Technical Appendix 8.1: Ecology Desk Study Report

Cairnoch Hill Wind Farm

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SLR Project No.: 428.V12085.00001

3 August 2026

Revision: 01

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
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Basis of Report

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Acronyms and Abbreviations

AOD	Above Ordnance Datum
ECU	Energy Consent Unit
EIA	Environmental Impact Assessment
FLS	Forestry and Land Scotland
GB	Britain
INNS	Invasive Non-Native Species
LNCS	Local Nature Conservation Sites
LNR	Local Nature Reserves
LWS	Local Wildlife Sites
MAGIC	Multi Agency Geographic Information for the Countryside
NBN	National Biodiversity Network
NI	Northern Ireland
NNR	National Nature Reserves
OS	Ordnance Survey
SAC	Special Areas of Conservation
SBL	Scottish Biodiversity List
SSRS	Saving Scotland’s Red Squirrels
SSSI	Sites of Special Scientific Interest
TWIC	The Wildlife Information Centre

1.0 Introduction

SLR was commissioned by Eurowind Energy Limited ("the Applicant") to undertake an ecology desk study for the proposed Cairnoch Hill Wind Farm (hereafter referred to as "the Proposed Development"). This desk study was completed in April 2024 and the results have been used to inform plans for the Proposed Development and the associated Environmental Impact Assessment (EIA).

It is anticipated that the Proposed Development would comprise up to four wind turbines with associated works and infrastructure.

1.1 Site Description

The location of the Proposed Development ("the Site") is situated approximately 6km north of Kilsyth and 6km east of Fintry, within the Stirling Council administrative boundary (National Grid Reference NS 69768 85606). It is positioned to the north of Carron Valley Reservoir within land managed by Forestry and Land Scotland (FLS).

The topography of the Site ranges from approximately 227m Above Ordnance Datum (AOD) at the southern application boundary next to Carron Valley Reservoir, to 413m AOD at the summit of Cairnoch Hill. The Site is characterised primarily by coniferous plantation of varying age classes with a series of forest rides and access tracks throughout. Pockets of open habitat surround the summit of Cairnoch Hill and Sir John de Graham's Castle. Several small watercourses intersect the Site, one of which flows into the Endrick water (flowing adjacent to the north and western Site boundary), several tributaries of the Earls Burn (flowing adjacent to the northern and eastern Site boundary), or directly into Carron Valley Reservoir.

1.2 Surrounding Area

The surrounding landscape consists of areas of grazing pasture and coniferous plantations with the Carron Valley reservoir situated south of the Site boundary. There are three operational wind farms (Craigengelt, Earlsburn and Earlsburn North), two consented wind farms (Shelloch, and Earlsburn Extension), and one 'in planning' wind farm (Drummarnock) within 10km of the Site. There are four residential properties/farms close to the Site (within 1km), the nearest of which are located immediately south of the Site on the northern side of the B818.

1.3 Desk Study Scope

This desk study is designed to give an overview of relevant existing non-avian ecological data, including data for protected and notable (e.g., rare or invasive), species and designated sites nearby (up to 10km for statutory designated sites and bats plus up to 2km for other protected/notable species and for non-statutory designated sites). The desk study summarises the results of publicly available data obtained from the National Biodiversity Network (NBN Atlas)[1], NatureScot Site Link[2], the Multi Agency Geographic Information for the Countryside (MAGIC) online GIS tool[3] and The Wildlife Information Centre[4] (TWIC).

[1] NBN Atlas. (2024). Search Tool. [Online] Available at: National Biodiversity Network (nbn.org.uk)

[2] NatureScot. (2024). Sitelink. [Online] Available at: https://sitelink.nature.scot/home

[3] DEFRA. (2024). MAGIC Maps. [Online] Available at: https://magic.defra.gov.uk/

[4] The Wildlife Information Centre. (2024). Search. [Online] Available at: The Wildlife Information Centre - Home Page

2.0 Methods

2.1 Designated Sites

Information relating to statutory designated nature conservation sites, designated primarily for their non-avian features, in the area surrounding the Site (10km) was obtained from The Wildlife Information Centre (TWIC) 4, the MAGIC online GIS tool3 and the NatureScot Sitelink website2.

Information relating to non-statutory designated sites within 2 km is typically also acquired from the TWIC.

Designated sites of relevance to this desk study report are summarised below.

Statutory:

- Ramsar sites;
- Special Areas of Conservation (SACs);
- Sites of Special Scientific Interest (SSSIs); and
- Locally designated sites such as Local Nature Reserves (LNRs), or National Nature Reserves (NNRs).

Non-Statutory:

Local Wildlife Sites (LWS) and Local Nature Conservation Sites (LNCS).

2.2 Carbon and Peatland Map

A search for the presence of carbon-rich soils, deep peat, and priority peatland habitat was made using NatureScot's Carbon and Peatland Map 2016[5].

2.3 Ancient Woodland

Records of ancient woodlands listed on the Ancient Woodland Inventory were searched for using the NatureScot interactive ancient woodland inventory map[6].

2.4 Protected and Notable species

Desk study data were acquired for protected and notable species from the following sources:

- TWIC ;
- Saving Scotland's Red Squirrels[7] (SSRS);
- NBN Atlas[8] (using commercially available information (CC-BY) only); and
- NatureScot[9].

Searches for protected and notable species data were limited to:

[5] Scotland's Soils. (2024). Soil Map. [Online] Available at: Maps | Scotland's soils

[6] NatureScot. (2024.). Ancient Woodland Inventory. [Online] Available at: https://opendata.nature.scot/datasets/ancient-woodland-inventory/explore [Accessed 1 July. 2024].

[7] Saving Scotland's Red Squirrels. (2024). Sightings. [Online] Available at: Saving Scotland's Red Squirrels – Transforming hope for Scotland's red squirrels [Accessed 7 November 2024].

[8] NBN Atlas. (2024). Explore Your Area. [Online] Available at: Explore Your Area | NBN Atlas [Accessed 7 November 2024].

[9] NatureScot. (2023). Protected species: Fish. [Online] Available at: Protected species: fish | NatureScot [Accessed 7 November 2024].

- Data from within the last 15 years (2009 to 2024); and
- From within 2km of the Site boundary (extended to 10km for bats).

2.5 Invasive Non-Native Species

Planning documents of sites within 2km were searched for any records of invasive non-native species (INNS).

2.6 Other Species Records

On a five-yearly basis, the British Deer Society undertake the Deer Distribution Survey[10] whereby the distribution of all six species of deer (Chinese water deer *Hydropotes inermis*, sika deer *Cervus nippon*, red deer *Cervus elaphus*, roe deer *Capreolus capreolus*, muntjac deer *Muntiacus* and fallow deer *Dama dama*) across Britain (GB) and Northern Ireland (NI) is mapped to provide indicative distribution data by 10km^2. The purpose of the survey is to monitor and record changes to deer distribution and range across GB and NI. Deer distribution records were searched for within 2km from the Site.

2.7 Nearby Wind Farms

The Stirling Planning Portal and the Energy Consent Unit (ECU) portal were searched for wind farm developments within 10km of the Site. Relevant documents were reviewed and any protected/notable species information collated. A total of seven wind farms were identified; these are summarised in **Table 2-1**.

Table 2-1: Relevant Wind Farms within 10km of the Site

Wind Farm	Status	Distance (m/km) and Direction	Distance to Nearest Turbine (km)	Specification	Planning ref no.
Craigannet Turbine	Operational	190 m E	0.6	1 turbine, 102m to blade tip	15/00211/FUL
Craigengelt Wind Farm[11]	Operational	480 m NE	1.7	8 turbines, 125m to blade tip	06/01052/DET
Earlsburn Wind Farm	Operational	520 m N	1.0	15 turbines, 110m to blade tip	03/00936/DET
Shelloch Wind Farm[12]	Consented	1.6 km NW	2.9	5 turbines, between 149.9m to 180m to blade tip	20/00840/FUL

[10] The British Deer Society. (n.d.). Deer Distribution Survey. [Online] Available at: https://bds.org.uk/science-research/deer-surveys/deer-distribution-survey/ [Accessed 20 Dec. 2023].

[11] SKM. (2006). Craigengelt Wind Farm, Stirling: Environmental Statement. [Online] Available at: https://pabs.stirling.gov.uk/online-applications/files/54D8359D58544282E438F0EEEB7F28C3/pdf/06_01052_DET--281135.pdf, pp.179–200.

[12] LUC. (2020). Shelloch Wind Farm EIA Report. [Online] Available at: https://pabs.stirling.gov.uk/online-applications/files/6845BF4035DDC6F853329A1C78DBA207/pdf/20_00840_FUL-CHAPTER_8__ECOLOGY-792923.pdf.

Wind Farm	Status	Distance (m/km) and Direction	Distance to Nearest Turbine (km)	Specification	Planning ref no.
Earlsburn North (Kingsburn) Wind Farm[13]	Operational	2.5 km N	3.0	9 turbines, 115m to blade tip	08/00104/FUL
Earlsburn Extension Wind Farm	Consented	2.7 km N	3.6	7 turbines, 149.9m to blade tip	ECU00004510
Drummarnock Wind Farm	In Planning	1 km NE	2.7	4 turbines, 180 m to blade tip	24/00494/FUL

2.8 Nomenclature

For ease of understanding for most readers common (English) names for species are used within the main body of the report (unless a species has no common name). Scientific (*Latin*) names are provided on first mention within the main body of the report.

2.9 Limitations

No obvious limitations were encountered whilst carrying out the desk study. However, it should be noted that absence of a species from this desk study does not necessarily preclude it from being present on Site.

3.0 Results

3.1 Designated Sites

3.1.1 Statutory Designated Sites

There are 15 statutory designated sites within 10km of the Site designated primarily for their non-avian ecological features, including 12 SSSIs, two SACs, and one NNR. These are shown on **Figure 8.1.1** and detailed in **Table 3-1**.

Table 3-1: Statutory Designated Sites within 10km

Name & Designation	Approximate distance and direction from Site (km)	Qualifying Feature(s) of Interest	Hydrological Connectivity
Endrick Water SSSI and SAC	1.4 W	SSSI – Scottish dock *Rumex aquaticus*, river lamprey *Lampetra fluviatilis,* brook lamprey *Lampetra planeri*, and Atlantic salmon *Salmo salar*. Also of fluvial geomorphological interest.	Hydrologically connected to Site from tributaries within the Site flowing west off Site. The Site is upstream of the SSSI/SAC. Water drains from the west of the Site into the Endrick Water (NS 67973 86725).

[13] RSK. (2023). Earlsburn Wind Farm Extension: EIA Report, Volume 2. https://www.earlsburnextension.co.uk/application-documents

Name & Designation	Approximate distance and direction from Site (km)	Qualifying Feature(s) of Interest	Hydrological Connectivity
		SAC – river lamprey, brook lamprey, and Atlantic salmon	
Denny Muir SSSI	3.5 ESE	Subalpine acid grassland, blanket bog, basic fen.	The Site is situated upstream of the designated site tributary confluence. Water drains from the east of the Site into the Earl Burn. Forms confluence with River Carron (NS 72971 83721).
Double Craigs SSSI	3.5 WNW	Subalpine calcareous grassland. Also of geological interest.	N/A
Carron Glen SSSI	3.8 E	Upland oak woodland, upland mixed ash woodland, lowland neutral grassland.	The Site is situated upstream of the designated site. Water drains from the east of the Site into the Earl Burn. Forms confluence with River Carron (NS 72971 83721).
Sauchie Craig Wood SSSI	6.0 NE	Upland mixed ash woodland. Also of geological interest.	N/A
Dullatur Marsh SSSI	6.8 SE	Hydromorphological mire range.	N/A
Sculliongour Limestone Quarry SSSI	7.9 SW	Lowland calcareous grassland.	N/A
Balglass Corries SSSI	8.1 W	Blanket bog, upland assemblage. Also of geological interest.	N/A
Wester Balgair Meadow SSSI	8.9 WNW	Lowland dry heath, lowland wet heath, valley fen, lowland neutral grassland.	N/A
Arnprior Glen SSSI	9.6 NW	Upland mixed ash woodland.	N/A
Shirgarton Moss SSSI	9.7 NW	Raised bog.	N/A
Flanders Moss SSSI, SAC, NNR	9.7 NW	SSSI - Raised bog, moth assemblage, spider *Heliophanus dampfi*. Also of geological interest. SAC – active raised bog, degraded raised bog.	N/A

3.1.2 Non-Statutory Designated Sites

Five non-statutory designated sites were found to be within 2km of the Site. Details of these sites can be found on **Figure 8.1.2** and in **Table 3-2**.

Table 3-2: Non-Statutory Designated Sites within 2 km

Name & Designation	Approximate Distance and Direction from Site (km)	Qualifying Feature(s) of Interest
Carron Valley LNCS	0 SE (borders the Site)	Forestry.
Carron Valley Reservoir and Forest LNCS	0.2 SE	Scenic trout fishery. Forestry.
Carron Forest LNCS	0.8 SE	Forestry.
Upper Endrick Water LNCS	1.0 W	Inland waterbodies, deciduous woodland, bog and marsh habitats.
River Carron (Bentend) and Faughlin Reservoir LNCS	1.7 ESE	Reservoir and river habitat. Atlantic salmon.

3.2 Carbon and Peatland Map

According to the Carbon and Peatland Map[5] the majority of the Site consists of 'Class 5' which suggests that there are areas where no peatland is present and 'Class 4' suggesting there is heath with some peatland present. 'Class 3' soil is present on Cairnoch Hill only which suggests peatland with some heath is present within the area. No priority peatland habitat is found within the Site boundary, but 'Class 3' is heavily associated with wet and acidic ground.

3.3 Ancient Woodland

A search of the Ancient Woodland Inventory returned one area of ancient woodland (ID: 9871) located south-east of the application boundary along the Carron Valley reservoir (Grid reference: NS708839) which is a Long-Established (of plantation origin) woodland.

3.4 Protected and Notable Species

At least five bat species, seven mammal species, six invertebrate species and two fish species have been recorded within 2km of the Site boundary (within 10km for bats) within the last 15 years. A number of these are protected species, with some recorded within the application boundary (see **Appendix A**).

3.5 Invasive Non-Native Species

The data search did not return any records of invasive non-native species on Site or within a 2km buffer.

Records of American mink *Neogale vison* field signs were noted in the Earlsburn North Wind Farm planning documents[11].

3.6 Other Species Records

The results of the 2023 Deer Distribution Survey[10] indicate the presence of the following species within 2km of the Site:

- Fallow deer (recorded in 2016 and 2023);
- Roe deer (recorded in 2016, 2007, 2011 and 2023);
- Red deer (recorded in 2016, 2007, 2011 and 2023); and
- Sika deer (recorded in 2016, 2007, 2011 and 2023).

3.7 Records from Planning Documents

Protected/notable species records (excluding records of plants) found during the planning document search are noted in **Appendix A, Table A-2**.

Protected plant species were listed as being present on other nearby wind farms e.g. purple moorgrass *Molinia caerulea*[8] (associated with Scottish Biodiversity List (SBL) Priority Habitat, upland flushes, fens and swamps[9]). However, no protected plant species were recorded on the neighbouring wind farm, Earlsburn[10].

Mammals such as otter *Lutra lutra* and badger *Meles meles* were recorded as present on other wind farm sites nearby, as well as one fish species, brown trout *Salmon trutta*, was found to be present in the land at the proposed Craigton and Spittalhill Wind Farm[11]. Additionally, two amphibian species, common toad *Bufo bufo* and common frog *Rana temporaria* were recorded on Shelloch Wind Farm only.

Figures

Figure 8.1.1: Statutory Designated Sites within 10km

Figure 8.1.2: Non-statutory Designated Sites within 2km

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Appendix A Protected and Notable Species Records

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Table A-1: Protected and Notable Species Records from TWIC within 2km (and 10km for bats)

Species	Most Recent Record	Nearest Record to Site (km)	Protection	Data Source
Bats				
Bat sp. *Chiroptera sp.*	2006	0.03	CE SB Bern2, Bern3, CMS_A2, CMS_EUROBATS-A1, HabRegs2, HSD2p, HSD4, RLGB.CR, RLGB.DD, RLGB.EN, RLGB.Lr(NT), RLGB.VU, ScotBL, UKBAP, WCA5/9.4b, WCA5/9.4c	TWIC
Pipistrelle sp. *Pipistrellus sp.*	2016	0.1	CE Bern2, Bern3, CMS_A2, CMS_EUROBATS-A1, HabRegs2, HSD4, RLGB.Lr(NT), ScotBL, UKBAP, WCA5/9.4b, WCA5/9.4c	TWIC
Common pipistrelle *Pipistrellus pipistrellus*	2016	0.1	CE CL E SB W(K) CMS_A2, CMS_EUROBATS-A1, HabRegs2, HSD4, WCA5/9.4b, WCA5/9.4c	TWIC
Soprano pipistrelle *Pipistrellus pygmaeus*	2016	Within the Site	CE CL E F SB W(K) Bern2, CMS_A2, CMS_EUROBATS-A1, HabRegs2, HSD4, ScotBL, UKBAP, WCA5/9.4b, WCA5/9.4c	TWIC
Myotis sp. *Myotis sp.*	2016	4.0	CE SB Bern2, CMS_A2, CMS_EUROBATS-A1, HabRegs2, HSD2p, HSD4, RLGB.CR, RLGB.DD, ScotBL, UKBAP, WCA5/9.4b, WCA5/9.4c	TWIC
Daubenton's *Myotis daubentonii*	2000	6.6	CE CL Bern2, CMS_A2, CMS_EUROBATS-A1, HabRegs2, HSD4, ScotBL, WCA5/9.4b, WCA5/9.4c	TWIC
Natterer's *Myotis nattereri*	2016	3.9	CE CL E SB W(K) Borders Rarity (L) Lothian Rarity (VL) Bern2, CMS_A2, CMS_EUROBATS-A1, HabRegs2, HSD4, ScotBL, WCA5/9.4b, WCA5/9.4c	TWIC
Noctule *Nyctalus noctula*	2009	7.3	CE SB Borders and Lothian Rarity (VL) Bern2, CMS_A2, CMS_EUROBATS-A1, HabRegs2, HSD4, ScotBL,	TWIC

Species	Most Recent Record	Nearest Record to Site (km)	Protection	Data Source
			UKBAP, WCA5/9.4b, WCA5/9.4c	
Fish				
Powan *Coregonus lavaretus*	N/A	0.1	Sch5, Sch3, UKBAP	NatureScot
Brown trout *Salmo trutta*	N/A	0.1	SBL, UKBAP	Carron Valley Fishery[14]
Mammals				
Roe deer *Capreolus capreolus*	2019	1.9	Bern3	TWIC
European badger *Meles meles*	2022	Within the Site	CE CL E F SB ST W(K) Bern3, PBA	NBN Atlas / TWIC
European hedgehog *Erinaceus europaeus*	2006	Within the Site	CL F M Bern3, RLGB.VU, ScotBL, UKBAP	TWIC
European hare *Lepus europaeus*	2007	Within the Site	CL E F W(I) ScotBL, UKBAP	TWIC
European pine marten *Martes martes*	2020	Within the Site	CL SB ST, Borders and Lothian Rarity (VL) Bern3, HabRegs4, HSD5, ScotBL, UKBAP, WCA5/9.1k/I, WCA5/9.1t, WCA5/9.4.a, WCA5/9.4b, WCA5/9.4c	TWIC
European rabbit *Oryctolagus cuniculus*	2006	0.05	RLGLB.NT	TWIC
Red squirrel *Sciurus vulgaris*	2020	Within the Site	CL E SB ST W(K) Lothian Rarity (L) Bern3, RLGB.EN, ScotBL, UKBAP, WCA5/9.1k/I, WCA5/9.1t, WCA5/9.4.a, WCA5/9.4b, WCA5/9.4c	SSRS/NBN Atlas/TWIC
Invertebrates				
Orange-tip *Anthocharis cardamines*	2011	0.1	W(I)	TWIC
Small heath *Coenonympha pamphilus*	2011	Within the Site	ST, PS(RO), RLGB.Lr(NT), ScotBL, Borders and Lothian PS (research only)	TWIC

[14] Carron Valley Fishery. (2024). Fishing the Loch. [online] Available at: Carron Valley Fishery | Trout Fishing Members' Club [Accessed 07 Nov. 2024].

Species	Most Recent Record	Nearest Record to Site (km)	Protection	Data Source
Common hawker *Aeshna juncea*	2019	Within the Site	CE W(I)	TWIC
Large red damselfly *Pyrrhosoma nymphula*	2012	Within the Site	CE W(I)	TWIC
Red-necked footman *Atolmis rubricollis*	2020	Within the Site	Borders Rarity (L)	TWIC
Epirrhoe tristata	2020	Within the Site	Borders Rarity (L)	TWIC
Plants and Lichen				
No records returned of plants (moss), or lichen recorded.				TWIC / NBN Atlas
Invasive non-native species (INNS)				
No records returned of INNS recorded.				TWIC / NBN Atlas

Table A-2: Protected and Notable Species Records from Planning Documents of Nearby Wind Farms

Species	Last Recorded	Protection	Development planning document associated with record
Bats			
Common pipistrelle	2018	CE CL E SB W(K) CMS_A2, CMS_EUROBATS-A1, HabRegs2, HSD4, WCA5/9.4b, WCA5/9.4c	Shelloch Wind Farm Craigton and Spittalhill Wind Farm
Soprano pipistrelle	2018	CE CL E F SB W(K) Bern2, CMS_A2, CMS_EUROBATS-A1, HabRegs2, HSD4, ScotBL, UKBAP, WCA5/9.4b, WCA5/9.4c	Shelloch Wind Farm Craigton and Spittalhill Wind Farm
Myotis species	2018	CE SB Bern2, CMS_A2, CMS_EUROBATS-A1, HabRegs2, HSD2p, HSD4, RLGB.CR, RLGB.DD, ScotBL, UKBAP, WCA5/9.4b, WCA5/9.4c	Shelloch Wind Farm Craigton and Spittalhill Wind Farm
Mammals			
European hare *Lepus europaeus*	2006	CL E F W(I) ScotBL, UKBAP	Craigengelt Wind Farm

Species	Last Recorded	Protection	Development planning document associated with record
European otter (spraint) *Lutra lutra*	2018	CE CL E F SB 4.75 W(K) Bern2, HabRegs2, HSD2p, HSD4, ScotBL, UKBAP, WCA5/9.4b, WCA5/9.4c	Craigengelt Wind Farm Shelloch Wind Farm Earlsburn North Wind Farm Craigton and Spittalhill Wind Farm
European badger	2020	CE CL E F SB ST W(K) Bern3, PBA	Shelloch Wind Farm
Water shrew *Neomys fodiens*	2007	WCA6	Earlsburn North Wind Farm
American mink *Neovison vison*	2007	WCA9/INV	Earlsburn North Wind Farm
Red fox *Vulpes vulpes*	2007		Earlsburn North Wind Farm
Mountain hare *Lepus timidus*	2007	WCA5 (full protection)	Earlsburn North Wind Farm
Amphibians			
Common toad *Bufo bufo*	Not specified	WCA5/9.5a WCA5/9.5b	Shelloch Wind Farm
Common frog *Rana temporaria*	Not specified	WCA5/9.5a WCA5/9.5b	Shelloch Wind Farm
Fish			
Brown trout *Salmo trutta*	2013	CL E ST W(I) ScotBL, UKBAP	Craigton and Spittalhill Wind Farm

Table A-3: Abbreviation Key

Abbreviation	Full Designation	Region	Description
Bern2	Bern Convention Appendix 2	International	International treaty that aims to protect wild plant and animal species and their natural habitats
Bern3	Bern Convention Appendix 3	International	International treaty that aims to protect wild plant and animal species and their natural habitats
Borders/Lothian Rarity (L)	Local	Regional	
Borders/Lothian Rarity (VL)	Very Local	Regional	

Abbreviation	Full Designation	Region	Description
CE	City of Edinburgh	Local Biodiversity Action Plan (LBAP)	
CL	Clackmannanshire	Local Biodiversity Action Plan (LBAP)	
CMS_A2	Convention on Migratory Species Appendix2	National	Appendix II of the Convention on the Conservation of Migratory Species of Wild Animals (CMS) lists migratory species that require international agreements for their conservation and management
CMS_EUROBATS-A1	Convention on Migratory Species - EUROBATS Annex 1	National	The Agreement on the Conservation of Populations of European Bats (EUROBATS) which aims to address threats to all 45 species of bats identified in Europe arising from habitat degradation, disturbance of roosting sites and harmful pesticides.
E	East Lothian	Local Biodiversity Action Plan (LBAP)	
F	Falkirk	Local Biodiversity Action Plan (LBAP)	
HabRegs2	The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland) (Schedule 2)	National	Schedule 2- European protected species of animals.
HabRegs4	The Conservation (Natural Habitats c.) Regulations 2010 (Schedule 4)	National	Schedule 4- European protected species of animals.
HSD2p	Habitats Directive Annex 2 (Priority Species)	National	The Habitats Directive's Annex II lists species that are of Community interest and require the designation of Special Areas of Conservation (SACs). Priority species are particularly threatened and are subject to stronger

Abbreviation	Full Designation	Region	Description
			protection than other species listed in Annex II
HSD4	Habitats Directive Annex 4	National	Annex 4 of the Habitats Directive lists animal and plant species that are endangered, vulnerable, rare, or endemic in the European Community and require strict protection.
HSD5	Habitats Directive Annex 5	National	Animal and plant species of community interest whose taking in the wild and exploitation may be subject to management measures.
PBA 1992	The Protection of Badgers Act 1992 (C.51) (Scottish version)	National	Gives badgers full protection from taking, injuring, killing, cruelty, marking/ringing, selling or possession, and interfering with badger setts.
RLGB.CR	IUCN (2001) GB Red List - Critically Endangered	International	All taxa listed as Critically Endangered qualify for Vulnerable and Endangered, and all listed as Endangered qualify for Vulnerable.
RLGB.DD	IUCN (2001) GB Red List - Data Deficient	International	All taxa listed as Critically Endangered qualify for Vulnerable and Endangered, and all listed as Endangered qualify for Vulnerable.
RLGB.EN	IUCN (2001) GB Red List - Endangered	International	All taxa listed as Critically Endangered qualify for Vulnerable and Endangered, and all listed as Endangered qualify for Vulnerable.
RLGB.Lr(NT)	IUCN-Global Red List: Lower Risk(Near Threatened)	International	All taxa listed as Critically Endangered qualify for Vulnerable and Endangered, and all listed as Endangered qualify for Vulnerable.
RLGB.VU	IUCN (2001) GB Red List - Vulnerable	International	All taxa listed as Critically Endangered qualify for Vulnerable and Endangered, and all listed as Endangered qualify for Vulnerable.



