	0.00	0.00	3.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**3.7**
98.00%		100.00%	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.1**
99.80%		100.00%	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Herring gull	
Bird length	L	0.61	m
Wingspan	W	1.465	m
Bird flight speed	v	12.8	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2								0.006456					0.0005
Proportion at rotor risk height	Q_{2R}	100.00%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	12.8	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.0	0.0	246.4	0.0	0.0	0.0	0.0	**246**

Stage C

No of blades	b	3		Bird length	l	0.61	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	1.465	m
Rotor radius	R	81.5	m	Bird flight speed	v	12.8	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	7.42%
	downwind	3.74%
	weighted mean	**5.58%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
	Collision rates before avoidance													year total
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.73	0.00	0.00	0.00	0.00	**10**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
Avoidance rates modelled			Collision rates allowing for avoidance												
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.73	0.00	0.00	0.00	0.00	**9.7**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.73	0.00	0.00	0.00	0.00	**9.7**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.73	0.00	0.00	0.00	0.00	**9.7**
	99.50%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
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Bird data		Value	Units
Species name		Herring gull	
Bird length	L	0.61	m
Wingspan	W	1.465	m
Bird flight speed	v	12.8	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A	birds/km^2					9.32662193	0.000641							0.0001
Proportion at rotor risk height	Q_{2R}	25.70%													
At latitude 54.3		Daylight hours per month	246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month	497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

No of turbines	T	14													
Rotor radius	R	81.5	m												
		Total rotor frontal area m^2	292141												
Nocturnal activity factor	f_{night}	0%													
Bird flight speed	v	12.8	m s^{-1}	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
		Projected number of rotor transits		0.0	0.0	0.0	0.0	1.0	7.0	0.0	0.0	0.0	0.0	0.0	0.0	**8**

Stage C

No of blades	b	3		Bird length	l	0.61	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	1.465	m
Rotor radius	R	81.5	m	Bird flight speed	v	12.8	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					
		Single transit risk	upwind	7.42%			
			downwind	3.74%			
			weighted mean	**5.58%**			

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.00	0.04	0.34	0.00	0.00	0.00	0.00	0.00	0.00	**0**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
Avoidance rates modelled		100.00%	0.00	0.00	0.00	0.00	0.04	0.34	0.00	0.00	0.00	0.00	0.00	0.00	**0.4**
		100.00%	0.00	0.00	0.00	0.00	0.04	0.34	0.00	0.00	0.00	0.00	0.00	0.00	**0.4**
		100.00%	0.00	0.00	0.00	0.00	0.04	0.34	0.00	0.00	0.00	0.00	0.00	0.00	**0.4**
	99.50%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Hen harrier	
Bird length	L	0.48	m
Wingspan	W	1.1	m
Bird flight speed	v	8	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2				0.015179	0.003714	0.004122	0.003752	0.000825					0.0023
Proportion at rotor risk height	Q_{2R}	12.38%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

No of turbines	T	14														
Rotor radius	R	81.5	m													
		Total rotor frontal area m^2	292141													
Nocturnal activity factor	f_{night}	0%														
Bird flight speed	v	8	m s^{-1}	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
		Projected number of rotor transits		0.0	0.0	0.0	40.8	11.8	13.5	12.4	2.4	0.0	0.0	0.0	0.0	**81**

Stage C

No of blades	b	3		Bird length	l	0.48	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	1.1	m
Rotor radius	R	81.5	m	Bird flight speed	v	8	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					
		Single transit risk	upwind	8.97%			
			downwind	4.32%			
			weighted mean	**6.64%**			

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	2.37	0.64	0.79	0.53	0.11	0.00	0.00	0.00	0.00	**4**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
Avoidance rates modelled		100.00%	0.00	0.00	0.00	2.37	0.64	0.79	0.53	0.11	0.00	0.00	0.00	0.00	**4.4**
		100.00%	0.00	0.00	0.00	2.37	0.64	0.79	0.53	0.11	0.00	0.00	0.00	0.00	**4.4**
		100.00%	0.00	0.00	0.00	2.37	0.64	0.79	0.53	0.11	0.00	0.00	0.00	0.00	**4.4**
99.00%		100.00%	0.00	0.00	0.00	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Hen harrier	
Bird length	L	0.48	m
Wingspan	W	1.1	m
Bird flight speed	v	8	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2					0.000236	0.002216	0.000466	0.001421					0.0004
Proportion at rotor risk height	Q_{2R}	8.81%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	8	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.5	5.2	1.1	3.0	0.0	0.0	0.0	0.0	**10**

Stage C

No of blades	b	3		Bird length	l	0.48	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	1.1	m
Rotor radius	R	81.5	m	Bird flight speed	v	8	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					
		Single transit risk	upwind	8.97%			
			downwind	4.32%			
			weighted mean	**6.64%**			

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.00	0.03	0.30	0.05	0.14	0.00	0.00	0.00	0.00	**1**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

	large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
Avoidance rates modelled		Collision rates allowing for avoidance												
	100.00%	0.00	0.00	0.00	0.00	0.03	0.30	0.05	0.14	0.00	0.00	0.00	0.00	**0.5**
	100.00%	0.00	0.00	0.00	0.00	0.03	0.30	0.05	0.14	0.00	0.00	0.00	0.00	**0.5**
	100.00%	0.00	0.00	0.00	0.00	0.03	0.30	0.05	0.14	0.00	0.00	0.00	0.00	**0.5**
99.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

		Value	Units
Bird data			
Species name		**Hen harrier**	
Bird length	L	0.48	m
Wingspan	W	1.1	m
Bird flight speed	v	8	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

		Value	Units
Windfarm data			
Site name		**Lissinagroagh**	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

		Value	Units
Turbine data			
Model		**N163**	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2					0.000164	0.015061	0.003529						0.0016
Proportion at rotor risk height	Q_{2R}	62.98%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

No of turbines	T	14														
Rotor radius	R	81.5	m													
		Total rotor frontal area m^2	292141													
Nocturnal activity factor	f_{night}	0%														
Bird flight speed	v	8	m s^{-1}	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
		Projected number of rotor transits		0.0	0.0	0.0	0.0	2.6	251.3	59.2	0.0	0.0	0.0	0.0	0.0	**313**

Stage C

No of blades	b	3		Bird length	l	0.48	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	1.1	m
Rotor radius	R	81.5	m	Bird flight speed	v	8	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					
		Single transit risk	upwind	8.97%			
			downwind	4.32%			
			weighted mean	**6.64%**			

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.00	0.14	14.73	2.52	0.00	0.00	0.00	0.00	0.00	**17**

Stage E

Allow for large array correction?		No														
Width of windfarm	w	3	km													
			large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
				Collision rates allowing for avoidance												
Avoidance rates modelled			100.00%	0.00	0.00	0.00	0.00	0.14	14.73	2.52	0.00	0.00	0.00	0.00	0.00	**17.4**
			100.00%	0.00	0.00	0.00	0.00	0.14	14.73	2.52	0.00	0.00	0.00	0.00	0.00	**17.4**
			100.00%	0.00	0.00	0.00	0.00	0.14	14.73	2.52	0.00	0.00	0.00	0.00	0.00	**17.4**
		99.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.15	0.03	0.00	0.00	0.00	0.00	0.00	**0.2**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Hen harrier	
Bird length	L	0.48	m
Wingspan	W	1.1	m
Bird flight speed	v	8	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2				0.003366	0.00451	0.000978							0.0007
Proportion at rotor risk height	Q_{2R}	20.97%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	8	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	15.3	24.2	5.4	0.0	0.0	0.0	0.0	0.0	0.0	**45**

Stage C

No of blades	b	3		Bird length	l	0.48	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	1.1	m
Rotor radius	R	81.5	m	Bird flight speed	v	8	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	8.97%
	downwind	4.32%
	weighted mean	**6.64%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
	Collision rates before avoidance													year total
		0.00	0.00	0.00	0.89	1.31	0.32	0.00	0.00	0.00	0.00	0.00	0.00	**3**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

	large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
Avoidance rates modelled		Collision rates allowing for avoidance												
	100.00%	0.00	0.00	0.00	0.89	1.31	0.32	0.00	0.00	0.00	0.00	0.00	0.00	**2.5**
	100.00%	0.00	0.00	0.00	0.89	1.31	0.32	0.00	0.00	0.00	0.00	0.00	0.00	**2.5**
	100.00%	0.00	0.00	0.00	0.89	1.31	0.32	0.00	0.00	0.00	0.00	0.00	0.00	**2.5**
99.00%	100.00%	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Hen harrier	
Bird length	L	0.48	m
Wingspan	W	1.1	m
Bird flight speed	v	8	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2						0.000118	0.000207	3.62347382243621e-05					0.0000
Proportion at rotor risk height	Q_{2R}	18.57%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	8	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.6	1.0	0.2	0.0	0.0	0.0	0.0	**2**

Stage C

No of blades	b	3		Bird length	l	0.48	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	1.1	m
Rotor radius	R	81.5	m	Bird flight speed	v	8	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk		
upwind		8.97%
downwind		4.32%
weighted mean		**6.64%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.01	0.00	0.00	0.00	0.00	**0**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

Avoidance rates modelled		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
		100.00%	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.01	0.00	0.00	0.00	0.00	**0.1**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.01	0.00	0.00	0.00	0.00	**0.1**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.01	0.00	0.00	0.00	0.00	**0.1**
	99.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Hen harrier	
Bird length	L	0.48	m
Wingspan	W	1.1	m
Bird flight speed	v	8	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2	0.000179												0.0000
Proportion at rotor risk height	Q_{2R}	0.00%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

No of turbines	T	14														
Rotor radius	R	81.5	m													
		Total rotor frontal area m^2	292141													
Nocturnal activity factor	f_{night}	0%														
Bird flight speed	v	8	m s^{-1}	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
		Projected number of rotor transits		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0**

Stage C

No of blades	b	3		Bird length	l	0.48	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	1.1	m
Rotor radius	R	81.5	m	Bird flight speed	v	8	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					
		Single transit risk	upwind	8.97%			
			downwind	4.32%			
			weighted mean	**6.64%**			

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0**

Stage E

Allow for large array correction?		No														
Width of windfarm	w	3	km													
			large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
				Collision rates allowing for avoidance												
Avoidance rates modelled			100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**
			100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**
			100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**
		99.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

		Value	Units
Bird data			
Species name		**Hen harrier**	
Bird length	L	0.48	m
Wingspan	W	1.1	m
Bird flight speed	v	8	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

		Value	Units
Windfarm data			
Site name		**Lissinagroagh**	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

		Value	Units
Turbine data			
Model		**N163**	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2			0.000685						0.016871				0.0015
Proportion at rotor risk height	Q_{2R}	41.73%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

No of turbines	T	14														
Rotor radius	R	81.5	m													
		Total rotor frontal area m^2	292141													
Nocturnal activity factor	f_{night}	0%														
Bird flight speed	v	8	m s^{-1}	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
		Projected number of rotor transits		0.0	0.0	5.4	0.0	0.0	0.0	0.0	0.0	139.3	0.0	0.0	0.0	**145**

Stage C

No of blades	b	3		Bird length	l	0.48	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	1.1	m
Rotor radius	R	81.5	m	Bird flight speed	v	8	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					
		Single transit risk	upwind	8.97%			
			downwind	4.32%			
			weighted mean	**6.64%**			

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00	7.99	0.00	0.00	0.00	**8**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
Avoidance rates modelled			Collision rates allowing for avoidance												
		100.00%	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00	7.99	0.00	0.00	0.00	**8.3**
		100.00%	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00	7.99	0.00	0.00	0.00	**8.3**
		100.00%	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00	7.99	0.00	0.00	0.00	**8.3**
	99.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	**0.1**

COLLISION RISK MODEL

Required input data is in orange boxes
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Bird data		Value	Units
Species name		Hen harrier	
Bird length	L	0.48	m
Wingspan	W	1.1	m
Bird flight speed	v	8	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2									0.000127				0.0000
Proportion at rotor risk height	Q_{2R}	85.12%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

No of turbines	T	14														
Rotor radius	R	81.5	m													
		Total rotor frontal area m^2	292141													
Nocturnal activity factor	f_{night}	0%														
Bird flight speed	v	8	m s^{-1}	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
		Projected number of rotor transits		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	0.0	**2**