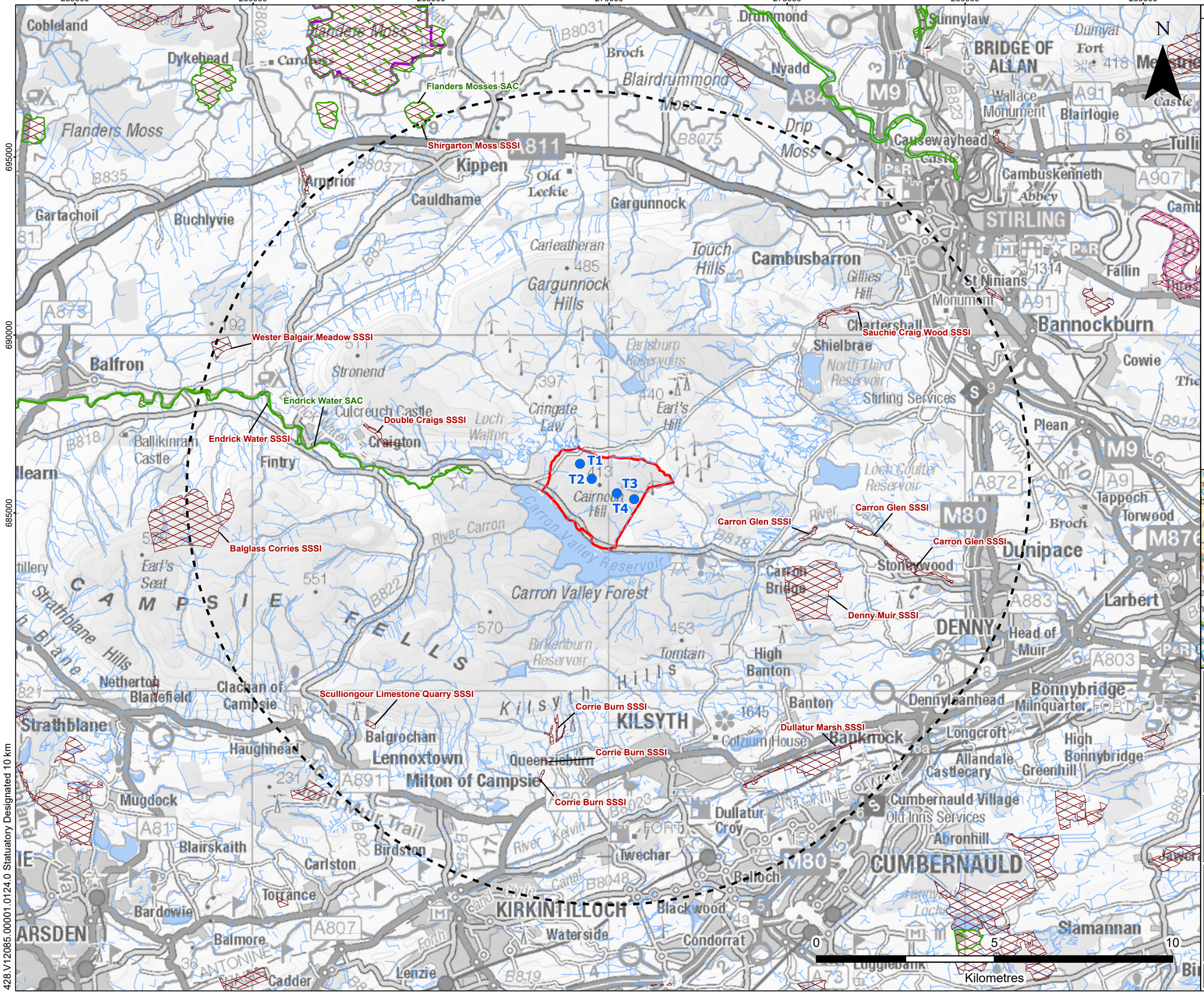
Abbreviation	Full Designation	Region	Description
SB	Scottish Borders	Local Biodiversity Action Plan (LBAP)	
ScotBL	Scottish Biodiversity List of species of principal importance for biodiversity conservation	National	The Scottish Biodiversity List is a list of flora, fauna and habitats considered by the Scottish Ministers to be of principal importance for biodiversity conservation. The development of the list has been a collaborative effort involving a great many stakeholders.
ST	Stirling	Local Biodiversity Action Plan (LBAP)	
UKBAP	UK Biodiversity Action Plan Priority Species	National	a UK-habitat classification prepared by the UK Biodiversity Group that classifies all terrestrial and freshwater habitats in the UK into 37 broad habitat types.
UKPS	UK Priority Habitats and Priority Species	National	The UK List of Priority Species and Habitats contains 1150 species and 65 habitats that have been listed as priorities for conservation action. The UKPS is no longer extant but many of the priority habitats and species remain conservation priorities.
W (I)	West Lothian Indicator Species	Local Biodiversity Action Plan (LBAP)	
W (K)	West Lothian Key Species	Local Biodiversity Action Plan (LBAP)	
WCA5/9.1k/I	Wildlife and Countryside Act 1981 (as amended in Scotland) (Schedule 5 Section 9.1 (killing/injuring))	National	Section 9.1. Animals which are protected from intentional killing or injuring.
WCA5/9.1t	Wildlife and Countryside Act 1981 (as amended in Scotland) (Schedule 5 Section 9.1 (taking))	National	Section 9.1 Animals which are protected from taking.
WCA5/9.2	Wildlife and Countryside Act 1981 (as amended in	National	Section 9.2 Animals which are protected from being

Abbreviation	Full Designation	Region	Description
	Scotland) (Schedule 5 Section 9.2)		possessed or controlled (live or dead).
WCA5/9.4a	Wildlife and Countryside Act 1981 (as amended in Scotland) (Schedule 5 Section 9.4, subdivision a)	National	Section 9.4 subdivision a - Animals which are protected from intentional damage or destruction to any structure or place used for shelter or protection.
WCA5/9.4b	Wildlife and Countryside Act 1981 (as amended in Scotland) (Schedule 5 Section 9.4b)	National	Section 9.4 Animals which are protected from intentional disturbance while occupying a structure or place used for shelter or protection.
WCA5/9.4c	Wildlife and Countryside Act 1981 (as amended in Scotland) (Schedule 5 Section 9.4c)	National	Animals which are protected from their access to any structure or place which they use for shelter or protection being obstructed.
WCA5/9.5a	Wildlife and Countryside Act 1981 (as amended in Scotland) (Schedule 5 Section 9.5a)	National	Section 9.5 Animals which are protected from being sold, offered for sale or being held or transported for sale either live or dead, whole or part.
WCA5/9.5b	Wildlife and Countryside Act 1981 (as amended in Scotland) (Schedule 5 Section 9.5b)	National	Section 9.5 Animals which are protected from being published or advertised as being for sale.
WCA6	Wildlife and Countryside Act 1981 (as amended in Scotland) (Schedule 6 Section 11(1))	National	Protection from being killed or taken by certain methods. The methods listed are: self-locking snares, bows, crossbows, explosives (other than ammunition for a firearm), or live decoys (not exhaustive).
WCA8	Wildlife and Countryside Act 1981 (as amended in Scotland) (Schedule 8)	National	Plants which are protected from intentional picking, uprooting or destruction (Section 13 1a); selling, offering for sale, possessing or transporting for the purpose of sale (live or dead, part or derivative) (Section 13 2a); advertising (any of these) for sale.

Abbreviation	Full Designation	Region	Description
WCA9/INV	Wildlife and Countryside Act 1981 (as amended in Scotland) (Schedule 9)	National	Includes all non-native species listed in Schedule 9 (parts 1 and 2) covering animals and plants which may not be released or allowed to escape into the wild plus additional invasive non-native species.

255000 260000 265000 270000 275000 280000 285000

695000 690000 685000


Flanders Moss SAC
Shirgarton Moss SSSI
Wester Balgair Meadow SSSI
Endrick Water SAC
Endrick Water SSSI
Double Craigs SSSI
Balglass Corries SSSI
Sauchie Craig Wood SSSI
Carron Glen SSSI
Carron Glen SSSI
Carron Glen SSSI
Denny Muir SSSI
Sculliongour Limestone Quarry SSSI
Corrie Burn SSSI
Corrie Burn SSSI
Corrie Burn SSSI
Dullatur Marsh SSSI
T1
T2
T3
T4
Cobleland
Dykehead
Flanders Moss
Gartachoil
Buchlyvie
Kippen
Cauldhame
Gargunnock
Carleatheran
Gargunnock Hills
Touch Hills
Cambusbarron
Stronend
Balfron
Culcreuch Castle
Fintry
Ballikinrain Castle
Craigton
Cringate Law
Earl's Hill
Shielbrae
Chartershall
Stirling Services
Bannockburn
Cowie
Plean
STIRLING
Cambuskenneth Abbey
Causewayhead
Wallace Monument
BRIDGE OF ALLAN
Blairlogie
Dunmyat Fort
Sunnylaw
Drummond
Broch
Blairdrummond Moss
Nyadd
Drip Moss
Old Leckie
St Ninians
Monument
Fallin
Carron Valley Forest
Carron Valley Reservoir
Earl's Seat
Campsie Fells
Strathblane Hills
Netherton
Blanefield
Clachan of Campsie
Strathblane
Haughhead
Balgrochan
Lennoxtown
Milton of Campsie
Queenzieburn
KILSYTH
Colzium House
Banton
High Banton
Tomtain Hills
Birkenburn Reservoir
Dullatur
Croy
Twechar
Kirkintilloch
Waterside
Condorrat
Blackwood
Balloch
CUMBERNAULD
Old Inns Services
Abronhill
Cumbernauld Village
Dunipace
Stoneywood
Carron Bridge
DENNY
Head of Muir
Larbert
Dennyloanhead
Bonnybridge
Milnquarter
Longcroft
Allandale
Castlecary
Greenhill
High Bonnybridge
Tappoch
Torwood
Broch
Mugdock
Blairskaith
Carlston
Torrance
Bardowie
Balmore
Cadder
Lenzie
Mugdock Country Park
Slamannan
Loch Coulter Reservoir
Earlsburn Reservoirs
North Third Reservoir
Gillies Hill
Cringate Law
Earl's Hill
Cairnoch Hill
Touch Hills
Gargunnock Hills
Carron Valley Forest
Carron Valley Reservoir
Birkenburn Reservoir
Loch Walton
Loch Coulter Reservoir
Earlsburn Reservoirs
North Third Reservoir
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M9
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M876
A9
A82
A879
A807
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A891
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264000 266000 268000 270000 272000 274000 276000

690000 688000 686000 684000

T1 T2 T3 T4

Upper Endrick water LNCS

Carron Valley LNCS

Carron Valley Reservoir & Forest LNCS

Carron Forest LNCS

Fintry Hills

CARRON VALLEY FOREST

Touchadam Muir

Cringate Muir

Craigengelt Hill

Cairnoch Hill

Ling Hill

Hart Hill

Meikle Bin

Little Bin

Plea Muir

Black Hill

Lecket Hill

Garrel Hill

Tomtain

Cock Hill

Denny Muir

Darrach Hill

Drummarnock

Dundaff Hill

Craigannet Hill

Haugh Hill

Bin Bairn

Standing Stones

Waterhead

Todholes

Cringate

Easter Cringate

Spittalhill

Gartcarron

Gartcarron Hill

Townhead

Lurg

Shielbrae

Berryhill

Townfoot

Carron Bridge

Slafarquhar

Muirmill

Historical Village

Shankhead

Craigengelt

Tappetknowe

Doups

Linns

Lochend

Glenhead

Shielwalls

Backdales

Foresthill

Tarduff Hill

Milngavie

Kilsyth

Denny

Stirling

Thornhill

Balfron

EAST DUNBARTONSHIRE

Cumbernauld

Earlsburn Reservoirs

Carron Valley Reservoir

Loch Walton

Kirk o' Muir Cemy

Craigannet

Easterton

Lewis Hill

Greenhill

Todholes

Muirpark

Earl's Hill

Burnfoot (ruin)

Cairn

Motte

B818

B822

A811

A9

A80

M80

M876

M9

A875

A803

A891

A81

LEGEND

- Site Boundary
- Site Boundary 2 km Buffer
- Proposed Turbine Location
- Watercourse (OS OpenMap Local)
- Waterbody (OS OpenMap Local)

Non-Statuatory Designated Sites

- Ancient Woodland
- Local Nature Conservation Site (LNCS)

Note: Only sites within 2 km of the Site Boundary have been labelled

0 2.5 5 Kilometres

Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.1 - DESK STUDY

NON-STATUTORY DESIGNATED WITHIN 2 KM

FIGURE 8.1.2

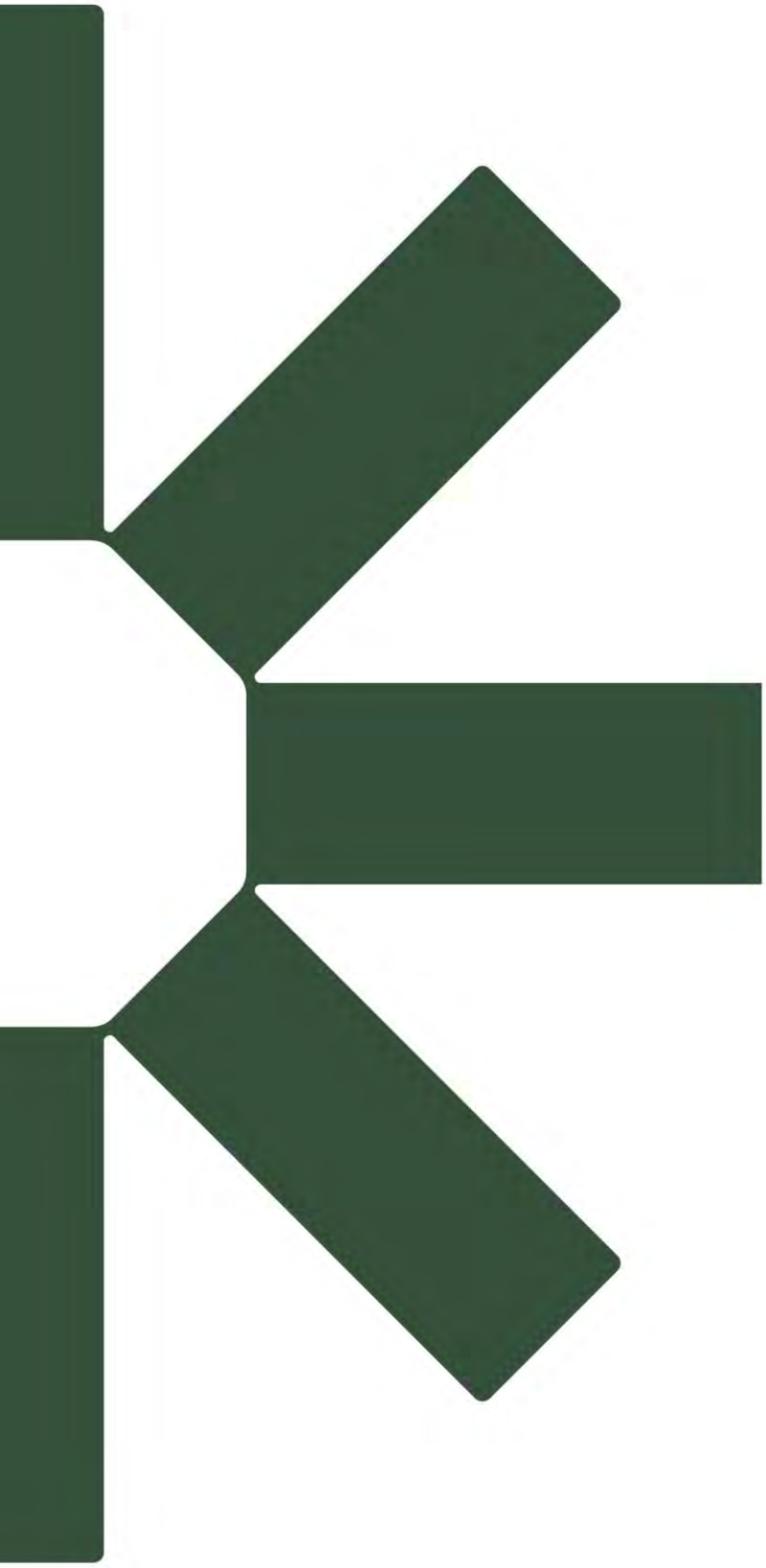
Scale 1:40,000 @ A3

Date JULY 2026

428.V12085.00001.0125.0 Non-Statutory Designated 2 km

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Making Sustainability Happen

Technical Appendix 8.2: UKHab and NVC Habitat Report

Cairnoch Hill Wind Farm

Eurowind Energy Limited

58 Morrison Street, Edinburgh, Scotland, EH3 8BP

Prepared by:

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SLR Project No.: 428.V12085.00001

3 August 2026

Revision: 01

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
01	3 August 2026	K. Hazelwood	R. Smith	S. Toule

Basis of Report

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Acronyms and Abbreviations

CIEEM	Chartered Institute of Ecology and Environmental Management
EIA	Environmental Impact Assessment
EUNIS	European Nature Information System
GWDTE	Groundwater Dependent Terrestrial Ecosystem
INNS	Invasive Non-Native Species
MMU	Minimum Mapping Unit
NVC	National Vegetation Classification
SAC	Special Area of Conservation
SBL	Scottish Biodiversity List
SEPA	Scottish Environmental Protection Agency
SNIFFER	Scotland and Northern Ireland Forum for Environmental Research
UKHab	UK Habitat Classification

1.0 Introduction

1.1 Background

SLR Consulting Ltd ('SLR') was appointed by Eurowind Energy Limited ("the Applicant") to undertake habitat surveys for the proposed Cairnoch Hill Wind Farm development (hereafter referred to as "the Proposed Development"). The habitat surveys are focused on the Proposed Development location ("the Site"), specifically the area within the Site boundary. This report details the results of a UK Habitat Classification (UKHab) and National Vegetation Classification (NVC) survey carried out from 20 to 23 May 2024.

1.2 Site Description

The Site is centred on National Grid Reference NS 69768 85606, located at Cairnoch Hill, to the north of Carron Valley Reservoir. The Site is approximately 6km north of Kilsyth and 6km east of Fintry, within the Stirling Council administrative area. The Site predominantly lies within the Forth River Trust catchment, with the western zone of the Carron Valley Reservoir lying within the Loch Lomond Fisheries Trust catchment.

The land within the Site boundary is managed as plantation woodland by Forestry Land Scotland. Several small watercourses run through the Site draining south into the Carron Valley Reservoir on the southern side of the B818 road. Watercourses at the north west and west side of the Site drain into Endrick Water and those at the north east and east side of the Site drain into Earl's Burn.

1.3 Surrounding Area

The surrounding landscape consists of areas of grazing pasture and coniferous plantations with the Carron Valley reservoir situated south of the Site boundary. There are three operational wind farms (Craigengelt, Earlsburn and Earlsburn North), two consented wind farms (Shelloch, and Earlsburn Extension), and one 'in planning' wind farm (Drummarnock) within 10km of the Site. There are four residential properties/farms close to the Site (within 1km), the nearest of which are located immediately south of the Site on the northern side of the B818.

1.4 Proposed Development

The Proposed Development comprises up to four wind turbines with associated works and infrastructure including (see **Chapter 3: Description of the Development**). It is proposed that the maximum blade tip height of the wind turbines would be 180m. The Site layout is presented on **Figure 8.2.1a-y.**

1.5 Scope of Study

The primary aim of the study was to record, map, and describe baseline habitats present within the Site and defined survey buffer, in accordance with UK Habitat (UKHab) and National Vegetation Classification (NVC) survey protocols. Specific study objectives were to:

- Map baseline habitats present on-site using UKHab and NVC survey protocols and record data in geospatial mapping software (ESRI ArcGIS); and

- Identify and quantify any habitats of nature conservation importance within the Site (including Annex 1 habitats[1], those listed within the Scottish Biodiversity List[2], and those with potential to be ground water dependant).

The results of the study provide baseline information on the nature conservation value of habitats identified within the Site and areas of potential ground water dependency. This data can in turn be used to inform the infrastructure design stage and the Environmental Impact Assessment (EIA) process.

2.0 Methods

2.1 Survey and Reporting Personnel

Table 2-1 details all personnel involved in habitat surveys at the Site.

Table 2-1: Survey and Reporting Personnel

Personnel	Role	Qualifications/Experience
Kirstie Hazelwood	Senior Ecologist	ACIEEM, PHD, MSc, 9 years
Nicola Tyrrell	Technical Director / Area Manager – North (Ecology & Biodiversity)	CEnv MCIEEM, MSc DIc BCs Hons, 19 years

2.2 Field Survey

The field survey was carried out by Senior Ecologist Kirstie Hazelwood from 20 to 23 May 2024. The weather during the surveys was mostly clear and dry with good visibility, with some short periods of rain. Methods associated with each aspect of the field survey are described below.

2.2.1 Study Area

The UKHab and NVC surveys were carried out on all land within the Site boundary plus a 250m buffer where access was available (refer to **Figure 8.2.1a-y**).

2.2.2 UK Habitat Classification Survey

UK Habitat Classification (UKHab) is a comprehensive habitat classification system that is used for rapidly recording and classifying terrestrial, freshwater, and coastal habitats across the UK[3]. The system enables habitats to be mapped using a hierarchical 'Primary Habitat' system (capturing ecosystems, broad habitats, priority habitats and Annex 1 habitats) and non-hierarchical Secondary Codes. The system has been designed to build on existing habitat mapping techniques and enable integration with European Union and other UK classification systems, including Phase 1 Habitat Survey, NVC, and European Union Nature Information Systems (EUNIS).

The UKHab survey was carried out in accordance with the method described in the UK Habitat Classification User Manual. During the survey, habitats within the Site digitised in

[1] Habitats listed on Annex 1 of the Council Directive EEC of 21 May 1992 on the Conservation of Natural Habitats and Wild Fauna and Flora (the Habitats Directive).

[2] NatureScot (2020). *The Scottish Biodiversity List*. Available online from: https://www.nature.scot/doc/scottish-biodiversity-list [Accessed October 2024].

[3] UKHab Ltd (2023). UK Habitat Classification Version 2.0. Available online from: https://www.ukhab.org [Accessed October 2024].

geospatial mapping software (ArcGIS). Target notes were recorded to describe any particularly notable features such as flushes, areas with habitat disturbance, or habitats that were too small to map. As required by the UKHab mapping system, the metadata table is provided in **Appendix A**, **Table A- 1**.

2.2.3 National Vegetation Classification Survey

The NVC is a detailed classification system for mapping and recording vegetation communities using plant species presence and abundance. The NVC survey was carried out in accordance with standard methodology and guidelines[4,5]. During the survey, NVC communities were mapped in the field by applying polygons around visible boundaries of homogenous vegetation. Where readily identifiable, stands were classified and mapped at sub-community level.

Due to variability in vegetation communities within the Study Area, some polygons represent complex mosaics of two or more NVC communities. Where polygons have been mapped as mosaics, an approximate percentage coverage of each NVC community within the polygon has been provided so that the dominant community could still be ascertained. These areas are labelled with all communities within the mosaic separated with a '/'.

Where a habitat has been classified as halfway through transitioning between two different NVC communities, the areas were marked with both NVC communities separated with a '-'.

Vegetation communities were assessed using both quantitative (quadrats) and qualitative sampling. Where quadrat sampling was used, the following methodology was adopted:

- A minimum one quadrat was taken per habitat across the Site. This is lower than the recommended number of quadrats because of the size of the Site and number of times habitats are repeated across the Site;
- Initial sampling of each vegetation type was carried out as recommended in the NVC users' handbook, by sampling stands of vegetation *"judged by eye to be floristically and structurally homogeneous"*; and
- Where it was difficult to establish the vegetation type, more than one sample was taken to achieve a larger data set.

The size of quadrat used was 2x2m. Within each quadrat, all vascular plants and bryophytes were identified and an estimate of cover value of each made. Results are presented using the DOMIN scale of cover, as shown **Table A- 2**, **Appendix A.**

2.2.4 Ground Water Dependent Terrestrial Ecosystems

Ground Water Dependant Terrestrial Ecosystems (GWTDEs) are wetland habitats that derive their water supply primarily from groundwater as opposed to being rain or surface water fed, often supporting diverse, botanically rich ground-flora communities[6]. Habitat communities recorded during the survey were assessed against Scotland and Northern

[4] Rodwell, J.S., (Editor) (1991 et seq). British Plant Communities, 1, Cambridge University Press: Cambridge.

[5] Rodwell, J. S., (2006). NVC User's Handbook, 1, JNCC: Peterborough.

[6]CONFOR (2018). *Practice guide for forest managers to assess and protect Groundwater Dependent Terrestrial Ecosystems when preparing woodland creation proposals*. Available online from: https://www.confor.org.uk/media/246950/practice-guide-on-ground-water-dependent-terrestrial-ecosystems.pdf [Accessed October 2024].

Ireland Forum for Environmental Research (SNIFFER)[7] and Scottish Environmental Protection Agency (SEPA)[8] guidelines for identifying potential GWDTEs.

2.3 Nomenclature

Botanical nomenclature in this report follows Stace (2019) for vascular plants and Atherton et al. (2010) for bryophytes. English species names have been used within the main body of the report. Both English and scientific names are provided in, **Table B- 1** and **Table B- 2, Appendix B**, for reference**.**

2.4 Limitations

The UKHab Minimum Mapping Unit (MMU) for the field survey was 400m^2, which may result in small areas of notable habitat (e.g. Priority Habitat) being excluded from maps. In order to ensure all areas of notable habitat were effectively captured, point features and target notes detailing the location of each habitat, key species, and general condition were recorded during the field survey.

3.0 Results

The results of the UKHab and NVC survey are summarised in **Table 3-1**, and illustrated on **Figure 8.2.1a-y** and **Figure 8.2.2a-i** respectively. Target Notes are provided in **Table B- 3**, **Appendix B**, which are designed to be reviewed in conjunction with the aforementioned Figures. NVC quadrat data is presented in **Table B- 4**, **Appendix B** but due to the large quantity of data recorded in quadrats, a sample of quadrats representing each of the habitats recorded on the Site has been provided in the report. Full quadrat data can be provided upon request.

A summary of each habitat recorded is provided in **Table 3-1**.

[7] SNIFFER (2009) WFD95: A Functional Wetland Typology for Scotland. Available online from: https://www.sniffer.org.uk/Handlers/Download.ashx?IDMF=a6579282-8428-4282-bfc7-17c7e6027601 [Accessed October 2024].

[8] SEPA (2017). Land Use Planning System, SEPA Guidance Note 31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. Version 3, September 2017. Available online from: https://www.sepa.org.uk/media/144266/lups-gu31-guidance-on-assessing-the-impacts-of-development-proposals-on-groundwater-abstractions-and-groundwater-dependent-terrestrial-ecosystems.pdf. [Accessed October 2024].

Table 3-1: Habitats Recorded at Cairnoch Hill Wind Farm

Habitat	UKHab	NVC	Protection Status	GWDTE Potential
Grassland	g1b6/g3c Other upland acid grassland/Other neutral grassland	U4 *Festuca ovina-Agrostis capillaris-Galium saxatile* grassland		
	g1b6 Other upland acid grassland	U5 *Nardus stricta-Galium saxatile* grassland	SBL	
	g1c Bracken	U20 *Pteridium aquilinum-Galium saxatile* community		
	g2b Upland calcareous grassland	CG10 *Festuca ovina-Agrostis capillaris-Thymus praecox* grassland	SBL	High
	g3c Other neutral grassland	MG6 *Lolium perenne-Cynosurus cristatus* grassland		
		OV27 *Epilobium angustifolium* community		
		No NVC		
	g3c/g3c7 Other neutral grassland/ Deschampsia neutral grassland	MG9 *Holcus lanatus-Deschampsia cespitosa* grassland		Moderate
	g3c8 Holcus-Juncus neutral grassland	MG10 *Holcus lanatus-Juncus effusus* rush-pasture		Moderate
Woodland	w1d Wet woodland	W4 *Betula pubescens-Molinia caerulea* woodland	SBL	High
		W6 *Alnus glutinosa-Urtica dioica* woodland	SBL	Moderate
		W7 *Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum* woodland	SBL	High
	w1g Other broadleaved woodland	W10 *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland	SBL	
	w1h Other woodland; mixed	No NVC		
	w1h/w1h6 Other woodland; mixed/Other woodland; mixed; mainly conifer	W14 *Fagus sylvatica-Rubus fruticosus* woodland		
	w1h5 Other woodland; mixed; mainly broadleaved	No NVC		
	w1h6 Other woodland; mixed; mainly conifer	No NVC		

Habitat	UKHab	NVC	Protection Status	GWDTE Potential
	w2b Other Scot's Pine woodland	No NVC		
	w2c Other coniferous woodland	No NVC		
Heathland and shrub	h1b Upland heathland	H9 *Calluna vulgaris-Deschampsia flexuosa* heath	SBL	
	h3h Mixed scrub	No NVC		
Wetland	f1a6 Degraded blanket bog	M19 *Calluna vulgaris-Eriophorum vaginatum* blanket mire	SBL	
		M20 *Eriophorum vaginatum* blanket and raised mire	SBL	
		No NVC	SBL	
	f2c Upland flushes, fens and swamps	M6 *Carex echinata-Sphagnum recurvum/auriculatum* mire	SBL	High
		M10 *Carex dioica-Pinguicula vulgaris* mire	SBL	High
	f2c8 Transition mires and quaking bogs; upland (H7140)	M4 *Carex rostrata-Sphagnum recurvum* mire	SBL, Annex 1	
		M9 *Carex rostrata-Calliergon cuspidatum/giganteum* mire	SBL, Annex 1	High
	f2d Aquatic marginal vegetation	S4 *Phragmites australis* swamp and reed-beds		
		S27 *Carex rostrata-Potentilla palustris* tall-herb fen		
	f2f Other Wetlands	M23 *Juncus effusus/acutiflorus-Galium palustre* rush-pasture		High
		M25 *Molinia caerulea-Potentilla erecta* mire		Moderate
		M27 *Filipendula ulmaria-Angelica sylvestris* mire		Moderate
		M28 *Iris pseudacorus-Filipendula ulmaria* mire		Moderate
		S10 *Equisetum fluviatile* swamp		
		No NVC		

Habitat	UKHab	NVC	Protection Status	GWDTE Potential
Urban	u1b5 Buildings	No NVC		
	u1b6 Other developed land	No NVC		
	u1e Built linear features	No NVC		
Sparsely vegetated land	s1a Inland rock outcrop and scree habitats	No NVC	SBL	
	s1d Other inland rock	No NVC		
Rivers and lakes	r1 Standing open water and canals	No NVC	SBL	
	r2b Other rivers and streams	No NVC	SBL	

3.1 Grassland

3.1.1 Other upland acid grassland (g1b6)

3.1.1.1 *Festuca ovina-Agrostis capillaris-Galium saxatile* grassland (U4)

The *Festuca ovina-Agrostis capillaris-Galium saxatile grassland*, typical sub-community (U4a) was recorded in a patch of likely self-set conifers scattered through with open grassland patches, in the centre of the Site. The grassland is species poor, dominated by grasses such as red fescue, Yorkshire fog and sweet vernal-grass, with heath bedstraw and few other herbs present. The more neutral *Holcus lanatus-Trifolium repens* sub-community (U4b) was recorded under UKHab both as acid grassland (g1b6) and neutral grassland (g3c). The communities have grasses that are found in both acid and neutral grassland habitats, particularly Yorkshire fog, but also red fescue, sweet vernal-grass, smooth meadow grass and creeping bent, and may have acid grassland herbs such as heath bedstraw mixed with more neutral herbs such as white clover. This habitat was found within the Site in forest rides (**Photograph 3-1**), mixed with the rushy M23 and the rosebay willowherb dominated OV27. In the buffer adjacent to Carron Valley Reservoir it was found as a habitat dominated by Yorkshire fog and meadow foxtail with few other grasses or smaller herbs, but some taller herbs such as common nettle and rosebay willowherb occasional throughout. The damper *Luzula multiflora-Rhytidiadelphus loreus* sub-community (U4d) was recorded in some parts of the buffer to the east of the Site, mixed with the mat-grass dominated U5. The heathy *Vaccinium myrtillus-Deschampsia flexuosa* sub-community (U4e) was recorded in large areas in the buffer to the north and east of the Site, and in the centre of the Site where the grassland was recorded in forest rides and in mosaic with degraded blanket bog. The habitat is dominated by acid grassland species such as wavy hairgrass and mat-grass, with remnant heath species still scattered through the sward such as blaeberry and heather (**Photograph 3-2**).

3.1.1.2 *Nardus stricta-Galium saxatile* grassland (U5)

The *Nardus stricta-Galium saxatile* grassland, *Agrostis canina-Polytrichum commune* sub-community (U5b) was recorded in the grazed buffer area, primarily to the east of the Site (**Photograph 3-2**). The habitat is dominated by mat-grass with a species poor herb community, mostly comprising heath bedstraw. This habitat is typical of acid grazed areas and was found mixed with the U4 acid grassland and rushy M23 and M6 habitats.



Photograph 3-1: U4b Grassland in Forest Ride



Photograph 3-2: U4/U5/M23 in Grazed Buffer

3.1.2 Bracken (g1c)

3.1.2.1 *Pteridium aquilinum-Galium saxatile* community (U20)

A small area of *Pteridium aquilinum-Galium saxatile* community, *Anthoxanthum odoratum* sub-community (U20a) was recorded in the grazed buffer to the north east of the Site, where bracken was dominant over a species poor understory.

3.1.3 Upland calcareous grassland (g2b)

3.1.3.1 *Festuca ovina-Agrostis capillaris-Thymus praecox* grassland (CG10)

Very small patches of calcareous grassland were recorded as target notes in the grazed buffer in the north east of the Site. The areas formed small patches with wild thyme scattered through over rocky outcrops on steeper ground. The areas were too small to map.

3.1.4 Other neutral grassland (g3c)

Some forest rides were marked as other neutral grassland with no NVC. These areas were dominated by grasses such as Yorkshire fog, red fescue and sweet vernal-grass with very few herbs and regenerating conifers scattered frequently throughout (Photograph 3-3).

3.1.4.1 MG6 *Lolium perenne-Cynosurus cristatus* grassland

Some areas adjacent to a dwelling in the south of the Site were matched to NVC community *Lolium perenne-Cynosurus cristatus* grassland, typical sub-community (MG6a), managed as lawns. The *Anthoxanthum odoratum* sub-community (MG6b) was recorded as pasture, with high cover of perennial ryegrass with herbs such as white clover and daisy. The areas were not accessed for detailed survey but were assessed with reasonable accuracy from the Site boundary.

The graveyard near the south of the Site was also recorded as MG6b, though it was a poor fit for NVC. The area comprised a tall sward of Yorkshire fog, sweet vernal-grass and red fescue, with small and tall herbs scattered frequently throughout, including cow parsley, common sorrel, pignut, meadow buttercup and germander speedwell (Photograph 3-4).



Photograph 3-3: g3c Neutral Grassland with No NVC in Forest Rides



Photograph 3-4: MG6 Habitat in Graveyard

3.1.4.2 OV27 *Epilobium angustifolium* community

The rosebay willowherb dominated OV27 community was recorded frequently in the southern half of the Site in forest rides and on the shores of Carron Valley Reservoir. All three sub-communities were recorded. The grassy *Holcus lanatus-Festuca ovina* sub-community (OV27a) had low diversity grasses such as Yorkshire fog scattered through of a sparse carpet of pleurocarp mosses. The most commonly recorded *Urtica dioica-Cirsium arvense* sub-community (OV27b) had tall herbs such as common nettle, wild angelica and

foxglove in the sward (**Photograph 3-5**), often with damper species such as common valerian, rushes and marsh bedstraw where the habitat was in mosaic with the rushy M23 (**Photograph 3-6**). The *Rubus fruticosus agg.-Dryopteris dilatata* sub-community (OV27c) had ferns and raspberry scattered through, forming a tall, scrubby sward.

Rosebay willowherb is a common pioneer herb in disturbed habitats and can have an invasive nature in areas such as felled forestry. It is likely that this habitat, along with the damper M23 rush habitat, will cover large areas as areas conifer plantation are felled.



Photograph 3-5: OV27b in Forest Ride



Photograph 3-6: OV27b/M23b in Forest Ride

3.1.5 *Deschampsia* neutral grassland (g3c7)

3.1.5.1 MG9 *Holcus lanatus-Deschampsia cespitosa* grassland

The *Holcus lanatus-Deschampsia cespitosa* grassland, *Poa trivialis* sub-community (MG9a) was found in throughout the Site in forest rides (**Photograph 3-7**). The habitat is a species poor, damp grassland with tall tufts of tufted hairgrass scattered through with Yorkshire fog, common sorrel and thistle species, often with rosebay willowherb frequent where the habitat is adjacent to OV27 habitat.



Photograph 3-7: MG9a in Forest Ride

3.1.6 *Holcus-Juncus* neutral grassland (g3c8)

3.1.6.1 MG10 *Holcus lanatus-Juncus effusus* rush pasture

There is a small area of *Holcus lanatus-Juncus effusus* rush pasture, typical sub-community (MG10a) in the south of the Site in a transitional zone between a damp area of MG9 and OV27 and a dry U4 habitat on sloping ground. The area is dominated by soft rush with grassy patches throughout, comprising a mix of Yorkshire fog and smooth meadow-grass with much rosebay willowherb, common sorrel and common nettle.

3.2 Woodland

3.2.1 Wet Woodland (w1d)

3.2.1.1 W4 *Betula pubescens-Molinia caerulea* woodland

The area of W4/W7 mosaic is in the north of the Site, in subcommunity W4c, *Sphagnum* spp. sub-community. The area is scattered through with selfset trees that are beginning to create a canopy with mix of native broadleaves including downy birch, willows and alder, and many non-native conifers. The ground layer is consistently damp either dominated by soft rush or bottle sedge (**Photograph 3-8**). Where *Sphagnum* carpets the ground under the rushes, the habitat has been classified as W4 woodland, and where there are non-*Sphagnum* mosses and scattered damp herbs the habitat has been classified as W7 (see Section 3.2.1.3). The area is a poor fit for W4 woodland, which should have purple moor-grass and very few other higher plants. It is possible this area is an open mire habitat (NVC M4 or M6, see Section 3.4) where conifers have begun to invade, closing up the canopy with the scattered broadleaved trees and thereby transitioning the habitat to woodland. The area is therefore not classified as Annex 1 bog woodland but recognised under SBL as a wet woodland.

3.2.1.2 W6 *Alnus glutinosa-Urtica dioica* woodland

The area marked as W6a, typical sub-community, was a poor fit for NVC as broadleaf woodland recovering on clearfell, but W6 was considered the closest likely NVC habitat to that found on Site. The area is dominated by young willow, alder and downy birch trees in a damp, slightly flushed area of clearfell. The area is damp enough that few conifers have self-set in the area and the ground layer is dominated by soft rush and rosebay willowherb, with scattered tall neutral herbs and grasses such as marsh thistle and foxglove (**Photograph 3-9**).

3.2.1.3 W7 *Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum* woodland

Areas of W7c *Deschampsia cespitosa* sub-community were located in small patches on the edges of the Site. The areas were dominated by a mix of birch, willow and alder with a damp understory dominated by soft rush.



Photograph 3-8: Mixed W4/W7 Woodland



Photograph 3-9: W6 Area in Clearfell

3.2.2 Other broadleaved woodland (w1g) and Other woodland; mixed (w1h)

There are stands of mixed woodland throughout the Site at the edge of conifer blocks, along riparian zones and in one larger area in the south east of the Site. Most areas have a higher cover of conifer than broadleaved trees, fitting the w1h6 UKhab category, two small areas are mainly broadleaved in the w1h5 UKhab category, with other small areas evenly mixed

(w1h). The larger area of mixed woodland was originally conifer that was felled between 2010-2015 and appears not to have been replanted. Much of the area is dominated by self-set conifers, now between 1.5m and 3m in height. Broadleaved saplings mixed in are primarily willow and birch species, which are sometimes dominant in the damper areas. The ground layer is a mix of damp rushy patches and dry areas dominated by rosebay willowherb over the brash and ditches left by the plantation.

3.2.2.1 W10 *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland

One small area of broadleaf woodland (w1g) was recorded adjacent to the cemetery in the south of the Site. The area comprises a few mature broadleaved trees with a ground layer mostly dominated by ground elder. A small number of giant hogweed plants were located in this area (Target Note no. 27).

3.2.2.2 W14 *Fagus sylvatica-Rubus fruticosus* woodland

W14 woodland was recorded in areas of mixed woodland in buffer area in the south of the Site, between the public road and the reservoir. These woodland comprised primarily mature larch and beech, with other conifers scattered throughout.

3.2.3 Other Scot's pine woodland (w2b)

There is a small stand of mature Scot's pine in the north of the Site and the edge of the conifer plantation. The stand is open with plenty of light allowed through to the understory, allowing understory plants to thrive as they are unable to in areas of spruce and creating a higher diversity woodland habitat than the surrounding plantation.

3.2.4 Other coniferous woodland (w2c)

The majority of the Site comprises mature non-native conifer plantation, primarily Sitka spruce, with some areas of lodgepole pine. The plantation areas vary in age, with some areas of mature trees, in the north-west and north east of the Site (**Photograph 3-10**) and felled and replanted areas through the rest of the Site. The most recently felled area is in the south west of the Site with replanted areas of conifer seedlings and saplings at various ages throughout the rest of the Site (**Photograph 3-11**). There are some small areas of self-set conifers where areas have been left clear of replanting and conifer seedlings and saplings now dominate. The w2c habitat on-site is in poor condition and has low species diversity, providing poor habitat for fauna.



Photograph 3-10: Mature Conifer Plantation



Photograph 3-11: Planted Conifer Saplings

3.3 Heathland and shrub

3.3.1 Upland heathland (h1b)

3.3.1.1 H9 *Calluna vulgaris-Deschampsia flexuosa* heath

A small area was categorised as *Calluna vulgaris-Deschampsia flexuosa* heath, *Vaccinium myrtillus-Cladonia spp. sub-community* (H9b). The area was recorded along a wide forest ride on a steep sloping bank. The habitat was species poor with blaeberry dominant with scattered green-ribbed sedge and wavy hair-grass, over a carpet of pleurocarp mosses (**Photograph 3-12**). The area appears to be grading from heath to grassland, with no heather and patches of acid grassland in the area.

While dry heath is classified as Annex I habitat, this area of H9 on-site is small and in poor condition, representing a poor example of heath habitat.

3.3.2 Mixed scrub (h3h)

An area of mixed scrub was recorded in the south of the Site adjacent to the cemetery. The area comprised mostly raspberry, with rosebay willowherb, fern species, common nettles and tufted hairgrass (**Photograph 3-13**). The protected archaeophyte, masterwort was recorded adjacent to the scrub area on the edge of the public footpath (see Section 4.4).



Photograph 3-12: Dry Heath Area



Photograph 3-13: Mixed Scrub

3.4 Wetland

3.4.1 Degraded blanket bog (f1a6)

Under this category blanket bogs are characterised by the presence of a blanket bog species, with all but the steepest slopes permanently waterlogged. No areas of blanket bog on the Site were categorised as Annex 1 habitat, due to the degraded nature of the habitat.

Some areas within forest rides were classified under UKHab as degraded blanket bog due to the presence of blanket bog species such as hummocks of *Sphagnums* and blaeberry, with hummocks of common haircap moss and very few grass or heath species (**Photograph 3-14**). These areas do not fit any NVC category as they are too degraded, but have been classified as degraded bog to indicate areas that were once blanket bog and are likely based on peat deposits.



Photograph 3-14: f1a6 Blanket Bog with No NVC in Forest Ride

3.4.1.1 M19 *Calluna vulgaris-Eriophorum vaginatum* blanket mire

The *Calluna vulgaris-Eriophorum vaginatum* blanket mire, *Erica tetralix* sub-community (M19a) was recorded in mosaics with M20 blanket bog and on Cairnoch Hill and in a segment of forest ride. The habitat was recorded in the open area on Cairnoch Hill with M20 and U4 habitats (see **Section 3.4.1.2** for details). The M19 patches were dominated by an even mix of hare's-tail cottongrass and heather with mostly pleurocarp mosses such as red-stemmed feathermoss and heath plait-moss in the understory, with patches of red bog-moss and flat-topped bog-moss (**Photograph 3-15**).

M19 was also recorded in a forest ride close to the Cairnoch hill bog area, with similar species community to the above. Blanket bog areas within forest rides are degraded due to frequent drainage ditches dug throughout for the conifer plantation.

3.4.1.2 M20 *Eriophorum vaginatum* blanket and raised mire

The largest area of *Eriophorum vaginatum* blanket and raised mire, *Calluna vulgaris-Cladonia* spp. sub-community (M20b) was recorded in the open area on Cairnoch Hill, in mosaic with M19 blanket bog (Section 3.4.1.1) and U4 acid grassland (Section 3.1.1). The area has not been afforested like the surrounding area, however young self-set conifer trees area scattered throughout the area, some with a yellow colouration indicating poor health due to the underlying peat. The M20 areas are dominated by hare's-tail cottongrass with a high cover of blaeberry and scattered wavy hair-grass (**Photograph 3-16**). There are few patches with red bog-moss present, the vegetation is primarily underlaid with pleurocarp mosses such as red-stemmed feathermoss. The lack of *Sphagnum* in the area indicates poor bog condition, likely caused by drainage from the nearby plantation and conifers seeding into the peat.

Some other areas of M20b were recorded to the north of the Site in the grazed pasture, in the buffer area. The areas were dominated by hair's-tail cottongrass with blaeberry scattered throughout, but little or no *Sphagnum*.

The species poor sub-community M20a, were recorded in forest rides close to Cairnoch Hill and in the open landscape in the buffer area to the north and east of the Site. All M20a habitats were dominated by Hare's-tail cottongrass, with few other blanket bog species and limited *Sphagnum* and, particularly in the pasture areas in the buffer. The areas were frequently scattered with graminoid species such as common sedge and wavy hairgrass, were grazing activities are converting the habitat to a damp grassland.

The M20 habitats are usually an indicator of degraded blanket bog, where some of the indicator species, e.g. hare's-tail cottongrass, are still present but most of the blanket bog

species and diversity expected in a good condition blanket bog have been lost, e.g. bulky *Sphagnums*. Many of these areas show signs of drying and transitioning towards a drier grassland community due to drainage ditches and non-native conifers.



Photograph 3-15: M19 Area on Cairnoch Hill



Photograph 3-16: M20 Area on Cairnoch Hill

3.4.2 Upland flushes fens and swamps (f2c)

Several flushes were recorded across the Site where small damp or waterlogged patches had a clearly distinctive plant community compared to surrounding habitats (Photograph 3-17). Many of these were recorded as the Sphagnum-dominated M6 (see **Section 3.4.2.1** below), the base-rich M10 (see **Section 3.4.2.2**), or the rush-dominated M23 (Photograph 3-18).



Photograph 3-17: Peaty Flush in Grazed Buffer



Photograph 3-18: M23 Flush in Forest Ride

3.4.2.1 *Carex echinata-Sphagnum recurvum/auriculatum* mire (M6)

The *Carex echinata-Sphagnum recurvum/auriculatum* mire, *Juncus effusus* sub-community (M6c) was recorded as small patches primarily in mosaic with the rushy M23 and the acid grassland U4 habitat. The habitats are damp areas dominated by soft rush over a carpet of *Sphagnum*, usually red bog-moss or flat-topped bog-moss, often with small herbs such as marsh violet and common sorrel. The areas were mostly located in the patches throughout the damp grazed area in the buffer to the east of the Site, with some patches in the peaty forest rides north of Cairnoch Hill (Photograph 3-19).

3.4.2.2 *Carex dioica-Pinguicula vulgaris* mire (M10)

The *Carex dioica-Pinguicula vulgaris* mire was recorded in small patches as target notes within the rushy M23 and the acid grassland U4 habitat in the buffer to the east of the Site. Few of these flushes match the description of M10 habitat well, but have been categorised as M10 due the presence of some species that show slight base enrichment, such as butterwort and small sedge species.

3.4.3 Transition mires and quaking bogs (f2c8)

3.4.3.1 *Carex rostrata-Sphagnum recurvum* mire (M4) and *Carex rostrata-Calliergon cuspidatum/giganteum* mire (M9)

The *Carex rostrata-Sphagnum recurvum* mire and *Carex rostrata-Calliergon cuspidatum/giganteum* mire were recorded in small patches throughout the Site, either as target notes or as small mapped areas. Both NVC communities represent areas where water seeps through the surface slowly, often in damp hollows or adjacent to lakes small burns.