Stage C

No of blades	b	3		Bird length	l	0.48 m
Rotation speed	Ω	8.8	rpm	Wingspan	w	1.1 m
Rotor radius	R	81.5	m	Bird flight speed	v	8 m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping
Pitch	λ	15	degrees	% of flights upwind/downwind		50% 50%
Blade profile		see Blade profile sheet				
		Single transit risk	upwind	8.97%		
			downwind	4.32%		
			weighted mean	**6.64%**		

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	**0**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

	large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
		Collision rates allowing for avoidance												
Avoidance rates modelled	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	**0.1**
	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	**0.1**
	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	**0.1**
99.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
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		Value	Units
Bird data			
Species name		**Kestrel**	
Bird length	L	0.34	m
Wingspan	W	0.755	m
Bird flight speed	v	12.7	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

		Value	Units
Windfarm data			
Site name		**Lissinagroagh**	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

		Value	Units
Turbine data			
Model		**N163**	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2								0.000131					0.0000
Proportion at rotor risk height	Q_{2R}	0.00%														
At latitude 54.3		**Daylight hours per month**		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	12.7	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0**

Stage C

No of blades	b	3		Bird length	l	0.34	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.755	m
Rotor radius	R	81.5	m	Bird flight speed	v	12.7	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	**upwind**	6.35%
	downwind	2.65%
	weighted mean	**4.50%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
Collision rates before avoidance													
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
		large array correction	**Collision rates allowing for avoidance**												
Avoidance rates modelled		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**
	95.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Kestrel	
Bird length	L	0.34	m
Wingspan	W	0.755	m
Bird flight speed	v	12.7	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2							0.000899	0.001639					0.0002
Proportion at rotor risk height	Q_{2R}	30.98%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	12.7	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.0	11.8	19.2	0.0	0.0	0.0	0.0	**31**

Stage C

No of blades	b	3		Bird length	l	0.34	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.755	m
Rotor radius	R	81.5	m	Bird flight speed	v	12.7	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	6.35%
	downwind	2.65%
	weighted mean	**4.50%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
Collision rates before avoidance													
	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.61	0.00	0.00	0.00	0.00	**1**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

Avoidance rates modelled		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.61	0.00	0.00	0.00	0.00	**1.0**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.61	0.00	0.00	0.00	0.00	**1.0**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.61	0.00	0.00	0.00	0.00	**1.0**
	95.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Kestrel	
Bird length	L	0.34	m
Wingspan	W	0.755	m
Bird flight speed	v	12.7	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2								0.002119					0.0002
Proportion at rotor risk height	Q_{2R}	62.04%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	12.7	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.0	0.0	49.8	0.0	0.0	0.0	0.0	**50**

Stage C

No of blades	b	3		Bird length	l	0.34	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.755	m
Rotor radius	R	81.5	m	Bird flight speed	v	12.7	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	6.35%
	downwind	2.65%
	weighted mean	**4.50%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
Collision rates before avoidance													
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.59	0.00	0.00	0.00	0.00	**2**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

Avoidance rates modelled		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.59	0.00	0.00	0.00	0.00	**1.6**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.59	0.00	0.00	0.00	0.00	**1.6**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.59	0.00	0.00	0.00	0.00	**1.6**
	95.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	**0.1**

COLLISION RISK MODEL

Required input data is in orange boxes
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Bird data		Value	Units
Species name		Kestrel	
Bird length	L	0.34	m
Wingspan	W	0.755	m
Bird flight speed	v	12.7	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2				0.000955	0.015672	0.002093	0.005312	0.003147					0.0023
Proportion at rotor risk height	Q_{2R}	71.52%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	12.7	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	23.5	455.5	63.0	160.5	85.2	0.0	0.0	0.0	0.0	**788**

Stage C

No of blades	b	3		Bird length	l	0.34	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.755	m
Rotor radius	R	81.5	m	Bird flight speed	v	12.7	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk		
upwind		6.35%
downwind		2.65%
weighted mean		**4.50%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%

Collision rates before avoidance	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
	0.00	0.00	0.00	0.93	16.72	2.50	4.63	2.72	0.00	0.00	0.00	0.00	**27**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

Avoidance rates modelled		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
		100.00%	0.00	0.00	0.00	0.93	16.72	2.50	4.63	2.72	0.00	0.00	0.00	0.00	**27.5**
		100.00%	0.00	0.00	0.00	0.93	16.72	2.50	4.63	2.72	0.00	0.00	0.00	0.00	**27.5**
		100.00%	0.00	0.00	0.00	0.93	16.72	2.50	4.63	2.72	0.00	0.00	0.00	0.00	**27.5**
	95.00%	100.00%	0.00	0.00	0.00	0.05	0.84	0.13	0.23	0.14	0.00	0.00	0.00	0.00	**1.4**

COLLISION RISK MODEL

Required input data is in orange boxes
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Bird data		Value	Units
Species name		Kestrel	
Bird length	L	0.34	m
Wingspan	W	0.755	m
Bird flight speed	v	12.7	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A	birds/km^2				0.00059				0.00025					0.0001
Proportion at rotor risk height	Q_{2R}	42.29%													
At latitude 54.3		Daylight hours per month	246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month	497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	12.7	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	8.6	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	**13**

Stage C

No of blades	b	3		Bird length	l	0.34	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.755	m
Rotor radius	R	81.5	m	Bird flight speed	v	12.7	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	6.35%
	downwind	2.65%
	weighted mean	**4.50%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
Collision rates before avoidance													
	0.00	0.00	0.00	0.34	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	**0**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

Avoidance rates modelled		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
		100.00%	0.00	0.00	0.00	0.34	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	**0.5**
		100.00%	0.00	0.00	0.00	0.34	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	**0.5**
		100.00%	0.00	0.00	0.00	0.34	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	**0.5**
	95.00%	100.00%	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

		Value	Units
Bird data			
Species name		**Kestrel**	
Bird length	L	0.34	m
Wingspan	W	0.755	m
Bird flight speed	v	12.7	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

		Value	Units
Windfarm data			
Site name		**Lissinagroagh**	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

		Value	Units
Turbine data			
Model		**N163**	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2											0.001989	0.00033	0.0002
Proportion at rotor risk height	Q_{2R}	56.96%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	12.7	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.9	3.5	**27**

Stage C

No of blades	b	3		Bird length	l	0.34	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.755	m
Rotor radius	R	81.5	m	Bird flight speed	v	12.7	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	6.35%
	downwind	2.65%
	weighted mean	**4.50%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
Collision rates before avoidance													
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.14	**1**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
		large array correction	Collision rates allowing for avoidance												
Avoidance rates modelled		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.14	**1.1**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.14	**1.1**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.14	**1.1**
	95.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.01	**0.1**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Kestrel	
Bird length	L	0.34	m
Wingspan	W	0.755	m
Bird flight speed	v	12.7	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A	birds/km^2									0.000419				0.0000
Proportion at rotor risk height	Q_{2R}	16.67%													
At latitude 54.3		Daylight hours per month	246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month	497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	12.7	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	**2**

Stage C

No of blades	b	3		Bird length	l	0.34	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.755	m
Rotor radius	R	81.5	m	Bird flight speed	v	12.7	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	6.35%
	downwind	2.65%
	weighted mean	**4.50%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
	Collision rates before avoidance													year total
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	**0**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

	large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
Avoidance rates modelled		Collision rates allowing for avoidance												
	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	**0.1**
	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	**0.1**
	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	**0.1**
95.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

		Value	Units
Bird data			
Species name		**Kestrel**	
Bird length	L	0.34	m
Wingspan	W	0.755	m
Bird flight speed	v	12.7	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

		Value	Units
Windfarm data			
Site name		**Lissinagroagh**	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

		Value	Units
Turbine data			
Model		**N163**	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2									0.000533				0.0000
Proportion at rotor risk height	Q_{2R}	89.70%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	12.7	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	0.0	0.0	0.0	**15**

Stage C

No of blades	b	3		Bird length	l	0.34	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.755	m
Rotor radius	R	81.5	m	Bird flight speed	v	12.7	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	6.35%
	downwind	2.65%
	weighted mean	**4.50%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
Collision rates before avoidance													
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.00	0.00	0.00	**1**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

Avoidance rates modelled		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.00	0.00	0.00	**0.6**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.00	0.00	0.00	**0.6**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.00	0.00	0.00	**0.6**
	95.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
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		Value	Units
Bird data			
Species name		**Kestrel**	
Bird length	L	0.34	m
Wingspan	W	0.755	m
Bird flight speed	v	12.7	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

		Value	Units
Windfarm data			
Site name		**Lissinagroagh**	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

		Value	Units
Turbine data			
Model		**N163**	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2									0.001693				0.0001
Proportion at rotor risk height	Q_{2R}	73.04%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	12.7	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.8	0.0	0.0	0.0	**39**

Stage C

No of blades	b	3		Bird length	l	0.34	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.755	m
Rotor radius	R	81.5	m	Bird flight speed	v	12.7	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	6.35%
	downwind	2.65%
	weighted mean	**4.50%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
Collision rates before avoidance													
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.51	0.00	0.00	0.00	**2**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

Avoidance rates modelled		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.51	0.00	0.00	0.00	**1.5**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.51	0.00	0.00	0.00	**1.5**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.51	0.00	0.00	0.00	**1.5**
	95.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	**0.1**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Lesser black-backed gull	
Bird length	L	0.6	m
Wingspan	W	1.45	m
Bird flight speed	v	13.1	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2					0.001007		0.00065	0.00359					0.0004
Proportion at rotor risk height	Q_{2R}	64.85%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	13.1	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	27.4	0.0	18.4	90.9	0.0	0.0	0.0	0.0	**137**

Stage C

No of blades	b	3		Bird length	l	0.6	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	1.45	m
Rotor radius	R	81.5	m	Bird flight speed	v	13.1	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	7.30%
	downwind	3.67%
	weighted mean	**5.49%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%

Collision rates before avoidance	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
	0.00	0.00	0.00	0.00	1.22	0.00	0.65	3.53	0.00	0.00	0.00	0.00	**5**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

Avoidance rates modelled		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
		100.00%	0.00	0.00	0.00	0.00	1.22	0.00	0.65	3.53	0.00	0.00	0.00	0.00	**5.4**
		100.00%	0.00	0.00	0.00	0.00	1.22	0.00	0.65	3.53	0.00	0.00	0.00	0.00	**5.4**
		100.00%	0.00	0.00	0.00	0.00	1.22	0.00	0.65	3.53	0.00	0.00	0.00	0.00	**5.4**
	99.50%	100.00%	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
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Bird data		Value	Units
Species name		Lesser black-backed gull	
Bird length	L	0.6	m
Wingspan	W	1.45	m
Bird flight speed	v	13.1	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2								0.047239					0.0039
Proportion at rotor risk height	Q_{2R}	80.96%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	13.1	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.0	0.0	1493.9	0.0	0.0	0.0	0.0	**1494**

Stage C

No of blades	b	3		Bird length	l	0.6	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	1.45	m
Rotor radius	R	81.5	m	Bird flight speed	v	13.1	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	7.30%
	downwind	3.67%
	weighted mean	**5.49%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
	Collision rates before avoidance													year total
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.03	0.00	0.00	0.00	0.00	**58**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
Avoidance rates modelled			Collision rates allowing for avoidance												
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.03	0.00	0.00	0.00	0.00	**58.0**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.03	0.00	0.00	0.00	0.00	**58.0**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.03	0.00	0.00	0.00	0.00	**58.0**
	99.50%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00	**0.3**

COLLISION RISK MODEL

Required input data is in orange boxes
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		Value	Units
Bird data			
Species name		**Lesser black-backed gull**	
Bird length	L	0.6	m
Wingspan	W	1.45	m
Bird flight speed	v	13.1	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

		Value	Units
Windfarm data			
Site name		**Lissinagroagh**	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

		Value	Units
Turbine data			
Model		**N163**	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2				0.002516	0.003914	0.000113	0.002419	0.000471					0.0008
Proportion at rotor risk height	Q_{2R}	88.92%														
At latitude 54.3		**Daylight hours per month**		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	13.1	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	79.5	145.9	4.4	93.8	16.4	0.0	0.0	0.0	0.0	**340**

Stage C

No of blades	b	3		Bird length	l	0.6 m
Rotation speed	Ω	8.8	rpm	Wingspan	w	1.45 m
Rotor radius	R	81.5	m	Bird flight speed	v	13.1 m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping
Pitch	λ	15	degrees	% of flights upwind/downwind		50% 50%
Blade profile		see Blade profile sheet				
		Single transit risk	**upwind**	7.30%		
			downwind	3.67%		
			weighted mean	**5.49%**		