The M4 community is dominated by bottle sedge with a carpet of *Sphagnum*, usually *Sphagnum fallax* and common haircap moss, with few other species in the sward. The *Carex diandra-Calliergon giganteum* sub-community (M9b) is dominated by bottle sedge as in M4, but with no *Sphagnum* and some more nutrient rich plants present because of base-rich water seeping through the deep peat, raising the soil pH (**Photograph 3-20**). Bottle sedge is accompanied by species such as horsetail species, marsh willowherb, marsh marigold and bog stitchwort.



Photograph 3-19: M6c Area in Forest Ride



Photograph 3-20: M9b Mixed with M23b

3.4.4 Aquatic marginal vegetation (f2d)

3.4.4.1 *Phragmites australis* swamp and reed-beds (S4) and *Carex rostrata-Potentilla palustris* tall-herb fen (S27)

Patches of S4 *Phragmites australis* swamp and reed-beds, *Phragmites australis* sub-community (S4a) were recorded on the shores of Carron Valley Reservoir, where the land is regularly inundated (Photograph 3-21). Common reed dominates with little in the understory, though where the community blends into the more species rich S27 community, the common reed is mixed with bottle sedge, marsh cinquefoil, common valerian and soft rush (Photograph 3-22). These communities are typical of regularly inundated loch or reservoir shore habitats and represent the transition land to water.



Photograph 3-21: S4a on the Shore of Carron Valley Reservoir



Photograph 3-22: S4a/S27a Mosaic on the Shore of Carron Valley Reservoir

3.4.5 Other wetland (f2f)

3.4.5.1 *Juncus effusus/acutiflorus-Galium palustre* rush-pasture (M23)

The *Juncus effusus/acutiflorus-Galium palustre* rush-pasture, *Juncus effusus* sub-community (M23b) was found throughout the Site in forest rides, and in the buffer along the edge of Carron Valley Reservoir and in the open pasture. The areas are dominated by soft rush with a variety of damp loving herbs such as marsh marigold, marsh thistle, cuckooflower and marsh horsetail. Sometimes taller grasses and herbs such as rosebay willowherb, wild angelica, and tufted hairgrass are scattered through the sward as the areas are transitioning to neighbouring habitats such as M28, OV27 and MG9. M23 was often found in small patchy mosaics with acid grassland (U4), tall herb habitats (OV27/M28) and the similarly rush dominated habitat M6.

This habitat usually represents a damp and modified habitat, often with low species diversity, however some M23 habitats on-site have some species richness and contribute towards a mosaic of damp, tall-herb habitats, particularly to the south of the Site (**Photograph 3-23**), and some represent small herb rich flushes (**Photograph 3-24**).



Photograph 3-23: M23b with Tall Herbs and Ferns in Forest Ride



Photograph 3-24: M23b Flush in Forest Ride

3.4.5.1 *Molinia caerulea-Potentilla erecta* mire (M25)

The *Molinia caerulea-Potentilla erecta* mire, *Anthoxanthum odoratum* sub-community (M25b) was found in the buffer to the north of the Site, in the open pasture. The habitat is dominated

by purple moor-grass with acid grassland species mixed in from the surrounding habitats such as heath bedstraw and red fescue. The habitat covers some larger areas but is mixed in with the rushy M23 and acid grassland.

3.4.5.2 *Filipendula ulmaria-Angelica sylvestris* mire (M27)

The *Filipendula ulmaria-Angelica sylvestris* mire, *Valeriana officinalis-Rumex acetosa* sub-community (M27a) was recorded in two damp areas in the south of the Site. An area adjacent to the public road was a tall damp sward dominated by meadowsweet with wild angelica, common valerian and sharp-flowered rush.

One area was not dominated by meadowsweet as would be expected in the community, though some meadowsweet was recorded scattered through the sward. The habitat was assigned the M27 NVC community as a best fit due to the high dominance of tall herbs such as wild angelica and common valerian, though there was a high dominance of sharp-flowered rush and the habitat also resembled an M23a (Photograph 3-25). This area formed a waterlogged patchwork of M27 areas and transitional M9 areas dominated by bottle sedge within the plantation in a patch that was too damp for conifers. Patches of bulrush were scattered through in small patches.

3.4.5.3 *Iris pseudacorus-Filipendula ulmaria* mire (M28)

The *Iris pseudacorus-Filipendula ulmaria* mire, *Juncus* spp. sub-community (M28a) was recorded in damp areas dominated by yellow flag iris. One area was adjacent to the private dwelling in the buffer to south of the Site, formed around a small artificial pond mixed in with rushy M23 habitat and the rosebay willowherb dominated OV27. The other area was recorded in a ditch associated with a historic hill fort in the buffer to the west of the Site, mixed with the rushy M23. Yellow flag iris habitats are naturally found in oceanic climates, however the plant is widely domesticated and is often found in damp areas close to habitation.

3.4.5.4 *Equisetum fluviatile* swamp (S10)

A small patch of the *Equisetum fluviatile* swamp, *Equisetum fluviatile* sub-community (S10a) was recorded in the southern corner of the Site close to the graveyard. The area was dominated by water horsetail and was likely waterlogged year-round (Photograph 3-26). Herbs such as marsh bedstraw, cuckooflower and marsh marigold were mixed with through the swamp.



Photograph 3-25: M27a/M9a Area



Photograph 3-26: S10a Swamp

3.5 Sparsely Vegetated Land

3.5.1 Inland rock outcrop and scree habitats (s1a)

Rock and scree was recorded where small rocky outcrops in the grazed buffer area to the north-east and in forest rides. The ground was steep in these areas and was generally surrounded by a dry, grassy habitat.

3.5.2 Other inland rock (s1d)

There were two quarries on Site for sand and gravel. The older quarry (NS 70437 84665), in the east of the Site now contains a number of rare species including shepherd's cress, small cudweed and annual knawel (see Section 4.4), unique to the sparse rocky habitat created by the quarry (Photograph 3-). The quarry in the centre of the Site (NS 69027 85785) has been more recently active and was unvegetated (Photograph 3-).



Photograph 3-27: Quarry in East of Site with Notable Species



Photograph 3-28: Quarry in Centre of Site

3.6 Rivers and Lakes

3.6.1 Standing open water and canals (r1)

Carron Valley Reservoir lies to the south west of the Site. The reservoir was created in 1939 and is approximately 5km in length. The reservoir is stocked with native brown trout *Salmo trutta* and non-native rainbow trout *Oncorhynchus mykiss* for recreational fishing, and borders walking routes for members of the public. There are two adjacent ponds within the Site boundary next to a ruined building (Photograph 3-). The ponds are surrounded by tall vegetation including rushes and tall herbs, the water's edge is dominated by submerged *Sphagnum* species and there are submerged aquatic plants in the deeper parts of the ponds.



Photograph 3-29: Pond

3.6.2 Other rivers and streams (r2b)

All watercourses on-site are classed as non-priority watercourses. These watercourses have extensive modifications, with drainage impacting them along their length. See **Technical Appendix 8.5** for details on the ecology within the watercourses on-site, and **Chapter 10: Hydrology, Hydrogeology, Geology and Soils** for details of the hydrology associated with this watercourse.

3.7 Urban

3.7.1 Buildings (u1b5)

Dwellings were recorded in the buffer of the Site, adjacent to the Site boundary to the south and in the buffer to the north. The dwellings were private residences and were not accessed during habitat surveys.

3.7.2 Other developed land (u1b6)

An area of sealed surface was recorded adjacent to the graveyard where small ruderals such as forget-me-not species and common whitlowgrass are scattered throughout. The area is likely utilised as a car park though appeared unused at the time of survey.

3.7.3 Built linear features (u1e)

Built linear features included fences, walls, tracks and roads. Fences were recorded at the edges of the Site and around grazed fields in the site buffer, walls were recorded on Site along forest rides, these were mostly in poor condition with collapsed sections, and are no longer used to contain livestock. On-site tracks were recorded, allowing access for forestry vehicles across the Site.

4.0 Evaluation of Botanical Interest

The habitats recorded during the field survey can be compared with several classification systems to assess their nature conservation interest and potential groundwater dependency. These classifications include:

- Annex I habitats listed under Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (the Habitats Directive);
- priority habitats detailed within the Scottish Biodiversity List[2] (SBL); and
- potentially groundwater dependant terrestrial ecosystems (GWDTEs) as defined by the SEPA[7,8].

4.1 Annex I Habitats

Annex I habitats are natural habitat types whose conservation requires the designation of Special Areas of Conservation (SAC) and are generally regarded as being of European importance. Not all areas of Annex 1 habitats are designated as SACs yet it is the case that some areas may qualify for designation in future.

Transition Mires and Quaking Bogs are classified as Annex I habitats (H7140). These habitats were recorded across the Site in small patches.

4.2 Scottish Biodiversity List Habitats

The Scottish Biodiversity List (SBL) is a list of animals, plants and habitats which the Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland. The purpose of the list is to identify species and habitats which are the highest priority for conservation in Scotland, of which are termed ‘priority habitats’.

Habitats identified that correspond with SBL priority habitats can be summarised as follows:

- ponds;
- rivers;
- upland calcareous grassland;
- upland heathland;
- wet woodland;
- blanket bog;
- inland rock outcrop and scree habitats;
- upland flushes, fens and swamps; and
- nardus stricta-Galium saxatile grassland (buffer)

4.3 Groundwater Dependant Terrestrial Ecosystems

The potential groundwater dependency of each NVC community as recommended by SEPA guidance[8] identified during the field survey is illustrated on **Figure 8.2.3** and summarised in section 4.4.

Moderate potential GWDTE:

- W6 wet woodland;
- M25, M27 and M28 mires; and

- MG9 and MG10 neutral grassland communities.

High potential GWDTE:

- W4 and W7 wet woodland;
- M6, M9, M10 and M23 mires; and
- CG10 upland grassland.

It must be stressed that NVC survey is only able to identify communities that are potentially groundwater dependant and, in practice, some of the areas shown on **Figure 8.2.1a-y** may not represent GWDTEs. Current SEPA guidance recommends that NVC communities should, however, be treated as GWDTE unless information can be provided to demonstrate that they are not groundwater dependant. If it is not possible to avoid areas of potential GWDTE and the relevant buffer zones within infrastructure design, it is recommended that a hydrogeologist provides further advice on whether or not the relevant NVC communities are, in fact, groundwater dependent and conducts any further assessment that may be required.

4.4 Notable Species

The following notable species were recorded on Site:

- Annual Knawel - GB redlist: Endangered, SBL and locally rare;
- Shepherd's cress - GB redlist: Near threatened, SBL and locally rare;
- Small cudweed – locally scarce; and
- Masterwort – GB redlist: Near threatened and locally rare archaeophyte.

Annual Knawel and small cudweed were recorded in the disused quarry to the east of the Site, shepherd's cress was recorded on the track leading up to the disused quarry (see Section 3.5.2). A quarry can artificially create a unique rocky habitat, that would naturally be found in rare locations on small rocky outcrops of cliffs, and therefore attracts the rare plants that utilise these habitats. Masterwort is an archaeophyte; non-native (alien) taxa that were introduced by humans, and became naturalised in Britain and Ireland between the start of the Neolithic period and AD1500. Masterwort was recorded adjacent to the public footpath beside the graveyard south east of the Site (see Section 3.3.2).

4.5 Invasive Non-Native Species (INNS)

Invasive non-native species (INNS) are species that have been introduced to the UK and have the ability to spread causing damage to the environment, the economy, our health or the way we live. The law on non-native species is covered by the Wildlife and Countryside Act 1981 (as amended), Nature Conservation (Scotland) Act 2004 (as amended) and Wildlife and Natural Environment (Scotland) Act 2012 (as amended). It is and offence to plant, or otherwise cause to grow or spread, a plant in the wild at a location outside its native range.

A single plant of giant hogweed was recorded within the buffer of the Site, close to the Site boundary to the south east, adjacent to the graveyard. Giant hogweed primarily grows on waste ground and waterways and is toxic when in contact with skin.

5.0 Summary

The Site largely comprises non-native conifer plantation, with mostly tall herb or rush dominated habitats in the forest rides. There is an area of degraded blanket bog on top of Cairnoch hill with peaty habitats in some forest rides. Damp areas include neutral swamp habitats, Annex I transition mire habitat and some small patches of wet woodland. The buffer area to the north and east largely comprises grazed acid grassland and damp rush or purple moor-grass dominated areas. In the buffer to the south lies Carron Valley Reservoir and associated water's edge swamps and mires. There are numerous flushes throughout the Site with GWDTE potential, and two adjacent ponds within the Site boundary. There are two quarries within the Site boundary, the quarry to the east of the Site has three notable plant species present. There is a graveyard adjacent to the south eastern border of the Site with one notable plant species and a giant hogweed plant which is an invasive non-native species (INNS).

Figures

Technical Appendix 8.2: UKHab and NVC Habitat Report

Figure 8.2.1 UK Habitat Survey
Figure 8.2.2 NVC Survey Classifications
Figure 8.2.3 Potential GWDTEs

Cairnoch Hill Wind Farm

Eurowind Energy Limited

SLR Project No.: 428.V12085.00001

3 August 2026

268000 269000 270000 271000 272000

687000 686000 685000

N

8.2.1a 8.2.1b 8.2.1c 8.2.1d 8.2.1e 8.2.1f 8.2.1g 8.2.1h 8.2.1i 8.2.1j 8.2.1k 8.2.1l 8.2.1m 8.2.1n 8.2.1o 8.2.1p 8.2.1q 8.2.1r 8.2.1s 8.2.1t 8.2.1u 8.2.1v 8.2.1w 8.2.1x 8.2.1y

T1 T2 T3 T4

Cringate Sheepfold Waterfall Cairn Weir Faster Cringate Burn Cairnoch Hill Craigannet Hill Craigannet Craig Craigannet Easterton Quarry (disused) Haugh Hill Carron Valley Reservoir Duncarron Fort

0 0.25 0.5 1
Kilometres

LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Crane Pad / Hardstanding
- Proposed Substation Compound
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Rivers and Lakes - Rivers and Streams
- r2b - Other Rivers and Streams

Grassland - Acid Grassland
- g1b6 - Other Upland Acid Grassland
- g1c - Bracken

Grassland - Neutral Grassland
- g3c - Other Neutral Grassland
- g3c7 - Deschampsia Neutral Grassland
- g3c8 - Holcus-Juncus Neutral Grassland

Heathland - Dwarf Shrub Heath
- h1b - Upland Heathland

Heathland and Shrub - Dense Scrub
- h3h - Mixed Scrub

Rivers and Lakes - Standing Open Water and Canals
- r1 - Standing Open Water and Canal

Sparsely Vegetated Land - Inland Rock
- s1d - Other Inland Rock and Scree

Urban - Built-up Areas and Gardens
- u1b5 - Building
- u1b6 - Other Developed Land
- u1e - Built Linear Feature

Wetland - Fen Marsh and Swamp
- f1a6 - Degraded Blanket Bog
- f2c - Upland Flushes Fens and Swamps
- f2c8 - Transition Mires and Quaking Bogs; Upland (H7140)
- f2d - Aquatic Marginal Vegetation
- f2f - Other Wetlands

Woodland and Forest - Broadleaved Mixed and Yew Woodland
- w1d - Wet Woodland
- w1g - Other Woodland; Broadleaved
- w1h - Other Woodland; Mixed
- w1h5 - Other Woodland; Mixed; Mainly Broadleaved
- w1h6 - Other Woodland; Mixed; Mainly Conifer

Woodland and Forest - Coniferous Woodland
- w2b - Other Scot's Pine Woodland
- w2c - Other Coniferous Woodland

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CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1a

Scale 1:15,000 @ A3

Date JUNE 2026

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268100 268200 268300 268400 268500 268600 268700 268800 268900

687100 687000 686900 686800 686700

N

g1b6 14 102
r2b 47
g3c 16
u1e
u1e 612
r2b 47
r2b 47
f1a6
w2c 29 212 523
w2c 29 212 523
w1d 14 202 503
w2c 29 212 523
u1e 839
w2c 29 212 523
w2c 29 212 523
w2c 29 212 523

0 50 100 200
Metres

LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed Existing Track to be Upgraded
- Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Rivers and Lakes - Rivers and Streams
- r2b - Other Rivers and Streams

Grassland - Acid Grassland
- g1b6 - Other Upland Acid Grassland

Grassland - Neutral Grassland
- g3c - Other Neutral Grassland

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Wetland - Fen Marsh and Swamp
- f1a6 - Degraded Blanket Bog

Woodland and Forest - Broadleaved Mixed and Yew Woodland
- w1d - Wet Woodland

Woodland and Forest - Coniferous Woodland
- w2c - Other Coniferous Woodland

Secondary Codes:
10 Scattered scrub
12 Scattered bracken
14 Scattered rushes
15 Rushes dominant
16 Tall forbs
29 Plantation
30 Semi-natural woodland
32 Scattered trees
40 Ponds (priority habitat)
45 Reservoir
47 Freshwater – natural
81 Ruderal or ephemeral
84 Wind farm
90 Cemeteries and churchyards
102 Sheep grazed
108 Frequently mown
128 Tall or tussocky sward
201 Young trees – planted
202 Young trees – self-set
206 Felled
207 Forest brash
212 High forest
407 Tall fen
411 Transition fen
503 Wet
504 Waterlogged
509 Acidic substrate
511 Compacted substrate
516 Active Management
522 Native
523 Non-native
532 Scattered grass
612 Fence
800 Road
818 Residential building
825 Ruined building
826 Castle or historic building or monument
828 Vegetated garden
838 Disused quarry
839 Track
853 Mortared wall

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CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1b

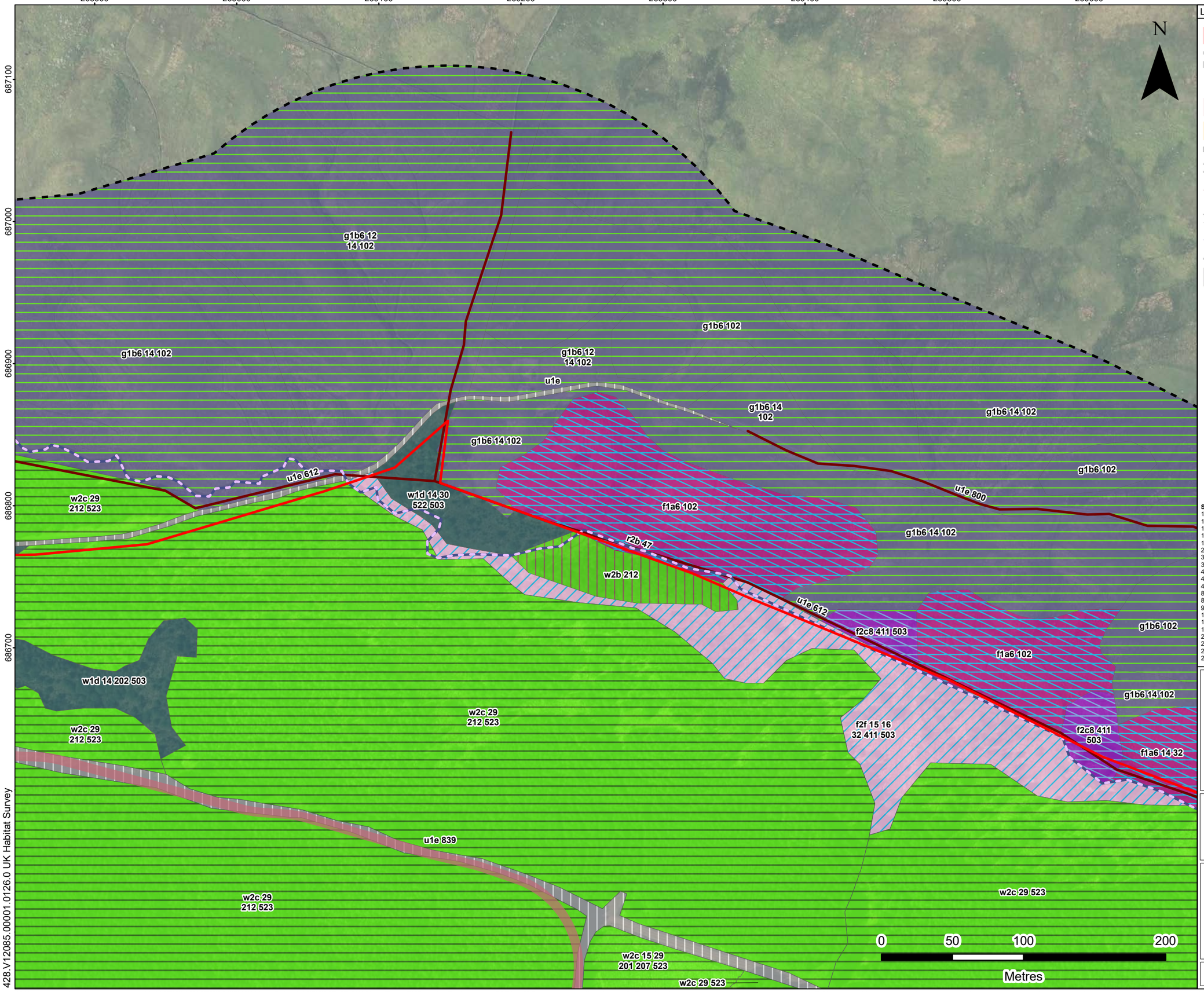
Scale 1:2,500 @ A3

Date JUNE 2026

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LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed Existing Track to be Upgraded
- Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Rivers and Lakes - Rivers and Streams
- r2b - Other Rivers and Streams

Grassland - Acid Grassland
- g1b6 - Other Upland Acid Grassland

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Wetland - Fen Marsh and Swamp
- f1a6 - Degraded Blanket Bog
- f2c8 - Transition Mires and Quaking Bogs; Upland (H7140)
- f2f - Other Wetlands

Woodland and Forest - Broadleaved Mixed and Yew Woodland
- w1d - Wet Woodland

Woodland and Forest - Coniferous Woodland
- w2b - Other Scot's Pine Woodland
- w2c - Other Coniferous Woodland

Secondary Codes:

10 Scattered scrub
12 Scattered bracken
14 Scattered rushes
15 Rushes dominant
16 Tall forbs
29 Plantation
30 Semi-natural woodland
32 Scattered trees
40 Ponds (priority habitat)
45 Reservoir
47 Freshwater – natural
81 Ruderal or ephemeral
84 Wind farm
90 Cemeteries and churchyards
102 Sheep grazed
108 Frequently mown
128 Tall or tussocky sward
201 Young trees – planted
202 Young trees – self-set
206 Felled
207 Forest brash
212 High forest
407 Tall fen
411 Transition fen
503 Wet
504 Waterlogged
509 Acidic substrate
511 Compacted substrate
516 Active Management
522 Native
523 Non-native
532 Scattered grass
612 Fence
800 Road
818 Residential building
825 Ruined building
826 Castle or historic building or monument
828 Vegetated garden
838 Disused quarry
839 Track
853 Mortared wall

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CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1c

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269600 269700 269800 269900 270000 270100 270200 270300

686900 686800 686700 686600 686500

N

g1b6 14 102
g1b6 102
g1b6 14 102
u1e 800
g1b6 102
u1e 68
f1a6 102
g1b6 14 102
u1e 68
f2c8 411 503
g1b6 14 102
f2f 15 16 32 411 503
g1b6 102
f1a6 14 32
r2b 47
f2f 15 102 503
u1e 612
f2f 15 102 503
g1b6 14 32
f1a6 14 32
r2b 47
w2c 29 523
w2c 29 523
w2c 29 523
w1h 30 212
u1b5 818
w2c 29 523
w1h
u1e 839
w2c 15 29 201 207 523
u1e 853
w2c 29 212 523
w2c 29 523
w2c 29 523
g3c 15 32
w2c 29 523

0 50 100 200
Metres

428.V12085.00001.0126.0 UK Habitat Survey

LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Rivers and Lakes - Rivers and Streams
- r2b - Other Rivers and Streams

Grassland - Acid Grassland
- g1b6 - Other Upland Acid Grassland

Grassland - Neutral Grassland
- g3c - Other Neutral Grassland

Urban - Built-up Areas and Gardens
- u1b5 - Building
- u1e - Built Linear Feature

Wetland - Fen Marsh and Swamp
- f1a6 - Degraded Blanket Bog
- f2c8 - Transition Mires and Quaking Bogs; Upland (H7140)
- f2f - Other Wetlands

Woodland and Forest - Broadleaved Mixed and Yew Woodland
- w1h - Other Woodland; Mixed

Woodland and Forest - Coniferous Woodland
- w2c - Other Coniferous Woodland

Secondary Codes:
10 Scattered scrub
12 Scattered bracken
14 Scattered rushes
15 Rushes dominant
16 Tall forbs
29 Plantation
30 Semi-natural woodland
32 Scattered trees
40 Ponds (priority habitat)
45 Reservoir
47 Freshwater – natural
81 Ruderal or ephemeral
84 Wind farm
90 Cemeteries and churchyards
102 Sheep grazed
108 Frequently mown
128 Tall or tussocky sward
201 Young trees – planted
202 Young trees – self-set
206 Felled
207 Forest brash
212 High forest
407 Tall fen
411 Transition fen
503 Wet
504 Waterlogged
509 Acidic substrate
511 Compacted substrate
516 Active Management
522 Native
523 Non-native
532 Scattered grass
612 Fence
800 Road
818 Residential building
825 Ruined building
826 Castle or historic building or monument
828 Vegetated garden
838 Disused quarry
839 Track
853 Mortared wall

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CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1d

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270400 270500 270600 270700 270800 270900 271000 271100

686900 686800 686700 686600 686500

N

u1b5 818
w1h 30 212
g1b6 14 102
g1b6 14 102
g1b6 102
g1b6 102
g1b6 14 102
r2b
g1b6 102
f2f 15
102 503
r2b 47
g1b6 14 102
f2f 15
102 503
u1e 612
w2c 29 523
r2b 47
r2b 47
w2c 29 523
u1e 839
w2c 29
201
523
w2c 29 523

0 50 100 200
Metres

428.V12085.00001.0126.0 UK Habitat Survey

LEGEND

Site Boundary
Site Boundary 250 m Buffer
Proposed Turbine Location
Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens
u1e - Built Linear Feature

Rivers and Lakes - Rivers and Streams
r2b - Other Rivers and Streams

Grassland - Acid Grassland
g1b6 - Other Upland Acid Grassland

Urban - Built-up Areas and Gardens
u1b5 - Building
u1e - Built Linear Feature

Wetland - Fen Marsh and Swamp
f2f - Other Wetlands

Woodland and Forest - Broadleaved Mixed and Yew Woodland
w1h - Other Woodland; Mixed

Woodland and Forest - Coniferous Woodland
w2c - Other Coniferous Woodland

Secondary Codes:
10 Scattered scrub
12 Scattered bracken
14 Scattered rushes
15 Rushes dominant
16 Tall forbs
29 Plantation
30 Semi-natural woodland
32 Scattered trees
40 Ponds (priority habitat)
45 Reservoir
47 Freshwater – natural
81 Ruderal or ephemeral
84 Wind farm
90 Cemeteries and churchyards
102 Sheep grazed
108 Frequently mown
128 Tall or tussocky sward
201 Young trees – planted
202 Young trees – self-set
206 Felled
207 Forest brash
212 High forest
407 Tall fen
411 Transition fen
503 Wet
504 Waterlogged
509 Acidic substrate
511 Compacted substrate
516 Active Management
522 Native
523 Non-native
532 Scattered grass
612 Fence
800 Road
818 Residential building
825 Ruined building
826 Castle or historic building or monument
828 Vegetated garden
838 Disused quarry
839 Track
853 Mortared wall

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CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1e

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271100 271200 271300 271400 271500 271600 271700 271800

686900 686800 686700 686600 686500

N

g1b6 102
g1b6 102
g1b6 14 102
r2b 47
r2b 47
u1e 612
u1e 612
f2f 15 102 503
w2c 29 523
f2f 102
g1b6 102
f2f 102
f2f 15 128 503
f2f 15 102

0 50 100 200
Metres

428.V12085.00001.0126.0 UK Habitat Survey

LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens

- u1e - Built Linear Feature

Rivers and Lakes - Rivers and Streams

- r2b - Other Rivers and Streams

Grassland - Acid Grassland

- g1b6 - Other Upland Acid Grassland

Wetland - Fen Marsh and Swamp

- f2f - Other Wetlands

Woodland and Forest - Coniferous Woodland

- w2c - Other Coniferous Woodland

Secondary Codes:

10 Scattered scrub
12 Scattered bracken
14 Scattered rushes
15 Rushes dominant
16 Tall forbs
29 Plantation
30 Semi-natural woodland
32 Scattered trees
40 Ponds (priority habitat)
45 Reservoir
47 Freshwater – natural
81 Ruderal or ephemeral
84 Wind farm
90 Cemeteries and churchyards
102 Sheep grazed
108 Frequently mown
128 Tall or tussocky sward
201 Young trees – planted
202 Young trees – self-set
206 Felled
207 Forest brash
212 High forest
407 Tall fen
411 Transition fen
503 Wet
504 Waterlogged
509 Acidic substrate
511 Compacted substrate
516 Active Management
522 Native
523 Non-native
532 Scattered grass
612 Fence
800 Road
818 Residential building
825 Ruined building
826 Castle or historic building or monument
828 Vegetated garden
838 Disused quarry
839 Track
853 Mortared wall

Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1f

Scale 1:2,500 @ A3

Date JUNE 2026

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268100 268200 268300 268400 268500 268600 268700 268800

686500 686400 686300 686200 686100

w2c 29
212 523

u1e 839

w2c 29
212 523

w2c 29
212 523

w2c 29
212 523

u1e

w2c 29 206
207 523

w2c 29 201
207 523

f2f
15 503

f2f 14 16
504 826

g3c 826

g1b6
826

g3c 14 16
128 826

f2f 16 128
504 826

g3c 16 32

w2c
29 206
207 523

f2f 15
411
503

w2c 29
212 523

f1a6

207 523

N

LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Blade Laydown Area

Grassland - Acid Grassland

- g1b6 - Other Upland Acid Grassland

Grassland - Neutral Grassland

- g3c - Other Neutral Grassland

Urban - Built-up Areas and Gardens

- u1e - Built Linear Feature

Wetland - Fen Marsh and Swamp

- f1a6 - Degraded Blanket Bog
- f2f - Other Wetlands

Woodland and Forest - Coniferous Woodland

- w2c - Other Coniferous Woodland

Secondary Codes:

10 Scattered scrub
12 Scattered bracken
14 Scattered rushes
15 Rushes dominant
16 Tall forbs
29 Plantation
30 Semi-natural woodland
32 Scattered trees
40 Ponds (priority habitat)
45 Reservoir
47 Freshwater – natural
81 Ruderal or ephemeral
84 Wind farm
90 Cemeteries and churchyards
102 Sheep grazed
108 Frequently mown
128 Tall or tussocky sward
201 Young trees – planted
202 Young trees – self-set
206 Felled
207 Forest brash
212 High forest
407 Tall fen
411 Transition fen
503 Wet
504 Waterlogged
509 Acidic substrate
511 Compacted substrate
516 Active Management
522 Native
523 Non-native
532 Scattered grass
612 Fence
800 Road
818 Residential building
825 Ruined building
826 Castle or historic building or monument
828 Vegetated garden
838 Disused quarry
839 Track
853 Mortared wall

0 50 100 200
Metres

Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1g

Scale 1:2,500 @ A3

Date JUNE 2026

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LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Crane Pad / Hardstanding
- Proposed Borrow Pit
- Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens

- u1e - Built Linear Feature

Grassland - Acid Grassland

- g1b6 - Other Upland Acid Grassland

Grassland - Neutral Grassland

- g3c7 - Deschampsia Neutral Grassland

Sparsely Vegetated Land - Inland Rock

- s1d - Other Inland Rock and Scree

Urban - Built-up Areas and Gardens

- u1e - Built Linear Feature

Wetland - Fen Marsh and Swamp

- f1a6 - Degraded Blanket Bog
- f2c - Upland Flushes Fens and Swamps
- f2f - Other Wetlands

Woodland and Forest - Coniferous Woodland

- w2c - Other Coniferous Woodland

Secondary Codes:

10 Scattered scrub
12 Scattered bracken
14 Scattered rushes
15 Rushes dominant
16 Tall forbs
29 Plantation
30 Semi-natural woodland
32 Scattered trees
40 Ponds (priority habitat)
45 Reservoir
47 Freshwater – natural
81 Ruderal or ephemeral
84 Wind farm
90 Cemeteries and churchyards
102 Sheep grazed
108 Frequently mown
128 Tall or tussocky sward
201 Young trees – planted
202 Young trees – self-set
206 Felled
207 Forest brash
212 High forest
407 Tall fen
411 Transition fen
503 Wet
504 Waterlogged
509 Acidic substrate
511 Compacted substrate
516 Active Management
522 Native
523 Non-native
532 Scattered grass
612 Fence
800 Road
818 Residential building
825 Ruined building
826 Castle or historic building or monument
828 Vegetated garden
838 Disused quarry
839 Track
853 Mortared wall

Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1h

Scale 1:2,500 @ A3

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269400 269500 269600 269700 269800 269900 270000 270100

686300 686200 686100 686000

N

w2c 29 523
w2c 15 29 201 207 523
u1e 839
w1h
r2b 47
w2c 29 212 523
f2f 15 503
g3c 15 32
g3c7
u1e 853
f1a6
f2c 15 503
w2c 14 29 523
f2f 15 32 503
T2
w2c 14 202 523 532
g1b6 14
f1a6 32
w1h6 202 522 523
0 50 100 200
Metres

LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed New Track
- Proposed Crane Pad / Hardstanding
- Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Rivers and Lakes - Rivers and Streams
- r2b - Other Rivers and Streams

Grassland - Acid Grassland
- g1b6 - Other Upland Acid Grassland

Grassland - Neutral Grassland
- g3c - Other Neutral Grassland
- g3c7 - Deschampsia Neutral Grassland

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Wetland - Fen Marsh and Swamp
- f1a6 - Degraded Blanket Bog
- f2c - Upland Flushes Fens and Swamps
- f2f - Other Wetlands

Woodland and Forest - Broadleaved Mixed and Yew Woodland
- w1h - Other Woodland; Mixed
- w1h6 - Other Woodland; Mixed; Mainly Conifer

Woodland and Forest - Coniferous Woodland
- w2c - Other Coniferous Woodland

Secondary Codes:
10 Scattered scrub
12 Scattered bracken
14 Scattered rushes
15 Rushes dominant
16 Tall forbs
29 Plantation
30 Semi-natural woodland
32 Scattered trees
40 Ponds (priority habitat)
45 Reservoir
47 Freshwater – natural
81 Ruderal or ephemeral
84 Wind farm
90 Cemeteries and churchyards
102 Sheep grazed
108 Frequently mown
128 Tall or tussocky sward
201 Young trees – planted
202 Young trees – self-set
206 Felled
207 Forest brash
212 High forest
407 Tall fen
411 Transition fen
503 Wet
504 Waterlogged
509 Acidic substrate
511 Compacted substrate
516 Active Management
522 Native
523 Non-native
532 Scattered grass
612 Fence
800 Road
818 Residential building
825 Ruined building
826 Castle or historic building or monument
828 Vegetated garden
838 Disused quarry
839 Track
853 Mortared wall

Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1i

Scale 1:2,500 @ A3

Date JUNE 2026

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LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed Blade Laydown Area

Primary Habitat Classification

Rivers and Lakes - Rivers and Streams

- r2b - Other Rivers and Streams

Grassland - Neutral Grassland

- g3c - Other Neutral Grassland

Urban - Built-up Areas and Gardens

- u1e - Built Linear Feature

Wetland - Fen Marsh and Swamp

- f1a6 - Degraded Blanket Bog
- f2f - Other Wetlands

Woodland and Forest - Broadleaved Mixed and Yew Woodland

- w1h - Other Woodland; Mixed
- w1h6 - Other Woodland; Mixed; Mainly Conifer

Woodland and Forest - Coniferous Woodland

- w2c - Other Coniferous Woodland

Secondary Codes:

10 Scattered scrub
12 Scattered bracken
14 Scattered rushes
15 Rushes dominant
16 Tall forbs
29 Plantation
30 Semi-natural woodland
32 Scattered trees
40 Ponds (priority habitat)
45 Reservoir
47 Freshwater – natural
81 Ruderal or ephemeral
84 Wind farm
90 Cemeteries and churchyards
102 Sheep grazed
108 Frequently mown
128 Tall or tussocky sward
201 Young trees – planted
202 Young trees – self-set
206 Felled
207 Forest brash
212 High forest
407 Tall fen
411 Transition fen
503 Wet
504 Waterlogged
509 Acidic substrate
511 Compacted substrate
516 Active Management
522 Native
523 Non-native
532 Scattered grass
612 Fence
800 Road
818 Residential building
825 Ruined building
826 Castle or historic building or monument
828 Vegetated garden
838 Disused quarry
839 Track
853 Mortared wall

Eurowind Energy

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CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

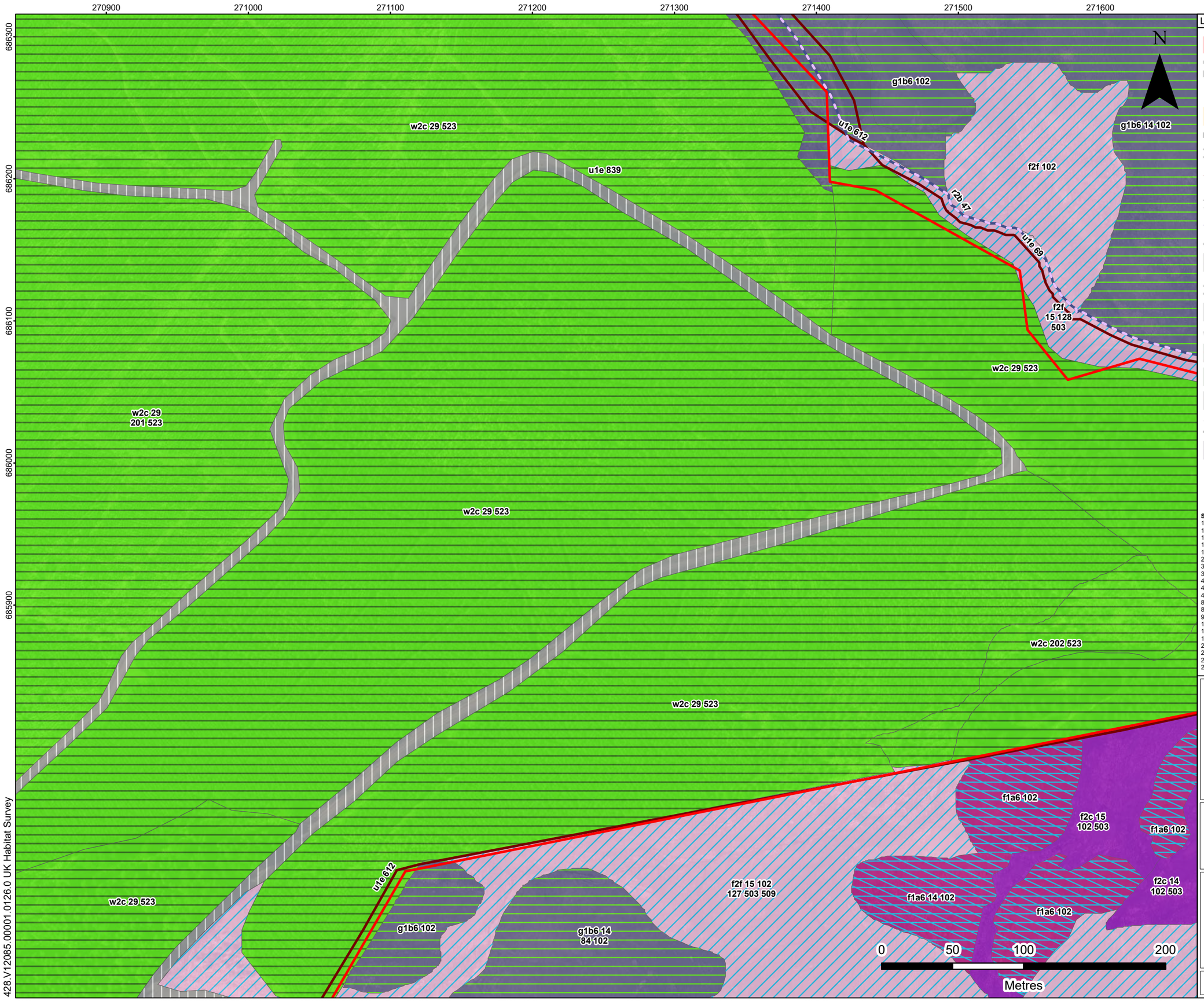
FIGURE 8.2.1j

Scale 1:2,500 @ A3

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LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens

- u1e - Built Linear Feature

Rivers and Lakes - Rivers and Streams

- r2b - Other Rivers and Streams

Grassland - Acid Grassland

- g1b6 - Other Upland Acid Grassland

Urban - Built-up Areas and Gardens

- u1e - Built Linear Feature

Wetland - Fen Marsh and Swamp

- f1a6 - Degraded Blanket Bog
- f2c - Upland Flushes Fens and Swamps
- f2f - Other Wetlands

Woodland and Forest - Coniferous Woodland

- w2c - Other Coniferous Woodland

Secondary Codes:

10 Scattered scrub
12 Scattered bracken
14 Scattered rushes
15 Rushes dominant
16 Tall forbs
29 Plantation
30 Semi-natural woodland
32 Scattered trees
40 Ponds (priority habitat)
45 Reservoir
47 Freshwater – natural
81 Ruderal or ephemeral
84 Wind farm
90 Cemeteries and churchyards
102 Sheep grazed
108 Frequently mown
128 Tall or tussocky sward
201 Young trees – planted
202 Young trees – self-set
206 Felled
207 Forest brash
212 High forest
407 Tall fen
411 Transition fen
503 Wet
504 Waterlogged
509 Acidic substrate
511 Compacted substrate
516 Active Management
522 Native
523 Non-native
532 Scattered grass
612 Fence
800 Road
818 Residential building
825 Ruined building
826 Castle or historic building or monument
828 Vegetated garden
838 Disused quarry
839 Track
853 Mortared wall

Eurowind Energy

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CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1k

Scale 1:2,500 @ A3

Date JUNE 2026

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271600 271700 271800 271900 272000 272100 272200 272300 272400

686400 686300 686200 686100 86000

428.V12085.00001.0126.0 UK Habitat Survey

f2f 102
f2f 102
f2f 15 102
f2f 15 128 503
g1c 102
g1b6 102
f2f 15 102
r2b 47
g1b6 14 102
w2c 29 523
w2c 29 523
g1b6 102
w2c 202 523
u1e 69
u1e 612
f2f 15 102 503
f2f 15 15 102 503
g1b6 14 102
f1a6 102
f2c 15 102 503
f1a6 102
f2c 14 102 503

N

0 50 100 200
Metres

LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens

- u1e - Built Linear Feature

Rivers and Lakes - Rivers and Streams

- r2b - Other Rivers and Streams

Grassland - Acid Grassland

- g1b6 - Other Upland Acid Grassland
- g1c - Bracken

Wetland - Fen Marsh and Swamp

- f1a6 - Degraded Blanket Bog
- f2c - Upland Flushes Fens and Swamps
- f2f - Other Wetlands

Woodland and Forest - Coniferous Woodland

- w2c - Other Coniferous Woodland

Secondary Codes:

10 Scattered scrub
12 Scattered bracken
14 Scattered rushes
15 Rushes dominant
16 Tall forbs
29 Plantation
30 Semi-natural woodland
32 Scattered trees
40 Ponds (priority habitat)
45 Reservoir
47 Freshwater – natural
81 Ruderal or ephemeral
84 Wind farm
90 Cemeteries and churchyards
102 Sheep grazed
108 Frequently mown
128 Tall or tussocky sward
201 Young trees – planted
202 Young trees – self-set
206 Felled
207 Forest brash
212 High forest
407 Tall fen
411 Transition fen
503 Wet
504 Waterlogged
509 Acidic substrate
511 Compacted substrate
516 Active Management
522 Native
523 Non-native
532 Scattered grass
612 Fence
800 Road
818 Residential building
825 Ruined building
826 Castle or historic building or monument
828 Vegetated garden
838 Disused quarry
839 Track
853 Mortared wall

Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1I

Scale 1:2,500 @ A3

Date JUNE 2026

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267800 267900 268000 268100 268200 268300 268400 268500 268600

685900 685800 685700 685600 685500

N

f2f 14 16 504 826
g3c 826
u1e 839
w2c 29 201 207 523
w2c 29 212 523
g1b6 826
f2f 15 503
g3c 14 16 128 826
f2f 16 128 504 826
w2c 29 206 207 523
g3c 16 32
f2f 15 503
f2f 15 411 503
w2c 29 212 523
g3c 16 128
w2c 29 206 207 523
w2c 29 201 207 523
u1e 800
g3c 14 16 32 128 503
w1h5
w2c 29 206 207 523
f2d 14 16 32 407 504
w2c 29 201 207 523
f2d 14 16 32 407 504
r1 45
w1h6 29 522 523
f2f 15 16 32 503
g3c 14 16 32 128 503 532
f2f 15 503
f2f 15 503
w2c 29 523

0 50 100 200
Metres

428.V12085.00001.0126.0 UK Habitat Survey

LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed Existing Track to be Upgraded
- Proposed Blade Laydown Area

Grassland - Acid Grassland
- g1b6 - Other Upland Acid Grassland

Grassland - Neutral Grassland
- g3c - Other Neutral Grassland

Rivers and Lakes - Standing Open Water and Canals
- r1 - Standing Open Water and Canal

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Wetland - Fen Marsh and Swamp
- f2d - Aquatic Marginal Vegetation
- f2f - Other Wetlands

Woodland and Forest - Broadleaved Mixed and Yew Woodland
- w1h5 - Other Woodland; Mixed; Mainly Broadleaved
- w1h6 - Other Woodland; Mixed; Mainly Conifer

Woodland and Forest - Coniferous Woodland
- w2c - Other Coniferous Woodland

Secondary Codes:
10 Scattered scrub
12 Scattered bracken
14 Scattered rushes
15 Rushes dominant
16 Tall forbs
29 Plantation
30 Semi-natural woodland
32 Scattered trees
40 Ponds (priority habitat)
45 Reservoir
47 Freshwater – natural
81 Ruderal or ephemeral
84 Wind farm
90 Cemeteries and churchyards
102 Sheep grazed
108 Frequently mown
128 Tall or tussocky sward
201 Young trees – planted
202 Young trees – self-set
206 Felled
207 Forest brash
212 High forest
407 Tall fen
411 Transition fen
503 Wet
504 Waterlogged
509 Acidic substrate
511 Compacted substrate
516 Active Management
522 Native
523 Non-native
532 Scattered grass
612 Fence
800 Road
818 Residential building
825 Ruined building
826 Castle or historic building or monument
828 Vegetated garden
838 Disused quarry
839 Track
853 Mortared wall

Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1m

Scale 1:2,500 @ A3

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268600 268700 268800 268900 269000 269100 269200 269300 269400

685800 685700 685600 685500

f1a6
w2c 29 212 523
w2c 29 212 523
w2c 29 212 523 523
f2f 15 503
N
s1d 838
w2c 29 523
w2c 29 212 523
w2c 10 202 523
w2c 14 202 523 532
w2c 29 201 207 523
g1b6 14 16
g3c 14 16 32
f2f 15 503
u1e 839
w2c 29 201 207 523
w2c 29 523
f2f 15 16 32 503
f2f 15 503
u1e 853
w2c 29 523
f2f 15 503
w2c 29 523
0 50 100 200
Metres

LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Crane Pad / Hardstanding
- Proposed Borrow Pit
- Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Grassland - Acid Grassland
- g1b6 - Other Upland Acid Grassland

Grassland - Neutral Grassland
- g3c - Other Neutral Grassland

Sparsely Vegetated Land - Inland Rock
- s1d - Other Inland Rock and Scree

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Wetland - Fen Marsh and Swamp
- f1a6 - Degraded Blanket Bog
- f2f - Other Wetlands

Woodland and Forest - Coniferous Woodland
- w2c - Other Coniferous Woodland

Secondary Codes:

10 Scattered scrub
12 Scattered bracken
14 Scattered rushes
15 Rushes dominant
16 Tall forbs
29 Plantation
30 Semi-natural woodland
32 Scattered trees
40 Ponds (priority habitat)
45 Reservoir
47 Freshwater – natural
81 Ruderal or ephemeral
84 Wind farm
90 Cemeteries and churchyards
102 Sheep grazed
108 Frequently mown
128 Tall or tussocky sward
201 Young trees – planted
202 Young trees – self-set
206 Felled
207 Forest brash
212 High forest
407 Tall fen
411 Transition fen
503 Wet
504 Waterlogged
509 Acidic substrate
511 Compacted substrate
516 Active Management
522 Native
523 Non-native
532 Scattered grass
612 Fence
800 Road
818 Residential building
825 Ruined building
826 Castle or historic building or monument
828 Vegetated garden
838 Disused quarry
839 Track
853 Mortared wall

Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1n

Scale 1:2,500 @ A3

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269300 269400 269500 269600 269700 269800 269900 270000 270100

685700 685600 685500 685400 685300

N

w2c 29 523
g1b6 14
u1e 853
w2c 14 202 523 532
f1a6 32
w2c 29 523
w2c 29 201 523
g1b6 14 16
g3c 14 16 32
w2c 29 523
u1e 853
f2f 15 503
w1h6 14 16 201 523
w1h6 14 16 201 523
w2c 29 206 207 523
f2f 15 16 32 503
f2f 15 503
u1e 853
w2c 29 523
w2c 29 206 207 523
w2c 29 523
w2c 29 523
r2b 47
w2c 29 523
f2f 15 16 503
f2f 15 16 503
h1b
w2c 29 523
w2c 29 523
g1b6 14
f2f 14 16 32

0 50 100 200
Metres

428.V12085.00001.0126.0 UK Habitat Survey

LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Crane Pad / Hardstanding
- Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Rivers and Lakes - Rivers and Streams
- r2b - Other Rivers and Streams

Grassland - Acid Grassland
- g1b6 - Other Upland Acid Grassland

Grassland - Neutral Grassland
- g3c - Other Neutral Grassland

Heathland - Dwarf Shrub Heath
- h1b - Upland Heathland

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Wetland - Fen Marsh and Swamp
- f1a6 - Degraded Blanket Bog
- f2f - Other Wetlands