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	3.81	6.52	0.21	3.29	0.64	0.00	0.00	0.00	0.00	**14**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
Avoidance rates modelled		100.00%	0.00	0.00	0.00	3.81	6.52	0.21	3.29	0.64	0.00	0.00	0.00	0.00	**14.5**
		100.00%	0.00	0.00	0.00	3.81	6.52	0.21	3.29	0.64	0.00	0.00	0.00	0.00	**14.5**
		100.00%	0.00	0.00	0.00	3.81	6.52	0.21	3.29	0.64	0.00	0.00	0.00	0.00	**14.5**
	99.50%	100.00%	0.00	0.00	0.00	0.02	0.03	0.00	0.02	0.00	0.00	0.00	0.00	0.00	**0.1**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Lesser black-backed gull	
Bird length	L	0.6	m
Wingspan	W	1.45	m
Bird flight speed	v	13.1	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2				0.001397	0.000373	0.001365							0.0003
Proportion at rotor risk height	Q_{2R}	35.42%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	13.1	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	17.6	5.5	21.0	0.0	0.0	0.0	0.0	0.0	0.0	**44**

Stage C

No of blades	b	3		Bird length	l	0.6	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	1.45	m
Rotor radius	R	81.5	m	Bird flight speed	v	13.1	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	7.30%
	downwind	3.67%
	weighted mean	**5.49%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
	Collision rates before avoidance													year total
		0.00	0.00	0.00	0.84	0.25	1.02	0.00	0.00	0.00	0.00	0.00	0.00	**2**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

Avoidance rates modelled		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
		100.00%	0.00	0.00	0.00	0.84	0.25	1.02	0.00	0.00	0.00	0.00	0.00	0.00	**2.1**
		100.00%	0.00	0.00	0.00	0.84	0.25	1.02	0.00	0.00	0.00	0.00	0.00	0.00	**2.1**
		100.00%	0.00	0.00	0.00	0.84	0.25	1.02	0.00	0.00	0.00	0.00	0.00	0.00	**2.1**
	99.50%	100.00%	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
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		Value	Units
Bird data			
Species name		**Merlin**	
Bird length	L	0.275	m
Wingspan	W	0.56	m
Bird flight speed	v	13.47	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

		Value	Units
Windfarm data			
Site name		**Lissinagroagh**	
Latitude		54.334929	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

		Value	Units
Turbine data			
Model		**N163**	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2				0.000202	7.83166153139441e-05	7.11819695768135e-05							0.0000
Proportion at rotor risk height	Q_{2R}	4.77%														
At latitude 54.3			Daylight hours per month	246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
			Nighttime hours per month	497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	13.47	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.4	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	**1**

Stage C

No of blades	b	3		Bird length	l	0.275	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.56	m
Rotor radius	R	81.5	m	Bird flight speed	v	13.47	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	5.92%
	downwind	2.36%
	weighted mean	**4.14%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0**

Stage E

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
Allow for large array correction?		No															
Width of windfarm	w	3	km														
			large array correction		Collision rates allowing for avoidance												
Avoidance rates modelled			100.00%		0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**
			100.00%		0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**
			100.00%		0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**
		98.00%	100.00%		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

		Value	Units
Bird data			
Species name		**Merlin**	
Bird length	L	0.275	m
Wingspan	W	0.56	m
Bird flight speed	v	13.47	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

		Value	Units
Windfarm data			
Site name		**Lissinagroagh**	
Latitude		54.334929	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

		Value	Units
Turbine data			
Model		**N163**	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2	8.85695310908465e-06												0.0000
Proportion at rotor risk height	Q_{2R}	0.00%														
At latitude 54.3		**Daylight hours per month**		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	13.47	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0**

Stage C

No of blades	b	3		Bird length	l	0.275	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.56	m
Rotor radius	R	81.5	m	Bird flight speed	v	13.47	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	**upwind**	5.92%
	downwind	2.36%
	weighted mean	**4.14%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
Avoidance rates modelled		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**
	98.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
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		Value	Units
Bird data			
Species name		**Peregrine**	
Bird length	L	0.42	m
Wingspan	W	1.025	m
Bird flight speed	v	12.1	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

		Value	Units
Windfarm data			
Site name		**Lissinagroagh**	
Latitude		54.334929	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

		Value	Units
Turbine data			
Model		**N163**	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2				0.000128				0.000613					0.0001
Proportion at rotor risk height	Q_{2R}	91.48%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	12.1	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	3.8	0.0	0.0	0.0	20.2	0.0	0.0	0.0	0.0	**24**

Stage C

No of blades	b	3		Bird length	l	0.42	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	1.025	m
Rotor radius	R	81.5	m	Bird flight speed	v	12.1	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	6.86%
	downwind	3.05%
	weighted mean	**4.95%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.71	0.00	0.00	0.00	0.00	**1**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
Avoidance rates modelled		100.00%	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.71	0.00	0.00	0.00	0.00	**0.9**
		100.00%	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.71	0.00	0.00	0.00	0.00	**0.9**
		100.00%	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.71	0.00	0.00	0.00	0.00	**0.9**
	98.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
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Bird data		Value	Units
Species name		Red grouse	
Bird length	L	0.395	m
Wingspan	W	0.605	m
Bird flight speed	v	31.3	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A	birds/km^2									3.08272829318076e-06				0.0000
Proportion at rotor risk height	Q_{2R}	0.00%													
At latitude 54.3		Daylight hours per month	246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month	497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	31.3	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0**

Stage C

No of blades	b	3		Bird length	l	0.395	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.605	m
Rotor radius	R	81.5	m	Bird flight speed	v	31.3	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	4.60%
	downwind	2.98%
	weighted mean	**3.79%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
Avoidance rates modelled		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**
	98.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Snipe	
Bird length	L	0.26	m
Wingspan	W	0.455	m
Bird flight speed	v	16	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		2	
Nocturnal activity factor	f_{night}	25%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2									8.79868191187035e-05				0.0000
Proportion at rotor risk height	Q_{2R}	56.25%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	25%															
Bird flight speed	v	16	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0	0.0	**2**

Stage C

No of blades	b	3		Bird length	l	0.26	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.455	m
Rotor radius	R	81.5	m	Bird flight speed	v	16	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	5.42%
	downwind	2.29%
	weighted mean	**3.86%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	**0**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
Avoidance rates modelled		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	**0.1**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	**0.1**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	**0.1**
	98.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Snipe	
Bird length	L	0.26	m
Wingspan	W	0.455	m
Bird flight speed	v	16	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		2	
Nocturnal activity factor	f_{night}	25%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2								0.001165					0.0001
Proportion at rotor risk height	Q_{2R}	16.00%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	25%															
Bird flight speed	v	16	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.2	0.0	0.0	0.0	0.0	**10**

Stage C

No of blades	b	3		Bird length	l	0.26	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.455	m
Rotor radius	R	81.5	m	Bird flight speed	v	16	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk		
upwind		5.42%
downwind		2.29%
weighted mean		**3.86%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	**0**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
Avoidance rates modelled		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	**0.3**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	**0.3**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	**0.3**
	98.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Snipe	
Bird length	L	0.26	m
Wingspan	W	0.455	m
Bird flight speed	v	16	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		2	
Nocturnal activity factor	f_{night}	25%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A	birds/km^2					0.00562			0.00237					0.0007
Proportion at rotor risk height	Q_{2R}	39.86%													
At latitude 54.3		Daylight hours per month	246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month	497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

No of turbines	T	14													
Rotor radius	R	81.5	m												
		Total rotor frontal area m^2	292141												
Nocturnal activity factor	f_{night}	25%													
Bird flight speed	v	16	m s^{-1}	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
		Projected number of rotor transits		0.0	0.0	0.0	0.0	129.0	0.0	0.0	51.9	0.0	0.0	0.0	0.0	**181**

Stage C

No of blades	b	3		Bird length	l	0.26 m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.455 m
Rotor radius	R	81.5	m	Bird flight speed	v	16 m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping
Pitch	λ	15	degrees	% of flights upwind/downwind		50% 50%
Blade profile		see Blade profile sheet				
		Single transit risk	upwind	5.42%		
			downwind	2.29%		
			weighted mean	**3.86%**		

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.00	4.05	0.00	0.00	1.42	0.00	0.00	0.00	0.00	**5**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

	large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
Avoidance rates modelled		Collision rates allowing for avoidance												
	100.00%	0.00	0.00	0.00	0.00	4.05	0.00	0.00	1.42	0.00	0.00	0.00	0.00	**5.5**
	100.00%	0.00	0.00	0.00	0.00	4.05	0.00	0.00	1.42	0.00	0.00	0.00	0.00	**5.5**
	100.00%	0.00	0.00	0.00	0.00	4.05	0.00	0.00	1.42	0.00	0.00	0.00	0.00	**5.5**
98.00%	100.00%	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.00	0.00	0.00	0.00	**0.1**

COLLISION RISK MODEL

Required input data is in orange boxes
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Bird data		Value	Units
Species name		Snipe	
Bird length	L	0.26	m
Wingspan	W	0.455	m
Bird flight speed	v	16	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		2	
Nocturnal activity factor	f_{night}	25%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2				0.00127	0.014755		0.003743						0.0016
Proportion at rotor risk height	Q_{2R}	68.09%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	25%															
Bird flight speed	v	16	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	44.2	578.7	0.0	150.7	0.0	0.0	0.0	0.0	0.0	**774**

Stage C

No of blades	b	3		Bird length	l	0.26	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.455	m
Rotor radius	R	81.5	m	Bird flight speed	v	16	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	5.42%
	downwind	2.29%
	weighted mean	**3.86%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	1.49	18.18	0.00	3.72	0.00	0.00	0.00	0.00	0.00	**23**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
Avoidance rates modelled		100.00%	0.00	0.00	0.00	1.49	18.18	0.00	3.72	0.00	0.00	0.00	0.00	0.00	**23.4**
		100.00%	0.00	0.00	0.00	1.49	18.18	0.00	3.72	0.00	0.00	0.00	0.00	0.00	**23.4**
		100.00%	0.00	0.00	0.00	1.49	18.18	0.00	3.72	0.00	0.00	0.00	0.00	0.00	**23.4**
	98.00%	100.00%	0.00	0.00	0.00	0.03	0.36	0.00	0.07	0.00	0.00	0.00	0.00	0.00	**0.5**

COLLISION RISK MODEL

Required input data is in orange boxes
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Bird data		Value	Units
Species name		Snipe	
Bird length	L	0.26	m
Wingspan	W	0.455	m
Bird flight speed	v	16	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		2	
Nocturnal activity factor	f_{night}	25%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2				0.086935	0.000305								0.0073
Proportion at rotor risk height	Q_{2R}	69.85%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

No of turbines	T	14														
Rotor radius	R	81.5	m													
		Total rotor frontal area m^2	292141													
Nocturnal activity factor	f_{night}	25%														
Bird flight speed	v	16	m s^{-1}	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
		Projected number of rotor transits		0.0	0.0	0.0	3106.1	12.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**3118**

Stage C

No of blades	b	3		Bird length	l	0.26	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.455	m
Rotor radius	R	81.5	m	Bird flight speed	v	16	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					
		Single transit risk	upwind	5.42%			
			downwind	2.29%			
			weighted mean	**3.86%**			

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	104.55	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**105**

Stage E

Allow for large array correction?		No														
Width of windfarm	w	3	km													
			large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
				Collision rates allowing for avoidance												
Avoidance rates modelled			100.00%	0.00	0.00	0.00	104.55	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**104.9**
			100.00%	0.00	0.00	0.00	104.55	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**104.9**
			100.00%	0.00	0.00	0.00	104.55	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**104.9**
		98.00%	100.00%	0.00	0.00	0.00	2.09	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**2.1**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Snipe	
Bird length	L	0.26	m
Wingspan	W	0.455	m
Bird flight speed	v	16	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		2	
Nocturnal activity factor	f_{night}	25%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A	birds/km^2	6.851394842731	2.95097001994659e-05								0.000158		2.45914168328883e-	0.0000
Proportion at rotor risk height	Q_{2R}	74.75%													
At latitude 54.3		Daylight hours per month	246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month	497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

No of turbines	T	14	
Rotor radius	R	81.5	m
Total rotor frontal area m^2		292141	
Nocturnal activity factor	f_{night}	25%	
Bird flight speed	v	16	m s^{-1}

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
Projected number of rotor transits	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	0.0	0.7	**7**