Woodland and Forest - Broadleaved Mixed and Yew Woodland
- w1h6 - Other Woodland; Mixed; Mainly Conifer

Woodland and Forest - Coniferous Woodland
- w2c - Other Coniferous Woodland

Secondary Codes:

10 Scattered scrub
12 Scattered bracken
14 Scattered rushes
15 Rushes dominant
16 Tall forbs
29 Plantation
30 Semi-natural woodland
32 Scattered trees
40 Ponds (priority habitat)
45 Reservoir
47 Freshwater – natural
81 Ruderal or ephemeral
84 Wind farm
90 Cemeteries and churchyards
102 Sheep grazed
108 Frequently mown
128 Tall or tussocky sward
201 Young trees – planted
202 Young trees – self-set
206 Felled
207 Forest brash
212 High forest
407 Tall fen
411 Transition fen
503 Wet
504 Waterlogged
509 Acidic substrate
511 Compacted substrate
516 Active Management
522 Native
523 Non-native
532 Scattered grass
612 Fence
800 Road
818 Residential building
825 Ruined building
826 Castle or historic building or monument
828 Vegetated garden
838 Disused quarry
839 Track
853 Mortared wall

Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1o

Scale 1:2,500 @ A3

Date JUNE 2026

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270100 270200 270300 270400 270500 270600 270700 270800

685600 685500 685400 685300

f1a6 32
w2c 29 201 523
w2c 29 207 523
f2f 15 503
T3
w2c 29 206 207 523
w2c 29 201 523
w2c 29 523
f2f 15 503
u1e 839
T4
g3c 14 16 32
w2c 29 523
r2b 47
w2c 29 206 207 523
w2c 29 523
w2c 29 523
g3c 14 16
w2c 29 523
w2c 29 523
g3c 14 16
w2c 29 523
u1e 612
u1e 68
w1h6 202 522 523
r2b 47
g1b6 14 102 127 509
w2c 29 207 523
w1h6 202 207 503 522 523
w2c 29 523

0 50 100 200
Metres

N

LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Crane Pad / Hardstanding
- Proposed Substation Compound
- Proposed Temporary Construction Compound
- Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Rivers and Lakes - Rivers and Streams
- r2b - Other Rivers and Streams

Grassland - Acid Grassland
- g1b6 - Other Upland Acid Grassland

Grassland - Neutral Grassland
- g3c - Other Neutral Grassland

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Wetland - Fen Marsh and Swamp
- f1a6 - Degraded Blanket Bog
- f2f - Other Wetlands

Woodland and Forest - Broadleaved Mixed and Yew Woodland
- w1h6 - Other Woodland; Mixed; Mainly Conifer

Woodland and Forest - Coniferous Woodland
- w2c - Other Coniferous Woodland

Secondary Codes:
10 Scattered scrub
12 Scattered bracken
14 Scattered rushes
15 Rushes dominant
16 Tall forbs
29 Plantation
30 Semi-natural woodland
32 Scattered trees
40 Ponds (priority habitat)
45 Reservoir
47 Freshwater – natural
81 Ruderal or ephemeral
84 Wind farm
90 Cemeteries and churchyards
102 Sheep grazed
108 Frequently mown
128 Tall or tussocky sward
201 Young trees – planted
202 Young trees – self-set
206 Felled
207 Forest brash
212 High forest
407 Tall fen
411 Transition fen
503 Wet
504 Waterlogged
509 Acidic substrate
511 Compacted substrate
516 Active Management
522 Native
523 Non-native
532 Scattered grass
612 Fence
800 Road
818 Residential building
825 Ruined building
826 Castle or historic building or monument
828 Vegetated garden
838 Disused quarry
839 Track
853 Mortared wall

Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1p

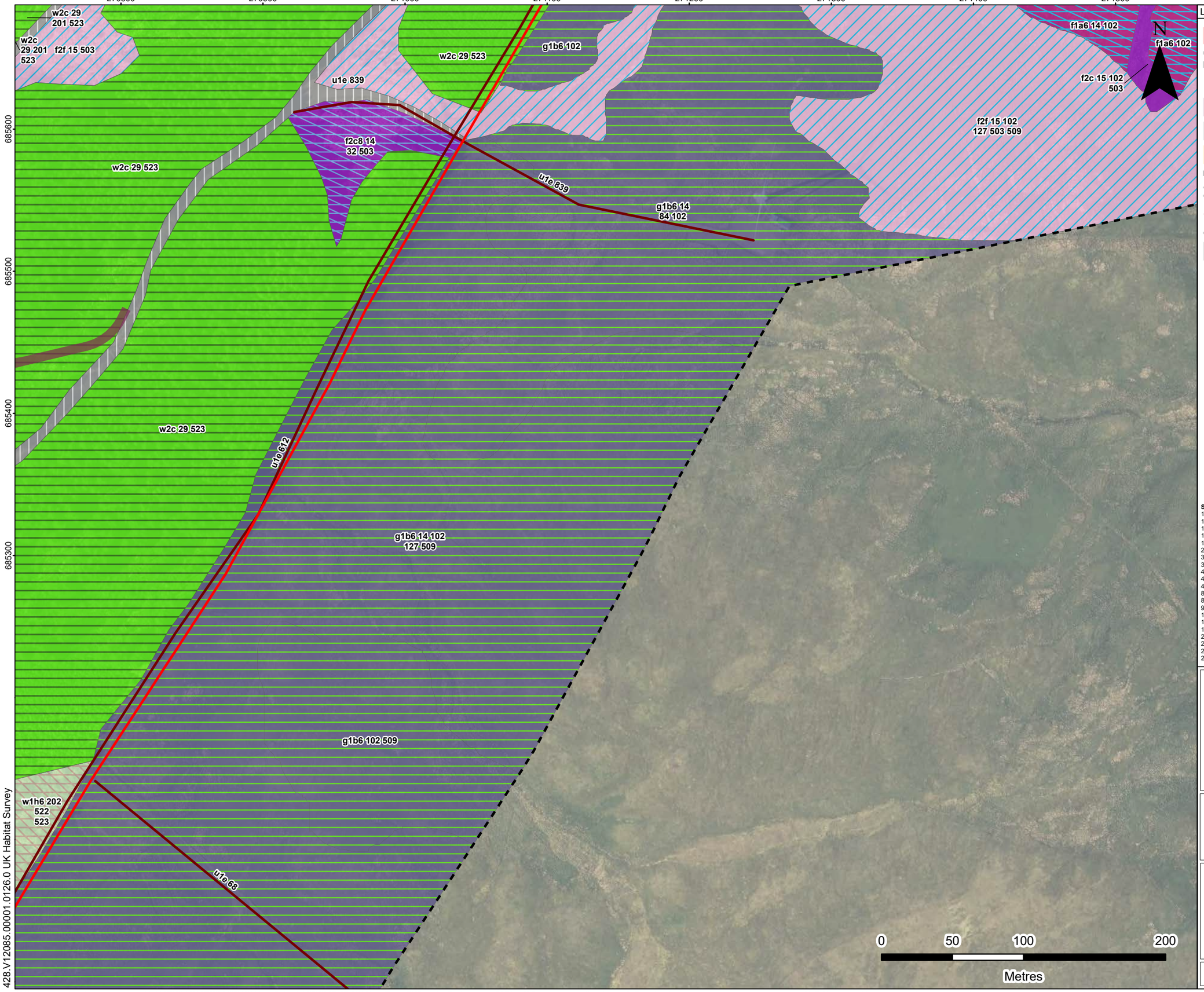
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Date JUNE 2026

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LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed New Track
- Proposed Crane Pad / Hardstanding
- Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens

- u1e - Built Linear Feature

Grassland - Acid Grassland

- g1b6 - Other Upland Acid Grassland

Urban - Built-up Areas and Gardens

- u1e - Built Linear Feature

Wetland - Fen Marsh and Swamp

- f1a6 - Degraded Blanket Bog
- f2c - Upland Flushes Fens and Swamps
- f2c8 - Transition Mires and Quaking Bogs; Upland (H7140)
- f2f - Other Wetlands

Woodland and Forest - Broadleaved Mixed and Yew Woodland

- w1h6 - Other Woodland; Mixed; Mainly Conifer

Woodland and Forest - Coniferous Woodland

- w2c - Other Coniferous Woodland

Secondary Codes:

10 Scattered scrub
12 Scattered bracken
14 Scattered rushes
15 Rushes dominant
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839 Track
853 Mortared wall

Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1q

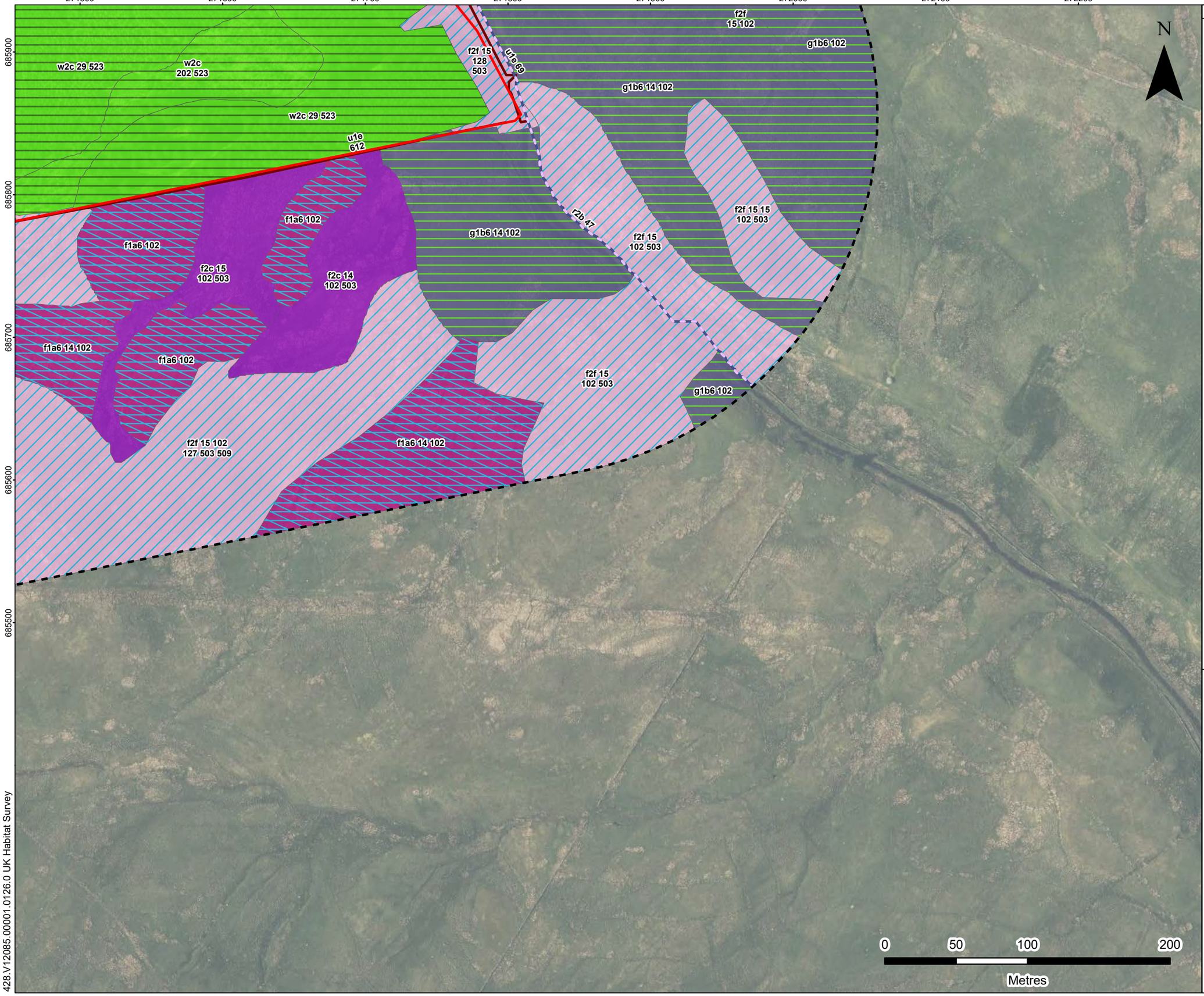
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Date: JUNE 2026

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LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens

- u1e - Built Linear Feature

Rivers and Lakes - Rivers and Streams

- r2b - Other Rivers and Streams

Grassland - Acid Grassland

- g1b6 - Other Upland Acid Grassland

Wetland - Fen Marsh and Swamp

- f1a6 - Degraded Blanket Bog
- f2c - Upland Flushes Fens and Swamps
- f2f - Other Wetlands

Woodland and Forest - Coniferous Woodland

- w2c - Other Coniferous Woodland

Secondary Codes:

10 Scattered scrub
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839 Track
853 Mortared wall

Eurowind Energy

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CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1r

Scale 1:2,500 @ A3

Date JUNE 2026

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LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed Existing Track to be Upgraded
- Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens

- u1e - Built Linear Feature

Grassland - Neutral Grassland

- g3c - Other Neutral Grassland

Rivers and Lakes - Standing Open Water and Canals

- r1 - Standing Open Water and Canal

Urban - Built-up Areas and Gardens

- u1e - Built Linear Feature

Wetland - Fen Marsh and Swamp

- f2f - Other Wetlands

Woodland and Forest - Coniferous Woodland

- w2c - Other Coniferous Woodland

Secondary Codes:

10 Scattered scrub
12 Scattered bracken
14 Scattered rushes
15 Rushes dominant
16 Tall forbs
29 Plantation
30 Semi-natural woodland
32 Scattered trees
40 Ponds (priority habitat)
45 Reservoir
47 Freshwater – natural
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84 Wind farm
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511 Compacted substrate
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523 Non-native
532 Scattered grass
612 Fence
800 Road
818 Residential building
825 Ruined building
826 Castle or historic building or monument
828 Vegetated garden
838 Disused quarry
839 Track
853 Mortared wall

Eurowind Energy

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CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1s

Scale 1:2,500 @ A3

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268900 269000 269100 269200 269300 269400 269500 269600 269700

685200 685100 685000 684900 684800

w2c 29 201 207 523
w2c 29 523
u1e 853
f2f 15 503
w2c 29 523
f2f 15 16 32 503
w2c 29 523
u1e 853
r2b 47
w2c 29 206 207 523
f2f 15 503
u1e 853
h1b
w2c 29 523
f2f 15 16 503
g1b6 14
f2f 15 16 503
w2c 29 523
f2f 15 16 32 504
f2f 14 16 32
w2c 29 523
g3c7 14 16
w2c 29 201 206 207 523
g3c 14 16 32
u1e 853
f2f 15 503
w2c 29 523
r2b 47
w2c 29 523
w2c 29 523
f2f 15 16 32 503
w2c 29 523
g3c 14 16 32
w2c 29 523
g3c 14 16
g3c8 15 16
w1h
f2f 15 16 32 503
w1h6 522 523
f2f 14 16 32 128 503 532
u1e 800
w2c 29 523
g3c 14 16
r1 45
w2c 29 523
w2c 29 523
g3c 14 16 128
f2f 15 16 128 503
g3c 108 516 828
u1e 839
w2c 29 523
w2c 29 523
0 50 100 200
Metres

428.V12085.00001.0126.0 UK Habitat Survey

LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed Existing Track to be Upgraded
- Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Rivers and Lakes - Rivers and Streams
- r2b - Other Rivers and Streams

Grassland - Acid Grassland
- g1b6 - Other Upland Acid Grassland

Grassland - Neutral Grassland
- g3c - Other Neutral Grassland
- g3c7 - Deschampsia Neutral Grassland
- g3c8 - Holcus-Juncus Neutral Grassland

Heathland - Dwarf Shrub Heath
- h1b - Upland Heathland

Rivers and Lakes - Standing Open Water and Canals
- r1 - Standing Open Water and Canal

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Wetland - Fen Marsh and Swamp
- f2f - Other Wetlands

Woodland and Forest - Broadleaved Mixed and Yew Woodland
- w1h - Other Woodland; Mixed
- w1h6 - Other Woodland; Mixed; Mainly Conifer

Woodland and Forest - Coniferous Woodland
- w2c - Other Coniferous Woodland

Secondary Codes:
10 Scattered scrub
12 Scattered bracken
14 Scattered rushes
15 Rushes dominant
16 Tall forbs
29 Plantation
30 Semi-natural woodland
32 Scattered trees
40 Ponds (priority habitat)
45 Reservoir
47 Freshwater – natural
81 Ruderal or ephemeral
84 Wind farm
90 Cemeteries and churchyards
102 Sheep grazed
108 Frequently mown
128 Tall or tussocky sward
201 Young trees – planted
202 Young trees – self-set
206 Felled
207 Forest brash
212 High forest
407 Tall fen
411 Transition fen
503 Wet
504 Waterlogged
509 Acidic substrate
511 Compacted substrate
516 Active Management
522 Native
523 Non-native
532 Scattered grass
612 Fence
800 Road
818 Residential building
825 Ruined building
826 Castle or historic building or monument
828 Vegetated garden
838 Disused quarry
839 Track
853 Mortared wall

Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1t

Scale 1:2,500 @ A3

Date JUNE 2026

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269500 269600 269700 269800 269900 270000 270100 270200 270300

685000 684900 684800 684700 684600

N

h1b
w2c 29 523
g1b6
g3c7 14 16
f2f 15 16 503
f2f 15 503
u1e 853
f2f 15 16 503
g3c 14 16 32
g3c8 15 16
f2f 15 16
g3c 14 16
g3c 16
r1 40
w2c 29 201 523
g3c7 128 503
g3c 14 16 128
g3c 14 16 32 128 825
w2c 29 523
u1e 612
r2b 47
w1h6 202 207 503 522 523
w1d 14
g3c 16 32
w1h6 10 14 202
u1e 839
w2c 29 207 523
w2c 14 202 503 523
w2c 14 102 127 509
14

0 50 100 200
Metres

428.V12085.00001.0126.0 UK Habitat Survey

LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed Existing Track to be Upgraded
- Proposed Temporary Construction Compound
- Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Rivers and Lakes - Rivers and Streams
- r2b - Other Rivers and Streams

Grassland - Acid Grassland
- g1b6 - Other Upland Acid Grassland

Grassland - Neutral Grassland
- g3c - Other Neutral Grassland
- g3c7 - Deschampsia Neutral Grassland
- g3c8 - Holcus-Juncus Neutral Grassland

Heathland - Dwarf Shrub Heath
- h1b - Upland Heathland

Rivers and Lakes - Standing Open Water and Canals
- r1 - Standing Open Water and Canal

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Wetland - Fen Marsh and Swamp
- f2f - Other Wetlands

Woodland and Forest - Broadleaved Mixed and Yew Woodland
- w1d - Wet Woodland
- w1h6 - Other Woodland; Mixed; Mainly Conifer

Woodland and Forest - Coniferous Woodland
- w2c - Other Coniferous Woodland

Secondary Codes:
10 Scattered scrub
12 Scattered bracken
14 Scattered rushes
15 Rushes dominant
16 Tall forbs
29 Plantation
30 Semi-natural woodland
32 Scattered trees
40 Ponds (priority habitat)
45 Reservoir
47 Freshwater – natural
81 Ruderal or ephemeral
84 Wind farm
90 Cemeteries and churchyards
102 Sheep grazed
108 Frequently mown
128 Tall or tussocky sward
201 Young trees – planted
202 Young trees – self-set
206 Felled
207 Forest brash
212 High forest
407 Tall fen
411 Transition fen
503 Wet
504 Waterlogged
509 Acidic substrate
511 Compacted substrate
516 Active Management
522 Native
523 Non-native
532 Scattered grass
612 Fence
800 Road
818 Residential building
825 Ruined building
826 Castle or historic building or monument
828 Vegetated garden
838 Disused quarry
839 Track
853 Mortared wall

Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

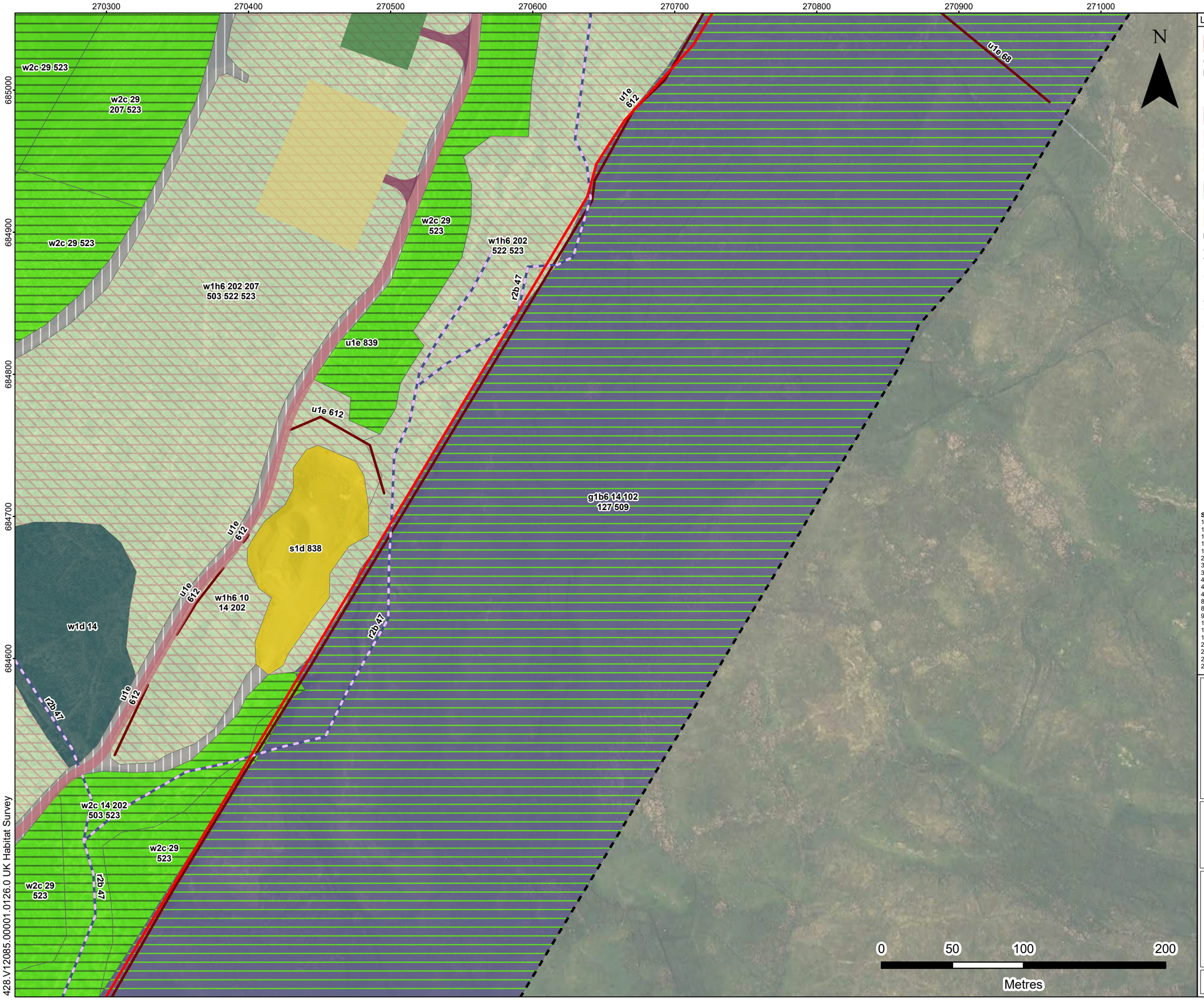
FIGURE 8.2.1u

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LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Substation Compound
- Proposed Temporary Construction Compound
- Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Rivers and Lakes - Rivers and Streams
- r2b - Other Rivers and Streams

Grassland - Acid Grassland
- g1b6 - Other Upland Acid Grassland

Sparsely Vegetated Land - Inland Rock
- s1d - Other Inland Rock and Scree

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Woodland and Forest - Broadleaved Mixed and Yew Woodland
- w1d - Wet Woodland
- w1h6 - Other Woodland; Mixed; Mainly Conifer

Woodland and Forest - Coniferous Woodland
- w2c - Other Coniferous Woodland

Secondary Codes:

10 Scattered scrub
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14 Scattered rushes
15 Rushes dominant
16 Tall forbs
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30 Semi-natural woodland
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128 Tall or tussocky sward
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509 Acidic substrate
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516 Active Management
522 Native
523 Non-native
532 Scattered grass
612 Fence
800 Road
818 Residential building
825 Ruined building
826 Castle or historic building or monument
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838 Disused quarry
839 Track
853 Mortared wall

Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1v

Scale 1:2,500 @ A3

Date JUNE 2026

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LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed Existing Track to be Upgraded
- Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Grassland - Neutral Grassland
- g3c - Other Neutral Grassland
- g3c7 - Deschampsia Neutral Grassland

Rivers and Lakes - Standing Open Water and Canals
- r1 - Standing Open Water and Canal

Urban - Built-up Areas and Gardens
- u1b5 - Building
- u1e - Built Linear Feature

Wetland - Fen Marsh and Swamp
- f2f - Other Wetlands

Woodland and Forest - Broadleaved Mixed and Yew Woodland
- w1h5 - Other Woodland; Mixed; Mainly Broadleaved
- w1h6 - Other Woodland; Mixed; Mainly Conifer

Woodland and Forest - Coniferous Woodland
- w2c - Other Coniferous Woodland

Secondary Codes:
10 Scattered scrub
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Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1w

Scale 1:2,500 @ A3

Date JUNE 2026

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269300 269400 269500 269600 269700 269800 269900 270000

684300 684200 684100 684000

g3c 108
g3c7 128 503
w2c 29 523
g3c 14 16 128
f2f 14 16 32 128 503 532
g3c 108 516
u1e 672
f2f 16 128 504
w2c 29 201 523
g3c 14 16 32 503
g3c7 16 128
w2c 29 523
g3c 14 16 32 128 825
w2c 29 523
u1e 853
w2c 29 523
u1e 853
w2c 29 523
N
w2c 14 202 503 523
u1e 839
w2c 29 523
w1h6 14 202 503 522 523
w2c 29 523
g3c 16
g3c 90 128
w1d 14 503
h3h
w1h 212
u1e 800
r1 45
g3c 14 16 32 128 503
r2b 47
u1b6 81 511 532
g3c 14 16 32 128 503

0 50 100 200
Metres

428.V12085.00001.0126.0 UK Habitat Survey

LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Temporary Construction Compound
- Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Rivers and Lakes - Rivers and Streams
- r2b - Other Rivers and Streams

Grassland - Neutral Grassland
- g3c - Other Neutral Grassland
- g3c7 - Deschampsia Neutral Grassland

Heathland and Shrub - Dense Scrub
- h3h - Mixed Scrub

Rivers and Lakes - Standing Open Water and Canals
- r1 - Standing Open Water and Canal

Urban - Built-up Areas and Gardens
- u1b6 - Other Developed Land
- u1e - Built Linear Feature

Wetland - Fen Marsh and Swamp
- f2f - Other Wetlands

Woodland and Forest - Broadleaved Mixed and Yew Woodland
- w1d - Wet Woodland
- w1h - Other Woodland; Mixed
- w1h6 - Other Woodland; Mixed; Mainly Conifer

Woodland and Forest - Coniferous Woodland
- w2c - Other Coniferous Woodland

Secondary Codes:
10 Scattered scrub
12 Scattered bracken
14 Scattered rushes
15 Rushes dominant
16 Tall forbs
29 Plantation
30 Semi-natural woodland
32 Scattered trees
40 Ponds (priority habitat)
45 Reservoir
47 Freshwater – natural
81 Ruderal or ephemeral
84 Wind farm
90 Cemeteries and churchyards
102 Sheep grazed
108 Frequently mown
128 Tall or tussocky sward
201 Young trees – planted
202 Young trees – self-set
206 Felled
207 Forest brash
212 High forest
407 Tall fen
411 Transition fen
503 Wet
504 Waterlogged
509 Acidic substrate
511 Compacted substrate
516 Active Management
522 Native
523 Non-native
532 Scattered grass
612 Fence
800 Road
818 Residential building
825 Ruined building
826 Castle or historic building or monument
828 Vegetated garden
838 Disused quarry
839 Track
853 Mortared wall

Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1x

Scale 1:2,500 @ A3

Date JUNE 2026

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270000 270100 270200 270300 270400 270500 270600 270700

684400 684300 684200 684100 684000

w2c 29 523
w2c 29 523
w2c 29 523
w2c 14 202 503 523
w2c 29 523
w2c 29 523
r2b 47
u1e 839
w1h6 14 202 503 522 523
w2c 29 523
h3h
f2f
w1d 14 503
g3c 16
g3c 90 128
w1g
u1b6 81 511 532
g3c 10 14 16
u1e 612
w1h 212
u1e 612
u1e 800
g3c 14 16 32 128 503
r2b 47
w1h 212 522 523
w1h6 212 523
g3c 14 16 32 128 503
g3c 14 16 32 128 503
r1 45
g1b6 14 102 127 509

N

0 50 100 200
Metres

LEGEND

- Site Boundary
- Site Boundary 250 m Buffer
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Temporary Construction Compound
- Proposed Blade Laydown Area

Primary Habitat Classification

Urban - Built-up Areas and Gardens
- u1e - Built Linear Feature

Rivers and Lakes - Rivers and Streams
- r2b - Other Rivers and Streams

Grassland - Acid Grassland
- g1b6 - Other Upland Acid Grassland

Grassland - Neutral Grassland
- g3c - Other Neutral Grassland

Heathland and Shrub - Dense Scrub
- h3h - Mixed Scrub

Rivers and Lakes - Standing Open Water and Canals
- r1 - Standing Open Water and Canal

Urban - Built-up Areas and Gardens
- u1b6 - Other Developed Land
- u1e - Built Linear Feature

Wetland - Fen Marsh and Swamp
- f2f - Other Wetlands

Woodland and Forest - Broadleaved Mixed and Yew Woodland
- w1d - Wet Woodland
- w1g - Other Woodland; Broadleaved
- w1h - Other Woodland; Mixed
- w1h6 - Other Woodland; Mixed; Mainly Conifer

Woodland and Forest - Coniferous Woodland
- w2c - Other Coniferous Woodland

Secondary Codes:
10 Scattered scrub
12 Scattered bracken
14 Scattered rushes
15 Rushes dominant
16 Tall forbs
29 Plantation
30 Semi-natural woodland
32 Scattered trees
40 Ponds (priority habitat)
45 Reservoir
47 Freshwater – natural
81 Ruderal or ephemeral
84 Wind farm
90 Cemeteries and churchyards
102 Sheep grazed
108 Frequently mown
128 Tall or tussocky sward
201 Young trees – planted
202 Young trees – self-set
206 Felled
207 Forest brash
212 High forest
407 Tall fen
411 Transition fen
503 Wet
504 Waterlogged
509 Acidic substrate
511 Compacted substrate
516 Active Management
522 Native
523 Non-native
532 Scattered grass
612 Fence
800 Road
818 Residential building
825 Ruined building
826 Castle or historic building or monument
828 Vegetated garden
838 Disused quarry
839 Track
853 Mortared wall

Eurowind Energy

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CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

UK HABITAT SURVEY

FIGURE 8.2.1y

Scale 1:2,500 @ A3

Date JUNE 2026

428.V12085.00001.0126.0 UK Habitat Survey

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268000 269000 270000 271000 272000

687000 686000 685000

N

8.2.2b 8.2.2c 8.2.2d 8.2.2e 8.2.2f 8.2.2g 8.2.2h 8.2.2i

T1 T2 T3 T4

LEGEND

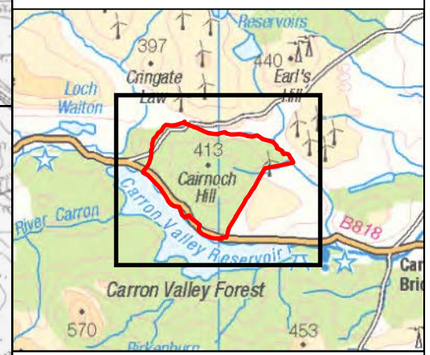
- Site Boundary
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Crane Pad / Hardstanding
- Proposed Substation Compound
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Blade Laydown Area
- Site Boundary 250 m Buffer
- No NVC Classification

NVC Classification

Dominanace is symbolised by either a soild fill or angled lines. The colour of the fill/lines represents NVC Type.

- Solid Fill - Dominant NVC Type
- 45° Lines - 2nd Most Dominant NVC Type
- 135° Lines - 3rd Most Dominant NVC Type

H9b	MG6a/b
M15b	MG9a/b
M19a	OV27a/b/c
M20a/b	S10a
M23b	S27a
M25b	S4a
M27a/b	U20a
M28a/b	U4a/b/c/d/e
M4	U5/U5b
M6c	W10d/W14
M9a/b	W23a
MG10a	W4c/W6a/W7c



0 0.25 0.5 1

Kilometres

Eurowind Energy

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CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

NVC SURVEY

FIGURE 8.2.2a

Scale 1:15,000 @ A3

Date JUNE 2026

428.V12085.00001.0127.0 NVC Survey

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268000 268500 269000 269500

687000 686500

N

U4e 100%
U4e 100%
U4b 100%
U4e 100%
U4e 100%
U4e 80% / M23b 20%
U4e 100%
U4b 100%
W7c 100%
M20b 100%
U4e 100%
M4 100%
M20b 100%
M4 100%
M23b 80% / M4 20%
MG9a 70% / OV27c 30%
W4c 60% / W7c 40%
T1
M23b 50% / M6c 50%
M23b 50% / M6c 50%
MG9a 100%
T2
500 0% / M23b 30%
M20a 100%
M23b 80% / M28a 20%
OV27a 90% / U4b 10%
M23b 100%

0 125 250 500 Metres

LEGEND

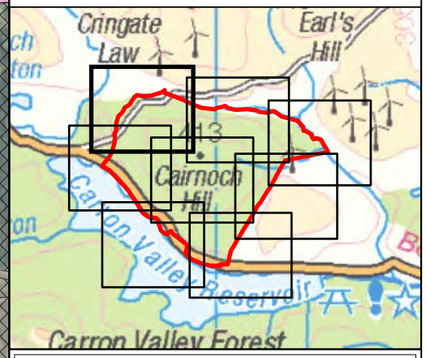
- Site Boundary
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Crane Pad / Hardstanding
- Proposed Borrow Pit
- Proposed Blade Laydown Area
- Site Boundary 250 m Buffer
- No NVC Classification

NVC Classification

Dominanace is symbolised by either a soild fill or angled lines. The colour of the fill/lines represents NVC Type.

- Solid Fill - Dominant NVC Type
- 45° Lines - 2nd Most Dominant NVC Type
- 135° Lines - 3rd Most Dominant NVC Type

H9b	MG6a/b
M15b	MG9a/b
M19a	OV27a/b/c
M20a/b	S10a
M23b	S27a
M25b	S4a
M27a/b	U20a
M28a/b	U4a/b/c/d/e
M4	U5/U5b
M6c	W10d/W14
M9a/b	W23a
MG10a	W4c/W6a/W7c



Eurowind Energy

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CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

NVC SURVEY

FIGURE 8.2.2b

Scale 1:5,000 @ A3

Date JUNE 2026

428.V12085.00001.0127.0 NVC Survey

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270000 270500 271000

687000

686500

N

U4e 100%
U4b 100%
U4e 100%
U4b 100%
M20b 100%
M4 100%
M23b 80% / M4 20%
M20a 100%
U4e 100%
U4e 100%
U5b 100%
U4b 100%
M20a 100%
U4b 100%
U4e 100%
M23b 70% / M25b 30%
M23b 100%
U4e 100%
U4b 100%
U4e 100%
U4b 100%
U4e 100%
U4e 50% / M23b 30% / M25b 20%

MG9a 100%
M19a 70% / M20a 30%
M6c 70% / M23b 30%
T2
M20a 100%
U4e 100%
M23b 60% / M6c 40%
M20a 70% / M19a 15% / U4e 15%
M23b 100%
M23b 70% / M6c 30%

0 125 250 500
Metres

428.V12085.00001.0127.0 NVC Survey

LEGEND

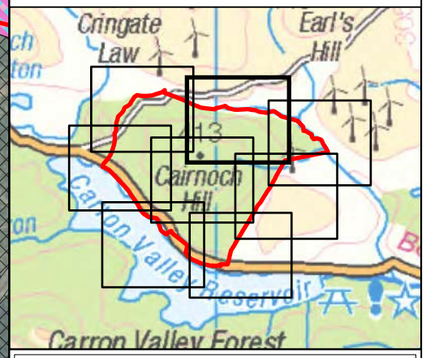
- Site Boundary
- Proposed Turbine Location
- Proposed New Track
- Proposed Crane Pad / Hardstanding
- Proposed Blade Laydown Area
- Site Boundary 250 m Buffer
- No NVC Classification

NVC Classification

Dominanace is symbolised by either a soild fill or angled lines. The colour of the fill/lines represents NVC Type.

- Solid Fill - Dominant NVC Type
- 45° Lines - 2nd Most Dominant NVC Type
- 135° Lines - 3rd Most Dominant NVC Type

H9b	MG6a/b
M15b	MG9a/b
M19a	OV27a/b/c
M20a/b	S10a
M23b	S27a
M25b	S4a
M27a/b	U20a
M28a/b	U4a/b/c/d/e
M4	U5/U5b
M6c	W10d/W14
M9a/b	W23a
MG10a	W4c/W6a/W7c



Eurowind Energy

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CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

NVC SURVEY

FIGURE 8.2.2c

Scale 1:5,000 @ A3

Date JUNE 2026

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271000 271500 272000 272500

686500

686000

U4b 100%
U4b 100%
U4e 100%
U4b 100%
M23b 100%
U4e 50% / M23b 30% / M25b 20%
M25b 100%
U4b 100%
M25b 100%
U20a 100%
M23b 100%
U5b 100%
M23b 100%
U5b 100%
M23b 70% / MG9a 30%
M23b 100%
M6c 100%
M20a 100%
M20a 100%
M6c 100%
U5b 50% / U4d 50%
M20a 100%
M20a 100%
M23b 100%
M23b 100%
U5b 100%
U5b 100%
M23b 70% / M6c 30%
M20a 100%
M4 100%
U4d 80% / U5b 20%
U4e 60% / M23b 30% / M6c 10%

N

0 125 250 500
Metres

LEGEND

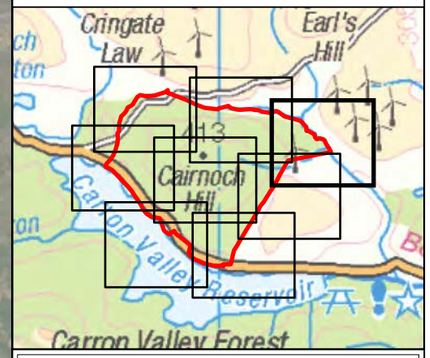
- Site Boundary
- Proposed Turbine Location
- Proposed Blade Laydown Area
- Site Boundary 250 m Buffer
- No NVC Classification

NVC Classification

Dominanace is symbolised by either a soild fill or angled lines. The colour of the fill/lines represents NVC Type.

- Solid Fill - Dominant NVC Type
- 45° Lines - 2nd Most Dominant NVC Type
- 135° Lines - 3rd Most Dominant NVC Type

H9b	MG6a/b
M15b	MG9a/b
M19a	OV27a/b/c
M20a/b	S10a
M23b	S27a
M25b	S4a
M27a/b	U20a
M28a/b	U4a/b/c/d/e
M4	U5/U5b
M6c	W10d/W14
M9a/b	W23a
MG10a	W4c/W6a/W7c



Eurowind Energy

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CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

NVC SURVEY

FIGURE 8.2.2d

Scale 1:5,000 @ A3

Date JUNE 2026

428.V12085.00001.0127.0 NVC Survey

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268000
268500
269000
686000
685500
428.V12085.00001.0127.0 NVC Survey

N

M23b 80% / M28a 20%
U4b 100%
M23b 100%
U4b 100% / M28a 100%
OV27a 90% / U4b 10%
U4b 85% / OV27c 15%
M23b 100%
MG9a 80% / OV27c 20%
OV27b 70% / M23b 30%
S4a 100%
M23b 60% / M9b 40%
S4a 85% / S27a 15%
M23b 100%
M23b 100%
M23b 100%
OV27b 60% / U4b 40%
M23b 50% / MG9a 50%
OV27b 80% / M23b 20%
U4b 80% / M23b 20%
M27a 80% / M9b
OV27b 100%
M23b 50% / M23b 50%
OV27a 50% / M23b 50%

0 125 250 500 Metres

LEGEND

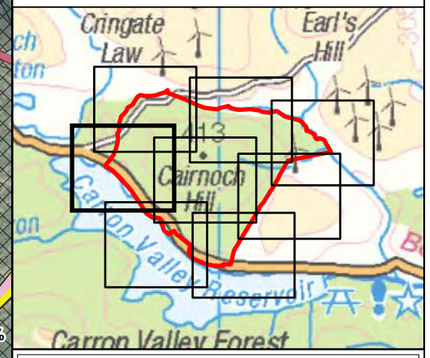
- Site Boundary
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Borrow Pit
- Proposed Blade Laydown Area
- Site Boundary 250 m Buffer
- No NVC Classification

NVC Classification

Dominanace is symbolised by either a soild fill or angled lines. The colour of the fill/lines represents NVC Type.

- Solid Fill - Dominant NVC Type
- 45° Lines - 2nd Most Dominant NVC Type
- 135° Lines - 3rd Most Dominant NVC Type

- H9b
- M15b
- M19a
- M20a/b
- M23b
- M25b
- M27a/b
- M28a/b
- M4
- M6c
- M9a/b
- MG10a
- MG6a/b
- MG9a/b
- OV27a/b/c
- S10a
- S27a
- S4a
- U20a
- U4a/b/c/d/e
- U5/U5b
- W10d/W14
- W23a
- W4c/W6a/W7c



Eurowind Energy

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CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

NVC SURVEY

FIGURE 8.2.2e

Scale 1:5,000 @ A3

Date JUNE 2026

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269000 269500 270000 270500

686000

685500

N

MG9a 100%

M19a 70% / M20a 30%

M23b 50% / M6c 50%

T2

M6c 70% / M23b 30%

M20a 100%

M23b 60% / M6c 40%

M20a 70% / M19a 15% / U4e 15%

U4e 100%

U4a 100%

OV27a 80% / U4b 20%

T3

M23b 50% / MG9a 50%

M23b 65% / OV27a 25% / U4b 10%

M23b 80% / U4b 20%

OV27a 100%

H9b 50% / U4e 50%

U4b 80% / M23b 20%

M23b 60% / OV27b 40%

M27a 80% / M9b 20%

M23b 50% / OV27b 50%

M23b 100%

U4e 100%

OV27b 100%

M23b 50% / OV27b 50%

M23b 100%

U4b 100%

MG9a 100%

M23b 70% / OV27c 30%

M23b 100%

OV27a 50% / M23b 50%

MG10a 100%

M23b 50% / U4b 40% / OV27b 10%

OV27b 60% / MG9a 40%

U4e 60% / M23b 30% / M6c 10%

0 125 250 500

Metres

428.V12085.00001.0127.0 NVC Survey

LEGEND

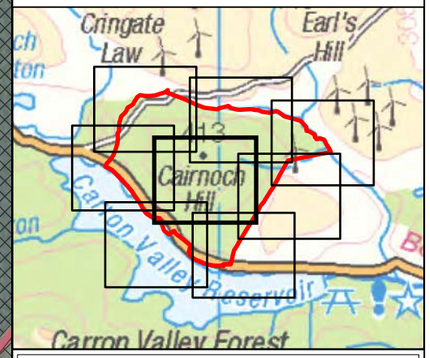
- Site Boundary
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Crane Pad / Hardstanding
- Proposed Substation Compound
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Blade Laydown Area
- Site Boundary 250 m Buffer
- No NVC Classification

NVC Classification

Dominanace is symbolised by either a soild fill or angled lines. The colour of the fill/lines represents NVC Type.

- Solid Fill - Dominant NVC Type
- 45° Lines - 2nd Most Dominant NVC Type
- 135° Lines - 3rd Most Dominant NVC Type

- H9b
- M15b
- M19a
- M20a/b
- M23b
- M25b
- M27a/b
- M28a/b
- M4
- M6c
- M9a/b
- MG10a
- MG6a/b
- MG9a/b
- OV27a/b/c
- S10a
- S27a
- S4a
- U20a
- U4a/b/c/d/e
- U5/U5b
- W10d/W14
- W23a
- W4c/W6a/W7c



Eurowind Energy

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CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

NVC SURVEY

FIGURE 8.2.2f

Scale 1:5,000 @ A3

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270500
271000
271500
685500
685000

M23b 100%
M23b 100%
M23b 100%
M4 100%
U5b 100%
U4d 80% / U5b 20%
M20a 100%
M6c 100%
M20a 100%
M20a 100%
M6c 100%
U5b 50% / U4d 50%
M23b 70% / M6c 30%
M20a 100%
M23b 100%
M23b 100%
U5b 100%
T4
OV27a 100%
U5b 100%
U4e 60% / M23b 30% / M6c 10%

N

0 125 250 500
Metres

LEGEND

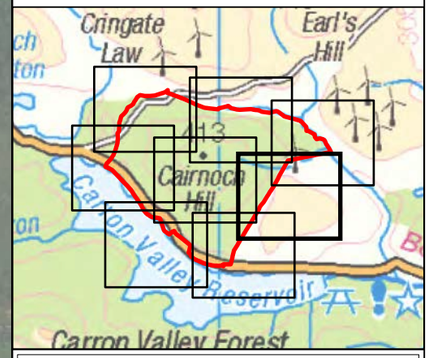
- Site Boundary
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Crane Pad / Hardstanding
- Proposed Substation Compound
- Proposed Temporary Construction Compound
- Proposed Blade Laydown Area
- Site Boundary 250 m Buffer
- No NVC Classification

NVC Classification

Dominanace is symbolised by either a soild fill or angled lines. The colour of the fill/lines represents NVC Type.

- Solid Fill - Dominant NVC Type
- 45° Lines - 2nd Most Dominant NVC Type
- 135° Lines - 3rd Most Dominant NVC Type

- H9b
- M15b
- M19a
- M20a/b
- M23b
- M25b
- M27a/b
- M28a/b
- M4
- M6c
- M9a/b
- MG10a
- MG6a/b
- MG9a/b
- OV27a/b/c
- S10a
- S27a
- S4a
- U20a
- U4a/b/c/d/e
- U5/U5b
- W10d/W14
- W23a
- W4c/W6a/W7c



Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

NVC SURVEY

FIGURE 8.2.2g

Scale 1:5,000 @ A3

Date JUNE 2026

428.V12085.00001.0127.0 NVC Survey

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268500 269000 269500

685000 684500

OV27b 80% / M23b 20%
OV27b 60% / U4b 40%
M27a 80% / M9b 20%
OV27b 100%
U4b 80% / M23b 20%
M23b 50% / OV27b 50%
M23b 60% / OV27b 40%
M23b 100%
MG9a 100%
U4e 100%
M23b 100%
M23b 50% / OV27b 50%
U4b 100%
M23b 70% / OV27c 30%
MG10a 100%
OV27a 50% / M23b 50%
M23b 100%
OV27b 60% / MG9a 40%
MG6a 100%
M23b 75% / OV27b 20% / M28a 5%
MG6a 100%
OV27b 60% / MG9a 40%
M23b 50% / U4b 40% / OV27b 10%
MG6b 100%
MG9a 100%
OV27c 100%
MG6b 100%
OV27b 80% / M23b 20%
M27a 100%
OV27b 60% / M23b 40%
MG9a 80% / OV27b 20%
OV27b 60% / M23b 40%
W14 100%

N

0 125 250 500
Metres

LEGEND

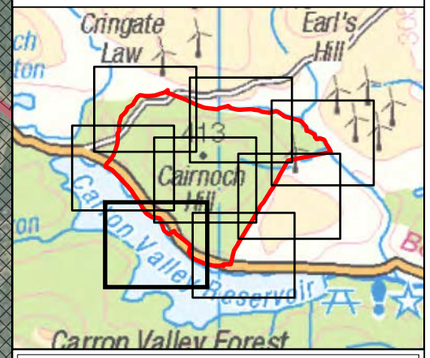
- Site Boundary
- Proposed Turbine Location
- Proposed Existing Track to be Upgraded
- Proposed Blade Laydown Area
- Site Boundary 250 m Buffer
- No NVC Classification

NVC Classification

Dominanace is symbolised by either a soild fill or angled lines. The colour of the fill/lines represents NVC Type.

- Solid Fill - Dominant NVC Type
- 45° Lines - 2nd Most Dominant NVC Type
- 135° Lines - 3rd Most Dominant NVC Type

H9b	MG6a/b
M15b	MG9a/b
M19a	OV27a/b/c
M20a/b	S10a
M23b	S27a
M25b	S4a
M27a/b	U20a
M28a/b	U4a/b/c/d/e
M4	U5/U5b
M6c	W10d/W14
M9a/b	W23a
MG10a	W4c/W6a/W7c



Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

NVC SURVEY

FIGURE 8.2.2h

Scale 1:5,000 @ A3

Date JUNE 2026

428.V12085.00001.0127.0 NVC Survey

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270000
270500
271000
684500
684000

U4b 100%
M23b 100%
M23b 70% / OV27c 30%
MG9a 100%
OV27b 60% / MG9a 40%
OV27b 100%
W6a 100%
OV27c 100%
OV27c 100%
U4e 60% / M23b 30% / M6c 10%
OV27b 60% / M23b 40%
MG9a 80% / OV27b 20%
S10a 50% / M23b 50%
W7c 100%
OV27c 100%
MG6b 100%
W10d 100%
OV27b 60% / M23b 40%
W14 100%
OV27c 70% / M23b 30%
W14 100%
W14 100%
OV27b 50% / M23b 50%
OV27b 60% / M23b 40%

N

0 125 250 500
Metres

LEGEND

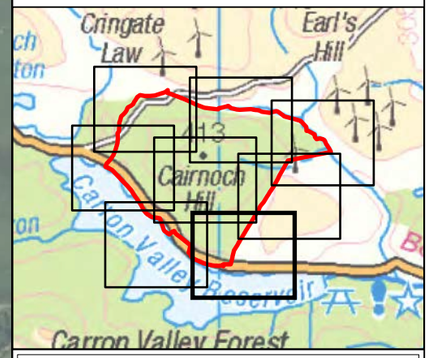
- Site Boundary
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Temporary Construction Compound
- Proposed Blade Laydown Area
- Site Boundary 250 m Buffer
- No NVC Classification

NVC Classification

Dominanace is symbolised by either a soild fill or angled lines. The colour of the fill/lines represents NVC Type.