Stage C

No of blades	b	3		Bird length	l	0.26 m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.455 m
Rotor radius	R	81.5	m	Bird flight speed	v	16 m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping
Pitch	λ	15	degrees	% of flights upwind/downwind		50% 50%
Blade profile		see Blade profile sheet				

Single transit risk	upwind	5.42%
	downwind	2.29%
	weighted mean	**3.86%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%

Collision rates before avoidance	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.02	**0**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Collision rates allowing for avoidance: Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
Avoidance rates modelled		100.00%	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.02	**0.2**
		100.00%	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.02	**0.2**
		100.00%	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.02	**0.2**
	98.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Snipe	
Bird length	L	0.26	m
Wingspan	W	0.455	m
Bird flight speed	v	16	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		2	
Nocturnal activity factor	f_{night}	25%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A	birds/km^2									0.000467				0.0000
Proportion at rotor risk height	Q_{2R}	20.00%													
At latitude 54.3		Daylight hours per month	246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month	497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

No of turbines	T	14													
Rotor radius	R	81.5	m												
		Total rotor frontal area m^2	292141												
Nocturnal activity factor	f_{night}	25%													
Bird flight speed	v	16	m s^{-1}	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
		Projected number of rotor transits		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	0.0	0.0	0.0	**5**

Stage C

No of blades	b	3		Bird length	l	0.26 m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.455 m
Rotor radius	R	81.5	m	Bird flight speed	v	16 m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping
Pitch	λ	15	degrees	% of flights upwind/downwind		50% 50%
Blade profile		see Blade profile sheet				
		Single transit risk	upwind	5.42%		
			downwind	2.29%		
			weighted mean	**3.86%**		

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	**0**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
Avoidance rates modelled		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	**0.1**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	**0.1**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	**0.1**
	98.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		Snipe	
Bird length	L	0.26	m
Wingspan	W	0.455	m
Bird flight speed	v	16	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		2	
Nocturnal activity factor	f_{night}	25%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A	birds/km^2									2.71426910560043e-07				0.0000
Proportion at rotor risk height	Q_{2R}	18.00%													
At latitude 54.3		Daylight hours per month	246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month	497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	25%															
Bird flight speed	v	16	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0**

Stage C

No of blades	b	3		Bird length	l	0.26	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	0.455	m
Rotor radius	R	81.5	m	Bird flight speed	v	16	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	5.42%
	downwind	2.29%
	weighted mean	**3.86%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
Avoidance rates modelled		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**
	98.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.0**

COLLISION RISK MODEL

Required input data is in orange boxes
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Bird data		Value	Units
Species name		White-tailed eagle	
Bird length	L	0.8	m
Wingspan	W	2.2	m
Bird flight speed	v	13.6	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2								0.002245					0.0002
Proportion at rotor risk height	Q_{2R}	42.86%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	13.6	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.0	0.0	0.0	0.0	0.0	**39**

Stage C

No of blades	b	3		Bird length	l	0.8	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	2.2	m
Rotor radius	R	81.5	m	Bird flight speed	v	13.6	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	8.06%
	downwind	4.53%
	weighted mean	**6.30%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.74	0.00	0.00	0.00	0.00	**2**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
Avoidance rates modelled		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.74	0.00	0.00	0.00	0.00	**1.7**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.74	0.00	0.00	0.00	0.00	**1.7**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.74	0.00	0.00	0.00	0.00	**1.7**
	95.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	**0.1**

COLLISION RISK MODEL

Required input data is in orange boxes
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Bird data		Value	Units
Species name		White-tailed eagle	
Bird length	L	0.8	m
Wingspan	W	2.2	m
Bird flight speed	v	13.6	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2								0.002009					0.0002
Proportion at rotor risk height	Q_{2R}	40.30%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	13.6	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.8	0.0	0.0	0.0	0.0	**33**

Stage C

No of blades	b	3		Bird length	l	0.8	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	2.2	m
Rotor radius	R	81.5	m	Bird flight speed	v	13.6	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	8.06%
	downwind	4.53%
	weighted mean	**6.30%**

Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.46	0.00	0.00	0.00	0.00	**1**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
Avoidance rates modelled		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.46	0.00	0.00	0.00	0.00	**1.5**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.46	0.00	0.00	0.00	0.00	**1.5**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.46	0.00	0.00	0.00	0.00	**1.5**
	95.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	**0.1**

COLLISION RISK MODEL

Required input data is in orange boxes
Calculated output is in blue boxes
green boxes are for information only, to show variables used at each stage

Bird data		Value	Units
Species name		White-tailed eagle	
Bird length	L	0.8	m
Wingspan	W	2.2	m
Bird flight speed	v	13.6	m s^{-1}
Flight type, flapping or gliding		flapping	
% of flights upwind/downwind		50%	50%
Nocturnal activity ranking 1-5		1	
Nocturnal activity factor	f_{night}	0%	

Windfarm data		Value	Units
Site name		Lissinagroagh	
Latitude		54.33493	degrees
No of turbines	T	14	
Width of windfarm	w	3	km

Turbine data		Value	Units
Model		N163	
Hub height		103.5	m
Rotor radius	R	81.5	m
No of blades	b	3	
Rotation speed	Ω	8.8	rpm
Max blade width	C	4.15	m
Blade pitch	λ	15	degrees
Risk height range		22-185	m

normal approach

Set to 'normal approach' to use survey data on bird density
Set to 'birds on migration' to use 'Migrant collision risk' sheet in place of Stage A

Stage A

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Daytime bird density	D_A		birds/km^2								0.000988					0.0001
Proportion at rotor risk height	Q_{2R}	44.25%														
At latitude 54.3		Daylight hours per month		246.8	271.3	366.1	420.6	496.0	513.3	515.7	462.1	383.3	328.1	257.2	230.1	4490.7
		Nighttime hours per month		497.2	400.7	377.9	299.4	248.0	206.7	228.3	281.9	336.7	415.9	462.8	513.9	4269.3

Stage B

					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year total
No of turbines	T	14															
Rotor radius	R	81.5	m														
		Total rotor frontal area m^2		292141													
Nocturnal activity factor	f_{night}	0%															
Bird flight speed	v	13.6	m s^{-1}														
		Projected number of rotor transits			0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.7	0.0	0.0	0.0	0.0	**18**

Stage C

No of blades	b	3		Bird length	l	0.8	m
Rotation speed	Ω	8.8	rpm	Wingspan	w	2.2	m
Rotor radius	R	81.5	m	Bird flight speed	v	13.6	m s^{-1}
Max blade width	C	4.15	m	Flight type		flapping	
Pitch	λ	15	degrees	% of flights upwind/downwind		50%	50%
Blade profile		see Blade profile sheet					

Single transit risk	upwind	8.06%
	downwind	4.53%
	weighted mean	**6.30%**

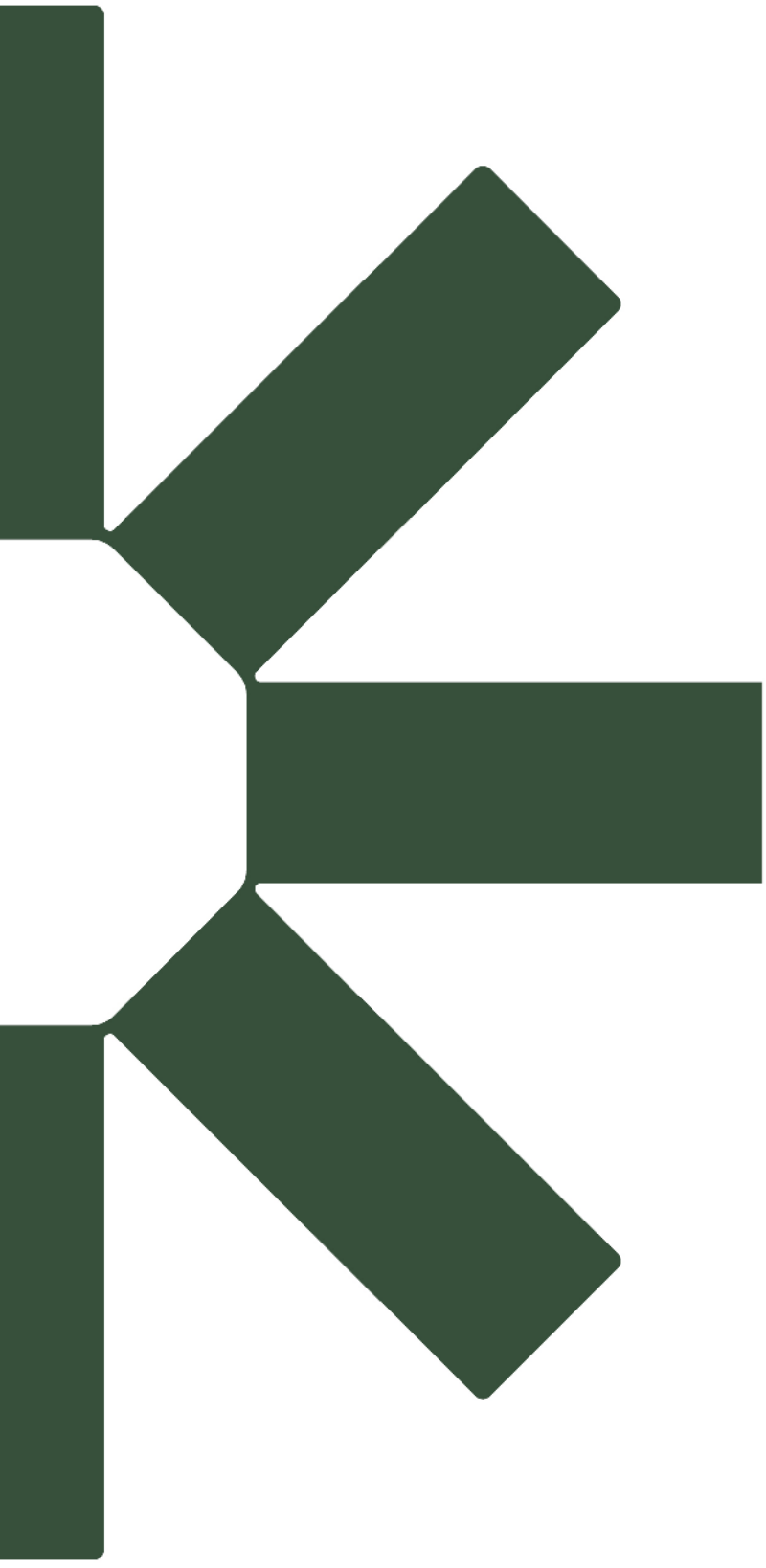
Stage D

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year avge
Proportion of time operational	Q_{op}	90.2%	94.1%	91.2%	87.3%	81.5%	88.2%	64.0%	70.8%	86.3%	91.2%	93.1%	90.2%	85.7%
		Collision rates before avoidance												year total
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.79	0.00	0.00	0.00	0.00	**1**

Stage E

Allow for large array correction? No
Width of windfarm w 3 km

		large array correction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	per year
			Collision rates allowing for avoidance												
Avoidance rates modelled		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.79	0.00	0.00	0.00	0.00	**0.8**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.79	0.00	0.00	0.00	0.00	**0.8**
		100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.79	0.00	0.00	0.00	0.00	**0.8**
	95.00%	100.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	**0.0**



Making Sustainability Happen

Appendix 6-15

Nature Conservation Site Synopses

SITE SYNOPSIS

SITE NAME: DRUMCLIFF BAY SPA

SITE CODE: 004013

Drumcliff Bay, Co. Sligo is the most northerly of Sligo Bay's three estuarine inlets. The bay comprises an inner area of sheltered estuarine habitat and an outer area of shallow seawater. It extends 9 km east to west from Drumcliff village to Raghly Point. Drumcliff Bay is the estuary of the Drumcliff River, a substantial river flowing from Glencar Lough to the east. The inner part of Drumcliff Bay is sheltered by a sandy/grassy peninsula extending north from Rosses Point. The northern part of the bay is fringed by fine sandy beaches - Ballygilgan Strand, Lissadell Strand and Ardtermon Strand. Salt marsh occurs in the most sheltered areas and at low tide, extensive inter-tidal flats are exposed. A bed of Dwarf Eelgrass (*Zostera noltii*) occurs near the south-eastern corner of the bay.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Sanderling and Bar-tailed Godwit. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Drumcliff Bay SPA is of importance as it supports nationally important populations of two species of wintering waterfowl: Sanderling (237) and Bar-tailed Godwit (336) – all figures are four year mean peaks for four of the five winters between 1995/96 and 1999/2000.

Other species that occur regularly include Whooper Swan (45), Light-bellied Brent Goose (74), Shelduck (75), Wigeon (138), Teal (57), Long-tailed Duck (14), Red-breasted Merganser (20), Great Northern Diver (13), Oystercatcher (356), Ringed Plover (139), Lapwing (155), Knot (107), Dunlin (559), Curlew (177) and Redshank (138).

Drumcliff Bay SPA is of national importance for its winter populations of Sanderling and Bar-tailed Godwit, and the site supports a good diversity of other waterfowl species. Of note is that three of the species which occur regularly (Whooper Swan, Great Northern Diver and Bar-tailed Godwit) are listed on Annex I of the E.U. Birds Directive. Part of Drumcliff Bay SPA is a Wildfowl Sanctuary.

25.3.2014

SITE SYNOPSIS

SITE NAME: CUMMEEN STRAND SPA

SITE CODE: 004035

Cummeen Strand is a large shallow bay stretching from Sligo Town westwards to Coney Island. It is one of three estuarine bays within Sligo Bay and is situated between Drumcliff Bay to the north and Ballysadare Bay to the south. The Garavogue River flows into the bay and forms a permanent channel.

At low tide, extensive sand and mud flats are exposed. These support a diverse macro-invertebrate fauna which provides the main food supply for the wintering waterfowl. Invertebrate species such as Lugworm (*Arenicola marina*), Ragworm (*Hediste diversicolor*), Cockles (*Cerastoderma edul*e), Sand Mason (*Lanice conchilega*), Baltic Tellin (*Macoma balthica*), Spire Shell (*Hydrobia ulvae*) and Mussels (*Mytilus edulis*) are frequent. Of particular note is the presence of eelgrass (*Zostera noltii* and *Z. angustifolia*) beds, which provide a valuable food stock for herbivorous wildfowl. The estuarine and intertidal flat habitats are of conservation significance and are listed on Annex I of the E.U. Habitats Directive. Areas of salt marsh fringe the bay in places and provide roosting sites for birds during the high tide periods. Sand dunes occur at Killaspug Point and Coney Island, with a shingle spit at Standalone Point near Sligo Town.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Light-bellied Brent Goose, Oystercatcher and Redshank. The E.U. Birds Directive pays particular attention to wetlands, and as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Cummeen Strand supports important concentrations of wintering waterfowl, including an internationally important Light-bellied Brent Goose flock (223) and nationally important populations of Oystercatcher (680) and Redshank (408). Other species occurring include Shelduck (86), Wigeon (149), Teal (54), Mallard (145), Red-breasted Merganser (15), Golden Plover (428), Lapwing (695), Knot (165), Sanderling (14), Dunlin (539), Bar-tailed Godwit (85), Curlew (430), Greenshank (13) and Turnstone (62) - all figures are mean peak counts for 4 of the 5 winters between 1995/96 and 1999/2000. Whooper Swan (7) also uses the site, though not regularly.

Cummeen Strand SPA is of high ornithological importance with one species, Light-bellied Brent Goose, occurring in numbers of international importance. In addition, the site supports nationally important populations of a further two species. The regular presence of Golden Plover and Bar-tailed Godwit is of particular note as these species are listed on Annex I of the E.U. Birds Directive. The site is also important as a component of the much larger Sligo Bay complex. Cummeen Strand is a Ramsar Convention site.

7.7.2014

SITE SYNOPSIS

SITE NAME: LOUGH DERG (DONEGAL) SPA

SITE CODE: 004057

Lough Derg is a large, oligotrophic lake situated north of Pettigo, Co. Donegal. The lake lies in a landscape of extensive blanket bogs and conifer plantations which make up its catchment. The underlying geology of the area is acid gneiss with some basic intrusions. The lakeshore is mainly stony, and marginal vegetation is poorly developed due to the close proximity of the conifer plantations. The lake has a number of islands.

The lakeshore has a sparse covering of Shoreweed (*Littorella uniflora*), Water Lobelia (*Lobelia dortmanna*) and the moss *Fontinalis antipyretica*. Broad-leaved Pondweed (*Potamogeton natans*) and Bulbous Rush (*Juncus bulbosus*) are found on the margins. There are areas of scrub along parts of the lake shores and on the ungrazed islands. These are composed of Alder (*Alnus glutinosa*), willow (*Salix* spp.), Rowan (*Sorbus aucuparia*) and birch (*Betula* sp.).

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Lesser Black-backed Gull and Herring Gull.

A large colony of nesting gulls was discovered on Inishgoosk Island in 1977. A survey in 1999 estimated a population of 500 pairs of Lesser Black-backed Gull, which is the largest colony in the country. An estimated 100 pairs of Herring Gull were also present, which is of national importance. Common Gull has bred here in the past.
The Pettigo Plateau Greenland White-fronted Goose flock formerly used Lough Derg as a feeding and/or roost site. Inishgoosk Island appeared to be the main feeding area used. In the 1980s, the bogs were largely deserted in favour of coastal grassland sites at Durnesh Lough and Brownhall. Wintering waterfowl are scarce on Lough Derg due to the oligotrophic character of the system but small numbers of Tufted Duck, Mallard and Goldeneye occur. A feral Greylag Goose flock is resident at the site.

Arctic Char (*Salvelinus alpinus*), a threatened Red Data Book species, was recorded from the lake as recently 1990/91.

Lough Derg SPA is of national importance for both Lesser Black-backed Gull and Herring Gull. In the past it was used by Greenland White-fronted Goose, a species that is listed on Annex I of the E.U. Birds Directive

27.1.2012

SITE SYNOPSIS

SITE NAME: BALLYSADARE BAY SPA

SITE CODE: 004129

Ballysadare Bay extends for approximately 10 km westwards from the town of Ballysadare, County Sligo. It is the most southerly of three inlets that form the eastern part of the larger Sligo Bay complex. The estuarine channel of the Ballysadare River winds its way through the bay, finally reaching the open sea near the Strandhill Dunes sand spit. The bay is underlain by sedimentary rocks of limestones, sandstones and shales which are exposed as low cliffs and small sections of bedrock shore at several locations.

The bay contains extensive intertidal sand and mudflats. The flats support good populations of macro-invertebrates which are important food items for wintering waterfowl. Common species present include the polychaete worms *Hediste diversicolor*, *Arenicola marina*, *Lanice conchilega* and *Nepthys hombergii*, and the bivalves *Cerastoderma edule*, *Macoma balthica* and *Scrobicularia plana*. Also present on the intertidal flats are the vascular plants Eelgrass (*Zostera marina*) and Beaked Tasselweed (*Ruppia maritima*), which provide food for herbivorous wildfowl. Well-developed salt marshes, which provide roosting sites for birds at high tide, occur at several locations around the bay. The sandy beaches around the Strandhill peninsula are used by roosting birds.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Light-bellied Brent Goose, Grey Plover, Dunlin, Bar-tailed Godwit and Redshank. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Ballysadare Bay is important for a range of waterfowl species in autumn and winter. The population of Light-bellied Brent Goose (188) is of international importance (all figures are mean peak counts for four winters in the period 1995/96 to 1999/2000). The populations of four other species are of national importance, i.e. Grey Plover (70), Dunlin (1,420), Bar-tailed Godwit (251) and Redshank (435). A range of other species occurs, including Whooper Swan (15), Shelduck (55), Wigeon (617), Teal (179), Mallard (304), Goldeneye (17), Red-breasted Merganser (26), Cormorant (43), Oystercatcher (518), Ringed Plover (96), Golden Plover (301), Lapwing (467), Curlew (508), Greenshank (22), Turnstone (40), Black-headed Gull (261) and Common Gull (203).

Ballysadare Bay SPA is of high ornithological importance - it supports a Light-bellied Brent Goose population of international importance as well as nationally important populations of four other wintering waterfowl species. The presence of Bar-tailed Godwit, Golden Plover and Whooper Swan is of particular note as these species are

listed on Annex I of the E.U. Birds Directive. The site forms an important component of the larger Sligo Bay complex.

8.2.2010

SITE SYNOPSIS

SITE NAME: DONEGAL BAY SPA

SITE CODE: 004151

Donegal Bay SPA is a very large, marine-dominated, site. It extends from Doorin Point, to the west of Donegal Town, to Tullaghan Point in County Leitrim, a distance of approximately 15 km along its north-east/south-west axis. It varies in width from about 3 km to over 8 km. The site includes the estuary of the River Eske, which flows through Donegal Town, and the estuary of the River Erne, which flows through Ballyshannon. Much of the shoreline is rocky or stony, with well-developed littoral reefs in places. There are also extensive stretches of sandy beaches, especially from the Murvagh peninsula southwards to Rossnowlagh and at the outer part of the estuary of the River Erne. Shingle or cobble beaches are also represented. There are extensive areas of intertidal flats associated with the estuary of the River Eske, reflecting the very sheltered conditions in this part of the bay. These have been shown to be biotope rich, and supporting a range of macro-invertebrates, including polychaete worms (*Hediste diversicolor, Arenicola marina* and *Nephtys hombergii*) and bivalves (*Scrobicularia plana, Cerastoderma edule* and *Macoma balthica*). Elsewhere, a narrow fringe of intertidal flats is exposed at low tides. Salt marshes are found in the sheltered conditions of the innermost part of the bay. A number of small, grassy, islands occur in the innermost part of the bay. The waters of the shallow bay overlie mostly sandy substrates, though reefs occur in places.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Great Northern Diver, Light-bellied Brent Goose, Common Scoter and Sanderling. The E.U. Birds Directive pays particular attention to wetlands, and as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Donegal Bay supports an excellent diversity of wintering waterbirds, especially species associated with shallow bays (all figures are mean peak counts for four of the five winters between 1995/96 and 1999/2000). It has an internationally important wintering population of Great Northern Diver (138) and is consistently one of the top sites in the country for this species. It also has one of the few regular populations of Black-throated Diver in the country (11), and Red-throated Diver (21). It supports an internationally important population of Light-bellied Brent Goose (207) and nationally important populations of Common Scoter (860) and Sanderling (68). A range of other species associated with estuarine and shoreline habitats occurs at the site, including Cormorant (29), Shelduck (24), Wigeon (224), Mallard (100), Long-tailed Duck (14), Red-breasted Merganser (38), Oystercatcher (581), Ringed Plover (99), Golden Plover (103), Lapwing (122), Dunlin (269), Bar-tailed Godwit (49), Curlew (359), Redshank (93), Greenshank (12) and Turnstone (53). Gulls are regular in autumn and winter, especially Black-headed Gull (239) and Common Gull (297).

This large coastal site is of high ornithological importance, with two species having populations of international importance (Great Northern Diver and Light-bellied Brent Goose) and a further two species having populations of national importance (Common Scoter and Sanderling). Also of note is that five of the regularly occurring species are listed on Annex I of the E.U. Birds Directive, i.e. Great Northern Diver, Black-throated Diver, Red-throated Diver, Golden Plover and Bar-tailed Godwit.

13.10.2010

SITE SYNOPSIS

SITE NAME: SLIGO/LEITRIM UPLANDS SPA

SITE CODE: 004187

The Sligo/Leitrim Uplands SPA is located north-east of the town of Sligo in the mountain ranges of Ben Bulben, Arroo and Cope's Mountain/Crockauns. The site straddles the Co. Sligo/Co. Leitrim border. The site includes six separate lengths of cliffs in these ranges, including those of King's Mountain, Benbulbin, Benwiskin, Gleniff, Truskmore, Tievebaun, Glenade, Glencar, Arroo Mountain and Cope's Mountain/Crockauns. The upper boundary of the site is taken to be 50 m from the cliff top except in the King's Mountain area, above Glencar Lough, where an expanse of suitable foraging habitat *c*. 200 m from the cliff top is included. These uplands are formed of Carboniferous limestone, capped in places by shales. They stand on a high plateau, 300-450 m above the surrounding countryside, and the edges form lofty cliffs from 15 to 300 m in height. Areas of scree occur below the cliffs on slopes of 40-50°.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Chough and Peregrine.

Inland cliffs and scree slopes are the predominant habitats of the site. Other habitats present on the site include heath, blanket bog, grassland, scrub, woodland and streams.

The cliffs hold an internationally important population of breeding Chough (14 breeding pairs recorded from the site in the 1992 survey and 15 in the 2002/03 survey). Chough forage mostly in unimproved, closely grazed grassland and flocks of up to 29 birds have been seen. The land on the plateau is, for the most part, vegetated by heath and blanket bog which is largely unsuitable habitat for Chough. The suitable grassland occurs mainly on the steep slopes below the cliffs.

The extensive uplands on the plateau provide excellent habitat for Peregrine; the cliffs are ideal nesting sites and four pairs were recorded here in 2002. Small numbers of Red Grouse are also known to occur within the site.

The Sligo/Leitrim Uplands SPA is of considerable ornithological significance, being a site of international importance for Chough and of national importance for Peregrine; both species are listed on Annex I of the E.U. Birds Directive.

30.5.2015

ENVIRONMENT
AND HERITAGE
SERVICE

Register entry UK9020051 under regulation 10 of The Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995.

This is the register entry for the European site known as Pettigoe Plateau Special Protection Area. The site has been classified by the Department of the Environment for Northern Ireland pursuant to Article 4(1) and/or 4(2) of Council Directive 79/409/EEC on the conservation of wild birds as a Special Protection Area.

The register reference number for this European site is UK9020051 and a folder, kept under this reference as part of the register, contains a map of the European site and a citation giving the reasons for the classification of the site as a Special Protection Area. The map and citation are identified by the register reference number and signed by me on the date of registration.

Other details of the European site are as follows:

Date of classification: 19 November 1996

Site centre location (1):

longitude: 007° 58' 55" W
latitude : 054° 31' 57" N

Area: 1270 hectares

Priority status(2): N/A

Date of registration: 17 February 1998

Signed:

on behalf of the Department of the Environment for Northern Ireland

Sealed with the Official Seal of the Department of the Environment for Northern Ireland on

R. Lanchelaus.
Civil Servant in Clarence House Belfast.

1. This indicates the approximate centre of the site. Where the European site consists of several distinct areas, the co-ordinates of the most important sub-area are entered.

2. Indicates if the site has been identified under Article 4.2 of Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora as hosting one or more priority natural habitat types or priority species.

S001_LMC.DOC

An Agency within the Department of the Environment for Northern Ireland

Natural Heritage
Commonwealth House, 35 Castle Street
BELFAST BT1 1GH
Tel: 01232 251477. Fax: 01232 546660

An Agency within the Department of the Environment for Northern Ireland

ENVIRONMENT AND HERITAGE SERVICE

EC Directive 79/409 on the Conservation of Wild Birds

PETTIGOE PLATEAU SPECIAL PROTECTION AREA

The Pettigoe Plateau is situated in Fermanagh in the west of Northern Ireland to the north of Lower Lough Erne. It abuts the International border with the Irish Republic. It is one of the largest expanses of blanket bog in Northern Ireland formed on a relatively low elevation rolling landscape interspersed with hills with mineral soil and depressions with several small lakes. The extensive blanket bog which covers most of the site exhibits the full range of characteristic vegetation and structural features associated with this type of habitat. The area of the Special Protection Area is 1270 ha.

The Special Protection Area boundary is entirely coincident with both that of the Pettigoe Plateau Area of Special Scientific Interest and the Pettigoe Plateau Special Area of Conservation.

The site qualifies under Article 4.1 of EC Directive 79/409 on the Conservation of Wild Birds by regularly supporting nationally important numbers of breeding golden plover *Pluvialis apricaria,* an Annex 1 species. The population is estimated to up to 12 pairs, representing 4% of the Irish population (based on 1987 and 1995 surveys).

The site forms part of an extended cross-border site which occasionally supports nationally important numbers of wintering Greenland white-fronted goose *Anser albifrons flavirostris,* an Annex 1 species. The average peak winter count of the extended site is 133 birds, representing 0.95% of the Irish population (based on the five year peak mean for 1989/90 to 1993/94). The Special Protection Area is used for both feeding and roosting and held a peak of over 60 birds in 1993/94 .

The Pettigoe Plateau also supports an important assemblage of breeding birds including four Annex 1 species, hen harrier *Circus cyaneus,* merlin *Falco columbarius,* dunlin *Calidris alpina*, and common tern *Sterna hirundo*. Other breeding species include lapwing *Vanellus vanellus*, curlew *Numenius arquata* and snipe *Gallinago gallinago*.

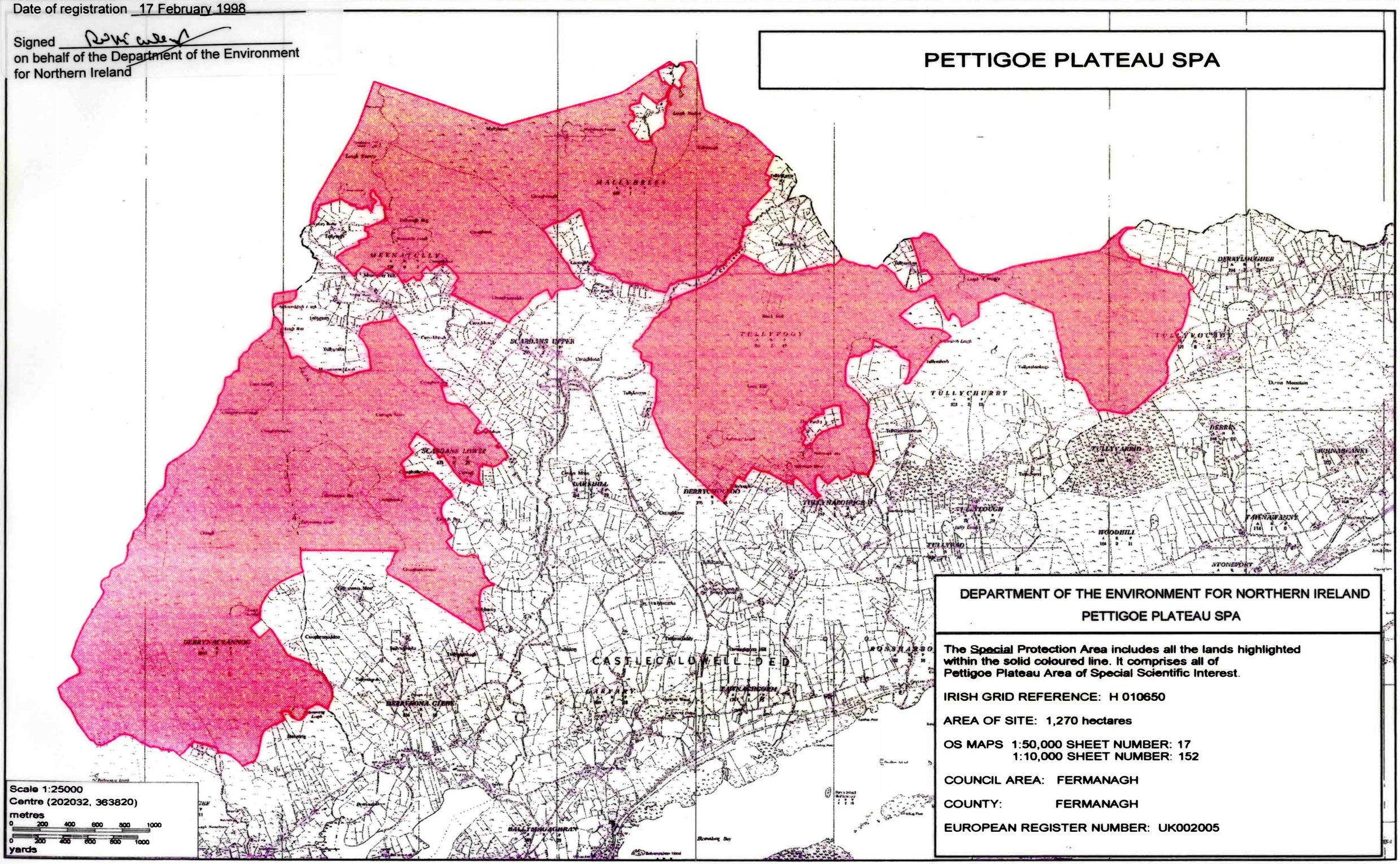
The Register of European Sites in Northern Ireland
Register reference number UK9020051
Date of registration 17 February 1998

Signed [signature]
on behalf of the Department of the Environment
for Northern Ireland

The Register of European Sites in Northern Ireland
Register reference number UK9020051 (originally shown as UK002005)
Date of registration 17 February 1998

Signed _____
on behalf of the Department of the Environment for Northern Ireland

PETTIGOE PLATEAU SPA



DEPARTMENT OF THE ENVIRONMENT FOR NORTHERN IRELAND

PETTIGOE PLATEAU SPA

The Special Protection Area includes all the lands highlighted within the solid coloured line. It comprises all of Pettigoe Plateau Area of Special Scientific Interest.

IRISH GRID REFERENCE: H 010650

AREA OF SITE: 1,270 hectares

OS MAPS 1:50,000 SHEET NUMBER: 17
1:10,000 SHEET NUMBER: 152

COUNCIL AREA: FERMANAGH

COUNTY: FERMANAGH

EUROPEAN REGISTER NUMBER: UK002005

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DEPARTMENT OF THE ENVIRONMENT FOR NORTHERN IRELAND

DECLARATION OF AREA OF SPECIAL SCIENTIFIC INTEREST AT CUILCAGH MOUNTAIN, COUNTY FERMANAGH. ARTICLE 24 OF THE NATURE CONSERVATION AND AMENITY LANDS (NORTHERN IRELAND) ORDER 1985.

The Department of the Environment for Northern Ireland (the Department), having consulted the Council for Nature Conservation and the Countryside and being satisfied that the area delineated and described on the attached map (the area) is of special scientific interest by reason of the flora, fauna, geological and physiographical features and accordingly needs to be specially protected, hereby declares the area to be an area of special scientific interest to be known as the 'Cuilcagh Mountain area of special scientific interest'.

The area is of special scientific interest because of its geology, physiography and peatland flora and fauna. Geological interest is comprised of the complete representation of the Carboniferous Leitrim Group, including richly fossiliferous sequences, while physiographical interest relates to various active processes, notably slope weathering and peat pseudo-karst features. Biological interest relates to the size, quality and diversity of the habitats within the area, in addition to the presence of particular plant and animal species of note. Cuilcagh Mountain is the second largest expanse of intact blanket bog in Northern Ireland. The summit ridge contains a fine example of Racomitrium moss heath, a scarce feature in Northern Ireland, in addition to a well-developed oceanic montane bryophyte flora. Heath and grassland communities are also well represented, producing a varied and diverse mosaic of habitats. A considerable number of rare plants are associated with these various habitats, while the area supports an important upland bird community, including a significant breeding population of Golden Plover Pluvialis apricaria.

The spectacular summit Gritstone edge and pavement, consisting of the Lackagh Sandstone Formation (also known as the Millstone Grit), is unique in Northern Ireland. The underlying sequences, principally of sandstone, shales and mudstones, can be richly fossiliferous, notably the Dergvone Shale Formation with its Killooman Shale Member and the Carraun Shale Formations. These strata are of P_1 - P_2 (Upper Visean) and E_1 - E_2 (Lower Namurian) goniatite stage ages, some 320 million years old. Fossil remains include an outstanding range of goniatites and also brachiopods, together with other fauna.

The total sequence on the Upper Cuilcagh area provides an excellent section through approximately 580 metres of the Leitrim Group of Carboniferous rocks. On the lower ground, particularly on east Cuilcagh, a series of potholes or shakeholes (dry vertical shafts) and sinks (shafts and surface water plunges) have developed on limestone. Some of these shafts have limited underground passages associated with them. Several caves are also present, with examples of dripstone and flowstone formations. Other karst features include the sizeable blind valley at Legacurragh. The limestones represented are the Dartry Limestone Formation.

Landforms due to past and present processes are also notable on Cuilcagh Mountain, and include periglacial rock shattering and associated blockfields at the Gritstone edge, rock slides and bog flows. Development of pseudo-karst features on the peat are notable with collapsed dolines, sinks, pipes, collapsed pipes, peat caves and blind valleys all represented.

The extensive blanket bog which mantles the mountain slopes exhibits a wide range of characteristic vegetation and structural features, with well developed pool, hummock and lawn complexes, acid flushes and bog bursts. The bog vegetation is characterised by Sphagnum and hypnoid mosses, ericoid dwarf-shrubs and other associated species, with the composition and abundance of these components dependent on local edaphic conditions.

Flat, water-logged ground is characterised by the presence of such species as Cross-leaved Heath Erica tetralix, Bog Asphodel Narthecium ossifragum and Common Cotton-grass Eriophorum angustifolium over a Sphagnum moss mat of predominantly S. capillifolium and S. papillosum. On more freely draining slopes, Heather Calluna vulgaris, Bilberry V. myrtillus, and Hare's-tail Cottongrass E. vaginatum are more typical over a mixed bryophyte mat. The presence of weak flushing of acidic water through the surface peat layer is indicated by the occurrence of scattered Purple Moor-grass Molinia caerulea or Sharp-flowered Rush Juncus acutiflorus. Where flushing is concentrated over a thinner peat or a peaty gley soil the vegetation is characterised by a small sedge community where Yellow-sedge Carex viridula, Carnation Sedge C. panicea and Star Sedge C. echinata predominate, while more mesotrophic waters are indicated by the presence of Tawny Sedge C. hostiana, Dioecious Sedge C. dioica and Flea Sedge C. pulicaris.

Mountain summit Racomitrium heath, a scarce vegetation type in Northern Ireland, grows as a short, tight carpet among the exposed rock and scattered boulders on the summit ridge. On the lower slopes at Aghatirourke, limestone grassland, dominated by Blue Moor-grass Sesleria caerulea, provides additional habitat diversity.

A number of rare and notable plants have been recorded for the area, mainly from the steep, north facing scarp slope and boulderfield below the summit. These rare plants are predominantly bryophytes, and include the mosses Dicranodontium asperulum and Dicranum scottianum and the liverworts Herbertus aduncus ssp. hutchinsiae, Bazzania tricrenata, Anastrepta orcadensis, Marsupella sphacelata and Gymnomitrion crenulatum. Higher plants include Dwarf Willow Salix herbacea, Starry Saxifrage Saxifraga stellaris, Stiff Sedge Carex bigelowii, Green Spleenwort Asplenium viride, Tunbridge Filmy Fern Hymenophyllum tunbridgense, Alpine Clubmoss Diphasiastrum alpinum and Stagshorn Clubmoss Lycopodium clavatum.

This mountainous area is the most important upland breeding site for Golden Plover Pluvialis apricaria in Northern Ireland. Peregrine Falcons Falco peregrinus regularly breed along the cliff faces while Merlin F. columbarius are frequently seen. The bog is occasionally used as a feeding and roosting site by Greenland White-fronted Geese Anser albifrons flavirostris. Ring Ouzel Turdus torquatus have been recorded for the area.

The invertebrate interest is known to include some notable species of aquatic insect. Of particular note are several alpine species, including the water beetle Dytiscus lapponicus and the water boatman Glaenocorisa propinqua, both of which are found in Lough Atona. The bog pools also support some of these species, in addition to the rare whirligig beetle Gyrinus natator.

SCHEDULE

The following operations and activities appear to the Department to be likely to damage the flora, fauna, geological and physiographical features of the area:

1. Cultivation, including ploughing, rotovating or re-seeding.

2. Increase in grazing intensity or change either in the type of livestock used or in feeding practices.

3. Introduction of mowing or other methods of cutting vegetation.

4. Application of manure, slurry, fertiliser or lime.

5. Application of pesticides, herbicides, fungicides or other chemicals deployed to kill, selectively or non-selectively, any form of animal, plant or other living organism.

6. Dumping, spreading or discharge of any matter.

7. Burning.

8. The release into the area of any wild, feral or domestic animal,plant or seed. "Animal" includes any mammal, reptile, amphibian, bird, fish or invertebrate, but excludes livestock and animals used in controlling livestock.

9. The destruction, displacement, removal or cutting of any plant, seed or plant remains, or the disturbance, killing or removal of any wild animal in a manner likely to affect the continued existence of the species within the area except as provided for under the terms of the Wildlife (Northern Ireland) Order 1985.

10. The introduction of tree or woodland management, including afforestation or planting.

11. Drainage, including peat drainage or the use of mole, tile, tunnel or other artificial drains.

12. Modification of the structure of water courses, including their banks and beds as by realignment, regrading or dredging.

13. Management of aquatic and bank vegetation.

14. The alteration of water levels or water tables or the utilisation of water including storage or extraction, but excluding water used for domestic requirements.

15. Infilling of ditches, drains, ponds, pools, marshes or lakes.

16. Reclamation of land from bog, marsh, river or lake.

17. Extraction of minerals including peat, sand, gravel, topsoil or subsoil.

18. Construction, removal or destruction of roads, tracks, walls, fences, hard-standings, banks, ditches and other earth works or the laying or removal of pipelines or cables, above or below ground.

19. Storage of materials.

20. Use of craft or vehicles likely to damage the vegetation.

21. Erection of permanent or temporary structures or the undertaking of building, engineering or other operations, including drilling.

22. Recreational, educational or research activities likely to damage the vegetation.

23. Changes in game management.

Sealed with the Official Seal of the
Department of the Environment for
Northern Ireland on 28 September 1994

Assistant Secretary

M Cunningham
CIVIL SERVANT OF CLARENCE COURT
BELFAST.

FOOTNOTES

(a) Please note that consent by the Department to any of the above operations or activities does not constitute planning permission. Where required, planning permission must be applied for in the usual manner to the Department under Part IV of the Planning (Northern Ireland) Order 1991. Operations or activities covered by planning permission are not normally covered in the list of Notifiable Operations.

(b) Also note that many of the operations and activities listed above are capable of being carried out either on a large scale or in a very small way. While it is impossible to define exactly what is large and what is small, the Department would intend to approach each case in a common sense and practical way. It is very unlikely that small scale operations would give rise for concern and if this was the case the Department would give consent, particularly if there is a long history of the operation being undertaken in that precise location.

CUILCAGH MOUNTAIN

Views About Management
The Environment (Northern Ireland) Order 2002 Article 28(2)

A statement of Environment and Heritage Service's views about the management of Cuilcagh Mountain Area of Special Scientific Interest ("the ASSI")

This statement represents the views of Environment and Heritage Service about the management of the ASSI for nature conservation. This statement sets out, in principle, our views on how the area's special conservation interest can be conserved and enhanced. Environment and Heritage Service has a duty to notify the owners and occupiers of the ASSI of its views about the management of the land.

Not all of the management principles will be equally appropriate to all parts of the ASSI and there may be other management activities, additional to our current views, which can be beneficial to the conservation and enhancement of the features of interest. It is also very important to recognise that management may need to change with time.

The management views set out below do not constitute consent for any operation or activity. The written consent of Environment and Heritage Service is still required before carrying out any operation or activity likely to damage the features of special interest (see the Schedule on pages 2 and 3 of the attached Document B for a list of these operations and activities). Environment and Heritage Service welcomes consultation with owners, occupiers and users of the ASSI to ensure that the management of this area maintains and enhances the features of interest, and to ensure that all necessary prior consents are obtained.

MANAGEMENT PRINCIPLES

Blanket Bog

Blanket bog is a unique habitat for wildlife. Environment and Heritage Service would encourage the maintenance and enhancement of the bog through the conservation of its associated native plants and animals. The latter includes important invertebrate communities.

Bogs depend on rainwater and maintaining a high water table is vital to the "health" of the bog. In addition, the peat soils and many of the species that grow there are very sensitive to physical disturbance.

Specific objectives include:

Ensure that the blanket bog is not burnt in order to prevent the loss of more specialised plants and animals and to avoid damage to peat soils which could lead to erosion.

Where appropriate, encourage the blocking of drains to prevent the bog from drying out.

Where appropriate, prevent the loss of light-demanding peatland species through the control of scrub and trees.

Where the surface is not too wet, blanket bogs can sustain very light levels of grazing by sheep. Environment and Heritage Service would encourage a regime that avoids overgrazing or poaching.

Where the habitat has been subjected to heavy grazing, Environment and Heritage Service would encourage a reduction in stocking density to allow the bog to recover.

Wet and Dry Heath

Wet and dry heaths are also important habitats for wildlife. Environment and Heritage Service would encourage the maintenance and enhancement of the heath through the conservation of its associated native plants and animals.

Most heathland communities need some management to retain their interest. Small patches of scrub within heathland are valuable in providing additional habitat niches, but in the absence of management, woody species can quickly take over. On the other hand, too much grazing, especially through the winter, can cause heathers to be replaced by coarse grasses. Shepherding can help to spread grazing pressure over a wider area while fencing may also be useful in some cases to control stock numbers and movement.

Specific objectives include:

Low intensity grazing has contributed to the conservation and enhancement of the heathland. Environment and Heritage Service would encourage the continuation and extension of this practice.

Where the habitat has been subjected to heavy grazing, Environment and Heritage Service would encourage a reduction in stocking density to allow the heath to recover. Shepherding and fencing to control the movement of stock may also be beneficial in some situations.

Where burning is considered appropriate, it should only be undertaken after close consultation with, and the agreement of, Environment and Heritage Service. Burning can cause the loss of more specialised plants and animals and may damage the peat soils, leading to erosion.

Where appropriate, encourage the blocking of drains to prevent wet heath from drying out.

Prevent the loss of light-demanding heathland species through the control of scrub and bracken. In general, this can be achieved through the appropriate grazing regime. In some cases other methods of control, such as cutting, may be required.

Montane Heath

Montane heath is an important habitat for wildlife. In Northern Ireland it is only found in a few of the highest, most exposed upland areas. The vegetation usually consists of low-growing, wind-clipped dwarf-shrubs, such as Heather, growing with mosses, lichens and sedges. Environment and Heritage Service would encourage the maintenance and enhancement of the montane heath through the conservation of its associated native plants and animals. These include important invertebrate communities, in addition to a number of rare plants.

Due to the effects of high altitude and harsh climate, montane heath is very slow growing and requires little active management. However, it is also slow to recover from disturbance and is therefore highly susceptible to damage through grazing and trampling.

Montane heath can generally sustain light summer grazing by sheep with stock being removed during the winter. Shepherding can help to spread grazing pressure over a wider area, avoiding localised trampling, erosion and nutrient enrichment through dunging. Fencing may also be useful in some cases to control stock numbers and movement. Where montane heath has been damaged by heavy grazing, it may be necessary to consider temporarily removing grazing stock to allow the vegetation to recover.

Montane heath is vulnerable to trampling through recreational use. The effects are usually localised but visitor pressure may require careful management through, for example, the appropriate placement and maintenance of footpaths.

Specific objectives include:

Montane heath can sustain light summer grazing by sheep. Environment and Heritage Service would encourage the continuation of this practice.

Where the habitat has been subjected to heavy grazing, Environment and Heritage Service would encourage a reduction in stocking density to allow the montane heath to recover. Shepherding and fencing to control the movement of stock may also be beneficial in some situations.

Environment and Heritage Service would encourage sensitive recreational management, for example, through careful routing of footpaths and siting of information panels.

The use of burning to manage montane heath is damaging and should be avoided.

Inland rock

Inland cliffs and screes often support specialised communities of plants and animals that are not found elsewhere. Many species use the scree, crevices and cliff ledges as a shelter from extremes of climate and from competition with more dominant plants, or as a refuge from grazing. A number of birds of conservation importance, such as peregrine falcon, also use rock ledges as safe nesting sites.

Cliffs and screes often need little or no management. Low levels of grazing can be beneficial in some circumstances, by preventing more vigorous species from shading out the less vigorous plants. Where heavy grazing has restricted particular species and communities to cliffs and scree slopes, controlling stock levels on the surrounding land could allow some of these species to spread more widely.

Screes are often unstable and their fragile plant communities are vulnerable to physical disturbance such as trampling. As a result some screes and cliffs may require protection from damage caused by heavy grazing and recreation such as walking and rock climbing.

Specific objectives include:

Light grazing can prevent less vigorous plants from being shaded out. Where appropriate, Environment and Heritage Service would encourage the continuation of this practice.

Where the habitat is subject to heavy grazing or where grazing on surrounding land has isolated the vegetation communities of cliffs and screes, Environment and Heritage Service would encourage a reduction in stocking density to allow grazing-sensitive species to disperse more widely.

Environment and Heritage Service would encourage sensitive recreational management. For example, where possible new footpaths should generally be routed around scree rather than through it. Where rare plants or cliff-nesting birds are known to be present careful management of climbing routes and the timing of the activity may be required.

Lakes and Pools

Upland, nutrient-poor (Dystrophic) lakes and pools are also important habitats for wildlife. Environment and Heritage Service would encourage the maintenance and enhancement of the lakes and pools through the conservation of their associated native plants and animals. The latter include important invertebrate communities.

Dystrophic lakes and pools depend on water quantity and quality to maintain their conservation value. They are generally sensitive to disturbance and nutrient enrichment. Sympathetic management practices and recreation have contributed to maintaining this feature of interest.

Specific objectives include:

Environment and Heritage Service would encourage the maintenance of water quality through the control of pollution and artificial enrichment.

Environment and Heritage Service would encourage the maintenance of natural water levels.

Environment and Heritage Service would encourage the maintenance of sympathetic management practices to ensure that disturbance to the waters, bed and shore of the lakes and pools and their wildlife is minimised.

Environment and Heritage Service recognises the important economic and social roles of fishing and welcomes sustainable fishery management that is sensitive to the special interests of the lakes and pools.

Management principles applicable to all habitats throughout the site

Environment and Heritage Service would encourage all activities associated with site maintenance, management, access and recreation to be undertaken in a sensitive manner that ensures disturbance to the site and its wildlife is minimised.

Maintain the diversity and quality of the habitats by ensuring there is no application of fertiliser, slurry, herbicide or fungicide to the site.

Discourage non-native species, especially those that tend to spread at the expense of native wildlife.

Maintain the diversity and quality of habitats associated with the main habitats, such as grassland and scrub through sensitive management. These adjoining habitats are often very important for wildlife, especially invertebrates.

Golden Plover

Cuilcagh Mountain ASSI supports numbers of Golden Plover that are important in an all-Ireland context. The Golden Plover is a wading bird of the uplands that nests on relatively flat or gently sloping areas. Vegetation structure is important to Golden Plover. The species prefers shorter swards that are typically found on ridges, areas of old cut-over bog and recovering burnt areas. Low vegetation allows ease of movement for foraging and lets nesting birds detect approaching

predators easily. Flushes and other wet areas are important to Golden Plover as feeding areas for chicks because these hold large numbers of invertebrates.

Specific objectives include:

> Environment and Heritage Service would wish to see diversity in the vegetation structure of the bog and heath across the site as a whole. This should include small areas of short vegetation suitable for nesting activities. Where this structure cannot be achieved naturally or by light grazing, Environment and Heritage Service may consider alternative management treatments for specific, localised areas. These treatments could include activities such as heavier grazing or Heather flailing when undertaken in a highly controlled way. Such actions should only be considered after close consultation with, and the agreement of, Environment and Heritage Service.
>
> Environment and Heritage Service would encourage actions which maintain or enhance soil wetness and wetland features, such as pools and flushes, as feeding areas for Golden Plovers - this can be achieved by blocking drains across peatland habitat.

The geological series

Earth science features provide information about a region's geological history and can also aid interpretation of geological processes in the past and present.

The earth science interest at Cuilcagh Mountain comprises important exposures of Carboniferous strata together with a range of weathered limestone (karst) features. The solid geology of interest occurs throughout the ASSI and includes minor exposures within sinks and dolines through to major outcrops along the stream valleys, ridges and the summit series. Karst features are related to the occurrences of limestone and are generally found along the southern and eastern areas of the ASSI.

Environment and Heritage Service would encourage the maintenance of the ASSI and its earth science interest.

Provided no damaging activities, as set out in the Schedule (pages 2 and 3), are undertaken without consent, the needs of owners, occupiers and the Department can be met. Earth science features such as those at Cuilcagh Mountain may require occasional management intervention to maintain access to, and exposure of, the geology. This could include selectively removing vegetation or any major build up of loose rock.

Specific objectives include:

> Maintain the geological series in an undamaged state.
>
> Maintain access to the geological series.

Surface karst features and caves

Areas of limestone within the Cuilcagh ASSI typically exhibit surface features collectively known as karst. Such features include limestone pavement, sinking streams, springs, depressions known as dolines and dry valleys. These landforms are important in helping us to understand historical and present processes affecting and shaping these areas. Landforms can be damaged by stone removal, infilling or slope regrading. These features are also commonly related to important underground cave systems and associated groundwaters which can be affected through changes in land management, especially drainage activities, the use of fertiliser or pesticides and applications of slurry.

These features owe their form to a range of processes which have operated over tens of thousands of years. These include deep weathering, the effect of past ice action and the slow dissolving of the limestone itself by water. These processes have given rise to a landscape that is extremely vulnerable. Once they have been damaged, these features cannot be recreated.

Minor cave systems are present under parts of the Cuilcagh ASSI. In addition, the main streams flowing off Cuilcagh are all directed towards the major cave systems to the north and east of the ASSI. Although underground, these are linked to the surface by a variety of features including cave entrances, shafts, sinking streams and by water movement through the ground which ultimately flows into the caves.

Surface features can be damaged by stone removal, infilling or regarding, while caves are susceptible to damage through decline in general water quality. Caves and surface depressions can be damaged through inappropriate disposal of rubbish or waste of any type. Recreational activities such as caving may be detrimental if undertaken in an insensitive way.

Specific objectives include:

> Environment and Heritage Service would wish to see all karst surface features retained through sympathetic land management practices.
>
> Environment and Heritage Service would discourage the inappropriate disposal of waste of any type within the site.
>
> Caving should be undertaken in a responsible manner through adherence to best practice as advocated by national caving bodies.

E Diane Stevenson

E Diane Stevenson
Authorised Officer

Dated the 1st of February 2008

SITE SYNOPSIS

SITE NAME: ERNE ESTUARY/FINNER DUNES

SITE CODE: 000139

The Erne Estuary/Finner Dunes occupies the area immediately west of Ballyshannon, Co Donegal and is an amalgamation of two former Areas of Scientific Interest, the Erne Estuary and Finner Dunes. The area is underlain by Carboniferous limestone, shale and sandstone, but recent blown sand and other deposits mask much of the solid geology under the site.

Much of the site is composed of a complex of intertidal habitats such as mud and sand flats, sandy and shingle beaches and sea bays, but in places a fringe of saltmarsh occurs on the shoreline. Common plants in these situations are Thrift (*Armeria maritima*), Common Scurvygrass (*Cochlearia officinalis*), Sea Rush (*Juncus maritimus*) and Sea Plantain (*Plantago maritima*). Brown seaweeds (*Fucus* spp.) are often abundant on rocks low down the shore.

A large area of sand dunes occupies the southern side of the site. Marram (*Ammophila arenaria*) is very evident there. Younger dunes support Red Fescue (*Festuca rubra*), Sand Sedge (*Carex arenaria*), Creeping Bent (*Agrostis stolonifera*), Wild Thyme (*Thymus praecox*) and an abundance of the moss *Rhytidiadelphus squarrosus*. Parts of the stable dunes are herb-rich, with Creeping Willow (*Salix repens*), Common Bird's-foot-trefoil (*Lotus corniculatus*), Wild Pansy (*Viola tricolor*), Primrose (*Primula vulgaris*) and White Clover (*Trifolium repens*) among the common plants. A scrub of Blackthorn (*Prunus spinosa*) is developing on the older dunes, while wetland communities occur in wetter dune hollows. Yellow Iris (*Iris pseudacorus*), Cuckooflower (*Cardamine pratensis*), Marsh-marigold (*Caltha palustris*) and Marsh Horsetail (*Equisetum palustre*) are frequent in these localised wetlands.

Small areas of cliff, heath, fen and reed-bed give further habitat diversity to the site.

The site is particularly important as a feeding area for waterfowl. Two species occur at nationally important levels, namely Red-breasted Merganser (32, average peak 1984/85 - 1985/86) and Sanderling (93, average peak 1984/85 - 1986/87). Other birds present in significant numbers include Cormorant (41), Wigeon (60), Teal (73), Long-tailed Duck (15), Oystercatcher (96), Ringed Plover (35), Lapwing (44) and Dunlin (61). (All average peaks are from 11 counts made over 2 seasons between 1984/85 and 1985/86).

In addition to these winter figures a very large congregation of Red-breasted Merganser occupies the area in late Summer during the annual moult, with 350 recorded on 24/8/85 and 657 on 16/8/86. Cormorants are also present in large numbers in autumn, with 250 recorded on 25/8/85. The Long-tailed Ducks are probably part of the same flock recorded for Bundoran. There was an additional count of 100 Sanderling on 17/12/87, giving a three year peak of 93.

Erne Estuary/Finner Dunes contains good examples of a number of coastal habitats and, furthermore, provides important feeding grounds for several waterfowl species.

5.11.2009

SITE SYNOPSIS

SITE NAME: OWENGAR WOOD

SITE CODE: 001419

Owengar Wood occurs on the steep, north facing bank of the Owengar River, 1km south-east of Drumkeeran and 4km west of Lough Allen. This site is a good example of wet, semi-natural deciduous woodland that has developed on the often waterlogged, clay-rich soils which are typical of County Leitrim. Most of the site is intact and has retained its natural character, despite being somewhat damaged from tree felling and grazing on the east side.

Willows (*Salix caprea, S. cinerea*) and Ash (*Fraxinus excelsior*) form the dominant species in the canopy with some birch (*Betula* spp.), Hazel (*Corylus avellana*) and Beech (*Fagus sylvatica*). Alder (*Alnus glutinosa*) is also very common near the river banks. The understorey includes Hazel, Holly (*Ilex aquifolium*), Blackthorn (*Prunus spinosa*) and Hawthorn (*Crataegus monogyna*). In some of the more ungrazed areas, the wood has developed into a very dense thicket which has a very natural character.

This woodland is notable for its excellent diversity of bryophyte and lichen communities which form a lush carpet in some of the more undisturbed parts of the wood. The ground flora also contains a good diversity of flowering herbs, ferns, grasses and sedges which are characteristic of slightly acidic soils. Common species include Lesser Celandine (*Ranunculus ficaria*), Meadowsweet (*Filipendula ulmaria*), some Golden-saxifrage (*Chrysosplenium oppositifolium*), Wild Angelica (*Angelica sylvestris*), Sanicle (*Sanicula europaea*), Wood-sedge (*Carex sylvatica*) and Early-purple Orchid (*Orchis mascula*). Wet patches and flushed channels running down slope feature Soft Rush (*Juncus effusus*), sedges (*Carex nigra, C. laevigata, C. remota*), Marsh Horsetail (*Equisetum palustre*), Yellow Iris (*Iris pseudacorus*) and Cuckooflower (*Cardamine pratensis*).

Due to widespread afforestation of conifers in this region, Owengar Wood is important as it is one of the few remaining, intact wet woodland sites in this region. Although the eastern half has been damaged by grazing, much of this site is exceptionally undisturbed and contains a good diversity of plant species. The varied age structure and diversity of tree species in the Owengar Wood also creates an important resource for local wildlife species including Pheasant and Woodcock.

20.11.2009

SITE SYNOPSIS

SITE NAME: COLGAGH LOUGH

SITE CODE: 001658

Colgagh Lough is a small lake nestled in the southern foothills of the Ben Bulben mountain range, 1km north of Lough Gill and 5km west of Sligo. This lake is underlain by limestone bedrock and is noted for its rich deposits of marl. Marl is white sediment composed of calcium carbonate which is derived from the decomposed matter of gelatinous algae and charophytes which grow in the lake. It accumulates on the bottom of the lake and on aquatic vegetation and is a fairly sterile substrate so few plants will grow on it.

However, at Colgagh Lough there are several aquatic species present including rafts of Common Club-rush (*Schoenoplectus lacustris*) with Amphibious Bistort (*Persicaria amphibia*), Fen Pondweed (*Potamogeton coloratus*), Water Mint (*Mentha aquatica*) and Marsh-marigold (*Caltha palustris*).

The margin of the lake is stony and is dominated by grasses and sedges (*Carex* spp.) with herbs such as Lesser Spearwort (*Ranunculus flammula*), Marsh Ragwort (*Senecio aquaticus*) and the moss *Climacium dendroides*.

Colgagh Lough is also unusual in that it has no surface water outlet. Water has been seen to drain through a swallow hole and it has been suggested that Colgagh Lough may have an underground link to Lough Gill but this remains unproven. However, this interesting geomorphological aspect of the lake also makes it more sensitive to pollution as there is a more restricted flow of water in and out of the lake. The use of fertilisers on the pastures which slope steeply down to the lakeshore could pose a threat to its water quality.

Some adjacent fields have also been cleared of scrub woodland. This type of damage not only reduces the habitat diversity of the area and thus its attraction to wildlife is diminished, but it also can increase the amount and rate of runoff of fertilisers and other nutrients into the lake, thus further increasing the risk of water pollution. However at present there are no definite signs of any deterioration in water quality.

Colgagh Lough also supports a rich invertebrate fauna, comprised of molluscs, beetles (Coleoptera spp.), leeches and a variety of waterfowl such as Mallard, Heron, Little Grebe, Wigeon, Teal, Pochard, Tufted Duck, Goldeneye, Mute Swans and Whooper Swans.

24.11.2009