- Solid Fill - Dominant NVC Type
- 45° Lines - 2nd Most Dominant NVC Type
- 135° Lines - 3rd Most Dominant NVC Type

- H9b
- M15b
- M19a
- M20a/b
- M23b
- M25b
- M27a/b
- M28a/b
- M4
- M6c
- M9a/b
- MG10a
- MG6a/b
- MG9a/b
- OV27a/b/c
- S10a
- S27a
- S4a
- U20a
- U4a/b/c/d/e
- U5/U5b
- W10d/W14
- W23a
- W4c/W6a/W7c



Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

NVC SURVEY

FIGURE 8.2.2i

Scale 1:5,000 @ A3

Date JUNE 2026

428.V12085.00001.0127.0 NVC Survey

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268000 269000 270000 271000 272000

687000 686000 685000

T1 T2 T3 T4

Cringate Cairn Endrick Water Ford Weir Waterfall Spr Sheepfold Faster Cringate CG 87 86 34 Earl's Burn Sluice Wind Fa Quarry (Stone) Sir John de Graham's Castle Motte & Bailey Cairnoch Hill 413 Smallburn B818 Quarry (disused) Haugh Hill Priest's Croft Burial Gd Muir o' Craigannet Hill Craigannet Craig Craigannet Easterton Carron Valley Reservoir Duncarron Fort FB

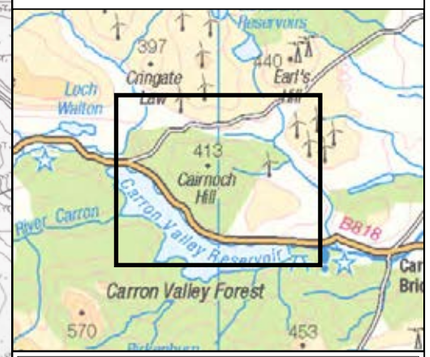
N

LEGEND

- Site Boundary
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Crane Pad / Hardstanding
- Proposed Substation Compound
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Blade Laydown Area
- Site Boundary 250 m Buffer

Potential Groundwater Dependent Terrestrial Ecosystem (GWDTE)

- GWDTE - High Potential



Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.2 - HABITATS

POTENTIAL GWDTES

FIGURE 8.2.3

Scale 1:15,000 @ A3

Date JUNE 2026

0 0.25 0.5 1 Kilometres

428.V12085.00001.0128.0 Potential GWDTEs

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Appendix A Survey Metadata Tables

Technical Appendix 8.2: UKHab and NVC Habitat Report

Cairnoch Hill Wind Farm

Eurowind Energy Limited

SLR Project No.: 428.V12085.00001

3 August 2026

Table A- 1: UKHab Metadata Applied to this Study

Scope and purpose of survey	Baseline habitat survey to inform wind farm design and EIA
Area surveyed	Area surveyed shown on **Figures 8.2.1** and **8.2.2**.
UKHab edition used	Edition 2 (2023) and UK Habitat Classification - Professional Edition
Minimum level of mapping unit (MMU)	400m2, smaller areas of interest have been target noted, locations shown on **Figure 8.2.1**.
Level of UKHab hierarchy used	Up to Level 5 where possible.
List of secondary codes used	10 – Scattered scrub 12 – Scattered bracken 14 – Scattered rushes 15 – Rushes dominant 16 – Tall forbs 29 – Plantation 30 – Semi-natural woodland 32 – Scattered trees 40 – Ponds (priority habitat) 45 – Reservoir 47 – Freshwater – natural 81 – Ruderal or ephemeral 84 – Wind Farm 90 – Cemeteries and churchyards 102 – Sheep grazed 108 – Frequently mown 127 – Sward type mosaic 128 – Tall or tussocky sward 201 – Young trees – planted 202 – Young trees – self-set 206 – Felled 207 – Forest brash 212 – High forest 407 – Tall fen 411 – Transition fen 503 – Wet 504 – Waterlogged 509 – Acidic substrate 511 – Compacted substrate 516 – Active management 522 – Native 523 – Non-native 532 – Scattered grass 612 – Fence 800 – Road 818 – Residential building

<table>
<tr><th>Scope and purpose of survey</th><th>Baseline habitat survey to inform wind farm design and EIA</th></tr>
<tr><td></td><td>825 – Ruined building
826 – Castle or historic building or monument
828 – Vegetated garden
838 – Disused quarry
839 – Track
853 – Mortared wall</td></tr>
<tr><td>Additional attributes recorded</td><td>Target notes provided in Table B- 2: Scientific Names Noted in this Report Not Recorded on Cairnoch Hill Wind Farm
<table>
<tr><th>Taxon Group</th><th>Scientific Name</th><th>Common Name</th></tr>
<tr><td>Herb</td><td>Cirsium arvense</td><td>Creeping thistle</td></tr>
<tr><td>Herb</td><td>Epilobium angustifolium</td><td>Rosebay willowherb</td></tr>
<tr><td>Herb</td><td>Erica tetralix</td><td>Cross-leaved heather</td></tr>
<tr><td>Herb</td><td>Filago minima</td><td>Small cudweed</td></tr>
<tr><td>Herb</td><td>Lysimachia nemorum</td><td>Yellow pimpernel</td></tr>
<tr><td>Herb</td><td>Thymus praecox</td><td>Wild thyme</td></tr>
<tr><td>Tree/shrub</td><td>Fraxinus excelsior</td><td>Ash</td></tr>
<tr><td>Tree/shrub</td><td>Quercus robur</td><td>Common oak</td></tr>
<tr><td>Tree/shrub</td><td>Rubus fruticosus agg.</td><td>Bramble</td></tr>
<tr><td>Grass</td><td>Agrostis canina</td><td>Velvet bent</td></tr>
<tr><td>Grass</td><td>Agrostis capillaris</td><td>Common bent</td></tr>
<tr><td>Grass</td><td>Cynosurus cristatus</td><td>Crested dogstail</td></tr>
<tr><td>Grass</td><td>Deschampsia flexuosa</td><td>Wavy hair-grass</td></tr>
<tr><td>Grass</td><td>Molinia caerulea</td><td>Purple moor-grass</td></tr>
<tr><td>Sedge</td><td>Carex dioica</td><td>Dioecious sedge</td></tr>
<tr><td>Rush</td><td>Juncus acutiflorus</td><td>Sharp-flowered rush</td></tr>
<tr><td>Rush</td><td>Luzula multiflora</td><td>Heath woodrush</td></tr>
<tr><td>Moss</td><td>Calliergon giganteum</td><td>Giant spearmoss</td></tr>
<tr><td>Moss</td><td>Campylium stellatum</td><td>Yellow starry feather-moss</td></tr>
<tr><td>Moss</td><td>Rhytidiadelphus loreus</td><td>Little shaggy moss</td></tr>
<tr><td>Moss</td><td>Scorpidium scorpioides</td><td>Hooked scorpion-moss</td></tr>
<tr><td>Moss</td><td>Sphagnum auriculatum</td><td>Cow-horn bog-moss</td></tr>
<tr><td>Moss</td><td>Sphagnum recurvum</td><td>Flat-topped bog-moss</td></tr>
</table>
, Appendix B.</td></tr>
<tr><td>Map projection and units</td><td>OSGB84</td></tr>
<tr><td>Year of survey</td><td>2024</td></tr>
<tr><td>Organisation and individual undertaking survey</td><td>SLR Consulting Ltd, Kirstie Hazelwood– Senior Ecologist</td></tr>
<tr><td>References for existing data sets that have been used</td><td>None</td></tr>
</table>

Table A- 2: DOMIN Scale

DOMIN Scale	Cover
10	91-100%
9	76-90%
8	51-75%
7	34 – 50%
6	26 – 33%
5	11 – 25%
4	4 – 10%
3	Many individuals
2	Several individuals
1	Few individuals

Appendix B Survey Results Tables

Technical Appendix 8.2: UKHab and NVC Habitat Report

Cairnoch Hill Wind Farm

Eurowind Energy Limited

SLR Project No.: 428.V12085.00001

3 August 2026

Table B- 1: Species Recorded on Cairnoch Hill Wind farm

Taxon Group	Scientific Name	Common Name	Status
Herb	*Achillea ptarmica*	Sneezewort	
Herb	*Aegopodium podagraria*	Ground elder	
Herb	*Ajuga reptans*	Bugle	
Herb	*Angelica sylvestris*	Wild angelica	
Herb	*Anthriscus sylvestris*	Cow parsley	
Herb	*Bellis perennis*	Daisy	
Herb	*Calluna vulgaris*	Heather	
Herb	*Caltha palustris*	Marsh marigold	
Herb	*Cardamine pratensis*	Cuckooflower	
Herb	*Cerastium fontanum*	Common mouse-ear	
Herb	*Chamaenerion angustifolium*	Rosebay willowherb	
Herb	*Chrysosplenium oppositifolium*	Opposite-leaved golden-saxifrage	
Herb	*Cirsium palustre*	Marsh thistle	
Herb	*Cirsium sp.*	Thistle sp.	
Herb	*Conopodium majus*	Pignut	
Herb	*Digitalis purpurea*	Foxglove	
Herb	*Epilobium palustre*	Marsh willowherb	
Herb	*Epilobium sp.*	Willowherb species	
Herb	*Erophila verna*	Common whitlowgrass	
Herb	*Filipendula ulmaria*	Meadowsweet	
Herb	*Galium palustre*	Marsh bedstraw	
Herb	*Galium saxatile*	Heath bedstraw	
Herb	*Heracleum mantegazzianum*	Giant hogweed	INNS
Herb	*Imperatoria ostruthium*	Masterwort	GB redlist: Near threatened Locally rare archaeophyte
Herb	*Iris pseudacorus*	Yellow iris	
Herb	*Lathyrus pratensis*	Meadow vetchling	
Herb	*Logfia minima*	Small cudweed	Locally scarce
Herb	*Lotus corniculatus*	Birds-foot trefoil	
Herb	*Myosotis secunda*	Creeping forget-me-not	
Herb	*Myosotis sp.*	Forget-me-not species	
Herb	*Orchis mascula*	Early purple orchid	
Herb	*Pinguicula vulgaris*	Common butterwort	
Herb	*Potentilla erecta*	Tormentil	
Herb	*Potentilla palustris*	Marsh cinquefoil	
Herb	*Ranunculus acris*	Meadow buttercup	
Herb	*Ranunculus repens*	Creeping buttercup	
Herb	*Rumex acetosa*	Common sorrel	
Herb	*Scleranthus annuus*	Annual Knawel	GB redlist: Endangered SBL Locally rare

Taxon Group	Scientific Name	Common Name	Status
Herb	*Stellaria alsine*	Bog stitchwort	
Herb	*Teesdalia nudicaulis*	Shepherd's Cress	GB redlist: Near threatened, SBL, locally rare
Herb	*Thymus polytrichus*	Wild thyme	
Herb	*Trifolium repens*	White clover	
Herb	*Urtica dioica*	Common nettle	
Herb	*Vaccinium myrtillus*	Blaeberry	
Herb	*Valeriana officinalis*	Common valerian	
Herb	*Veronica chamaedrys*	Germander speedwell	
Herb	*Veronica serpyllifolia*	Thyme-leaved speedwell	
Herb	*Viola palustris*	Marsh violet	
Tree/shrub	*Alnus glutinosa*	Black alder	
Tree/shrub	*Betula pubescens*	Downy birch	
Tree/shrub	*Fagus sylvatica*	Beech	
Tree/shrub	*Larix decidua*	European larch	
Tree/shrub	*Picea abies*	Norway spruce	
Tree/shrub	*Picea sitchensis*	Sitka spruce	
Tree/shrub	*Pinus contorta*	Lodgepole pine	
Tree/shrub	*Pinus sylvestris*	Scot's pine	
Tree/shrub	*Rubus idaeus*	Raspberry	
Tree/shrub	*Salix sp.*	Willow species	
Grass	*Agrostis stolonifera*	Creeping bent	
Grass	*Alopecurus pratensis*	Meadow foxtail	
Grass	*Anthoxanthum odoratum*	Sweet vernal-grass	
Grass	*Avenella flexuosa*	Wavy hair-grass	
Grass	*Deschampsia cespitosa*	Tufted hairgrass	
Grass	*Festuca ovina*	Sheep's fescue	
Grass	*Festuca rubra*	Red fescue	
Grass	*Holcus lanatus*	Yorkshire fog	
Grass	*Holcus mollis*	Creeping soft-grass	
Grass	*Lolium perenne*	Perennial ryegrass	
Grass	*Nardus stricta*	Mat-grass	
Grass	*Phragmites australis*	Common reed	
Grass	*Poa pratensis*	Smooth meadow-grass	
Grass	*Poa trivialis*	Rough meadow-grass	
Sedge	*Carex binervis*	Green-ribbed sedge	
Sedge	*Carex canescens*	White sedge	
Sedge	*Carex echinata*	Star sedge	
Sedge	*Carex nigra*	Common sedge	
Sedge	*Carex rostrata*	Bottle sedge	
Sedge	*Eriophorum vaginatum*	Hare's-tail cottongrass	
Rush	*Juncus acutiflorus x articulatus*	Sharp-flowered rush x jointed rush	

Taxon Group	Scientific Name	Common Name	Status
Rush	*Juncus effusus*	Soft rush	
Rush	*Juncus squarrosus*	Heath rush	
Rush	*Luzula campestris*	Field woodrush	
Cattail	*Typha latifolia*	Great reed mace	
Fern	*Dryopteris dilatata*	Broad buckler-fern	
Fern	*Dryopteris filix-mas*	Male-fern	
Fern	*Fern sp.*	Fern species	
Fern	*Pteridium aquilinum*	Bracken	
Horsetail	*Equisetum fluviatile*	Water horsetail	
Horsetail	*Equisetum palustre*	Marsh horsetail	
Horsetail	*Equisetum sp.*	Horsetail species	
Moss	*Calliergonella cuspidata*	Pointed spear-moss	
Moss	*Hylocomium splendens*	Glittering woodmoss	
Moss	*Hypnum jutlandicum*	Heath plait-moss	
Moss	*Pleurozium schreberi*	Red-stemmed feathermoss	
Moss	*Polytrichum commune*	Common haircap	
Moss	*Rhytidiadelphis triquetrus*	Big shaggy moss	
Moss	*Rhytidiadelphus squarrosus*	Springy turf-moss	
Moss	*Sphagnum capillifolium*	Red bog-moss	
Moss	*Sphagnum fallax*	Flat-topped bog-moss	
Moss	*Thuidium tamariscinum*	Common tamarisk-moss	
Lichen	*Cladonia sp.*	Cladonia sp.	

Table B- 2: Scientific Names Noted in this Report Not Recorded on Cairnoch Hill Wind Farm

Taxon Group	Scientific Name	Common Name
Herb	*Cirsium arvense*	Creeping thistle
Herb	*Epilobium angustifolium*	Rosebay willowherb
Herb	*Erica tetralix*	Cross-leaved heather
Herb	*Filago minima*	Small cudweed
Herb	*Lysimachia nemorum*	Yellow pimpernel
Herb	*Thymus praecox*	Wild thyme
Tree/shrub	*Fraxinus excelsior*	Ash
Tree/shrub	*Quercus robur*	Common oak
Tree/shrub	*Rubus fruticosus agg.*	Bramble
Grass	*Agrostis canina*	Velvet bent
Grass	*Agrostis capillaris*	Common bent
Grass	*Cynosurus cristatus*	Crested dogstail
Grass	*Deschampsia flexuosa*	Wavy hair-grass
Grass	*Molinia caerulea*	Purple moor-grass
Sedge	*Carex dioica*	Dioecious sedge
Rush	*Juncus acutiflorus*	Sharp-flowered rush
Rush	*Luzula multiflora*	Heath woodrush
Moss	*Calliergon giganteum*	Giant spearmoss
Moss	*Campylium stellatum*	Yellow starry feather-moss
Moss	*Rhytidiadelphus loreus*	Little shaggy moss
Moss	*Scorpidium scorpioides*	Hooked scorpion-moss
Moss	*Sphagnum auriculatum*	Cow-horn bog-moss
Moss	*Sphagnum recurvum*	Flat-topped bog-moss

Table B- 3: Target Notes

Target Note ID	Note	Category
4	Historical site - hill fort	Ruined/Historic building
5	UKHab: f2c8. Patch M4 transition mire	Habitat Feature
7	Mixed conifer regen and self-set willows	Habitat Feature
8	Patch of young planted birch	Habitat Feature
9	UKHab: f2c. M23 Flush	GWDTE - High potential
10	UKHab: s1a. Rocky outcrop	Habitat Feature
11	UKHab: f2c. M23 Flushes along forest edge	GWDTE - High potential
12	UKHab: f2c. M23 Flush	GWDTE - High potential
14	UKHab: f2c. M23 Flush	GWDTE - High potential
15	UKHab: f2c. M23 Flush	GWDTE - High potential
16	UKHab: f2c. M6 Flush	GWDTE - High potential
17	UKHab: f2c. M23 Flush	GWDTE - High potential
18	Ruined building	Ruined/Historic building

Target Note ID	Note	Category
19	UKHab: f2c. M23 Flush	GWDTE - High potential
20	UKHab: s1a. Rocky outcrop	Habitat Feature
21	Line of willows down forest ride	Habitat Feature
22	UKHab: f2c8. Patch M9 transition mire	GWDTE - High potential
23	UKHab: f2c8. Patch M9 transition mire	GWDTE - High potential
24	Masterwort (*Imperatoria ostruthium*) Locally rare archaeophyte	Species of Interest
25	UKHab: f2c. M23 Flush	GWDTE - High potential
27	Giant hogweed (*Heracleum mantegazzianum*) INNS Schedule 9	Species of Interest
28	Shepherds cress (*Teesdalia nudicaulis*) GB redlist: NT, SBL, Locally rare	Species of Interest
29	Annual knawel (*Scleranthus annuus*) GB redlist: EN, SBL, Locally rare	Species of Interest
30	Small cudweed (*Logfia minima*) Locally scarce	Species of Interest
31	UKHab: f2c. Flush	GWDTE - High potential
32	UKHab: f2c. Flush	GWDTE - High potential
33	UKHab: f2c8. Patch M9 transition mire amongst Juncus effusus	GWDTE - High potential
34	UKHab: f2c. M10 Flush	GWDTE - High potential
35	UKHab: f2c. M6 Flush . Carpet of S.capp and S.subnitens.	GWDTE - High potential
36	UKHab: f2c. M6 Flush . Carpet of S.fallax.	GWDTE - High potential
37	UKHab: f2c8. Patch M4 transition mire	Habitat Feature
38	UKHab: s1a. Rocky outcrop	Habitat Feature
39	UKHab: f2c. Grassy flush with Pinguicula vulgaris	GWDTE - High potential
40	UKHab: g2b. CG10 patch on rocky outcrops	Habitat Feature
41	UKHab: s1a. Rocky outcrop	Habitat Feature

Table B- 4: NVC Quadrat Sample

No.	NVC	UKHab	Location	Scientific Name	Common Name	DOMIN
1	M9	f2c8	NS 70984 85573	*Carex rostrata*	Bottle sedge	8
1	M9	f2c8	NS 70984 85573	*Cardamine pratensis*	Cuckooflower	4
1	M9	f2c8	NS 70984 85573	*Equisetum* sp.	Horsetail species	6
1	M9	f2c8	NS 70984 85573	*Epilobium palustre*	Marsh willowherb	4
1	M9	f2c8	NS 70984 85573	*Ranunculus repens*	Creeping buttercup	4
1	M9	f2c8	NS 70984 85573	*Rumex acetosa*	Common sorrel	3
1	M9	f2c8	NS 70984 85573	*Galium palustre*	Marsh bedstraw	1

No.	NVC	UKHab	Location	Scientific Name	Common Name	DOMIN
1	M9	f2c8	NS 70984 85573	*Cirsium palustre*	Marsh thistle	2
1	M9	f2c8	NS 70984 85573	*Juncus effusus*	Soft rush	4
2	NA	w1h6	NS 70522 84960	*Salix* sp.	Willow species	7
2	NA	w1h6	NS 70522 84960	*Betula pubescens*	Downy birch	5
2	NA	w1h6	NS 70522 84960	*Picea abies*	Norway spruce	7
2	NA	w1h6	NS 70522 84960	*Chamaenerion angustifolium*	Rosebay willowherb	6
2	NA	w1h6	NS 70522 84960	*Juncus effusus*	Soft rush	7
2	NA	w1h6	NS 70522 84960	*Rubus idaeus*	Raspberry	4
2	NA	w1h6	NS 70522 84960	Brash	Brash	4
2	NA	w1h6	NS 70522 84960	*Ajuga reptans*	Bugle	1
2	NA	w1h6	NS 70522 84960	*Cirsium* sp.	Thistle sp.	1
2	NA	w1h6	NS 70522 84960	*Sphagnum fallax*	Flat-topped bog-moss	4
2	NA	w1h6	NS 70522 84960	*Rhytidiadelphus squarrosus*	Springy turf-moss	6
2	NA	w1h6	NS 70522 84960	*Deschampsia cespitosa*	Tufted hairgrass	5
3	W6	w1d	NS 70287 84541	*Salix* sp.	Willow species	7
3	W6	w1d	NS 70287 84541	*Betula pubescens*	Downy birch	6
3	W6	w1d	NS 70287 84541	*Alnus glutinosa*	Black alder	5
3	W6	w1d	NS 70287 84541	*Chamaenerion angustifolium*	Rosebay willowherb	8
3	W6	w1d	NS 70287 84541	*Juncus effusus*	Soft rush	2
3	W6	w1d	NS 70287 84541	*Cirsium palustre*	Marsh thistle	2
3	W6	w1d	NS 70287 84541	*Digitalis purpurea*	Foxglove	2
3	W6	w1d	NS 70287 84541	*Galium saxatile*	Heath bedstraw	3
3	W6	w1d	NS 70287 84541	*Pleurocarp mosses*	Pleurocarp mosses	8
4	U4a	g1b6	NS 69356 85540	*Festuca rubra* agg.	Red fescue	6

No.	NVC	UKHab	Location	Scientific Name	Common Name	DOMIN
4	U4a	g1b6	NS 69356 85540	*Anthoxanthum odoratum*	Sweet vernal-grass	5
4	U4a	g1b6	NS 69356 85540	*Festuca ovina* agg.	Sheep's fescue	4
4	U4a	g1b6	NS 69356 85540	*Poa pratensis* s.l.	Smooth meadow-grass	4
4	U4a	g1b6	NS 69356 85540	*Holcus lanatus*	Yorkshire fog	5
4	U4a	g1b6	NS 69356 85540	*Galium saxatile*	Heath bedstraw	6
4	U4a	g1b6	NS 69356 85540	*Rhytidiadelphus squarrosus*	Springy turf-moss	7
4	U4a	g1b6	NS 69356 85540	*Potentilla erecta*	Tormentil	4
5	U4e	g1b6	NS 69463 85700	*Vaccinium myrtillus*	Bilberry	8
5	U4e	g1b6	NS 69463 85700	*Nardus stricta*	Mat-grass	5
5	U4e	g1b6	NS 69463 85700	*Potentilla erecta*	Tormentil	4
5	U4e	g1b6	NS 69463 85700	*Festuca ovina* agg.	Sheep's fescue	5
5	U4e	g1b6	NS 69463 85700	*Juncus squarrosus*	Heath rush	3
5	U4e	g1b6	NS 69463 85700	*Anthoxanthum odoratum*	Sweet vernal-grass	4
5	U4e	g1b6	NS 69463 85700	*Festuca rubra* agg.	Red fescue	4
5	U4e	g1b6	NS 69463 85700	*Holcus lanatus*	Yorkshire fog	4
5	U4e	g1b6	NS 69463 85700	*Polytrichum commune*	Common haircap	4
5	U4e	g1b6	NS 69463 85700	*Rhytidiadelphus squarrosus*	Springy turf-moss	6
5	U4e	g1b6	NS 69463 85700	*Pleurozium schreberi*	Red-stemmed feathermoss	5
5	U4e	g1b6	NS 69463 85700	*Galium saxatile*	Heath bedstraw	5
8	M6c	f2c	NS 69590 85961	*Juncus effusus*	Soft rush	6
8	M6c	f2c	NS 69590 85961	*Sphagnum capillifolium*	Red bog-moss	8
8	M6c	f2c	NS 69590 85961	*Sphagnum fallax*	Flat-topped bog-moss	5
8	M6c	f2c	NS 69590 85961	*Rumex acetosa*	Common sorrel	3
8	M6c	f2c	NS 69590 85961	*Viola palustris*	Marsh violet	3

No.	NVC	UKHab	Location	Scientific Name	Common Name	DOMIN
8	M6c	f2c	NS 69590 85961	*Carex nigra*	Common sedge	3
8	M6c	f2c	NS 69590 85961	*Potentilla erecta*	Tormentil	2
10	MG9a	g3c7	NS 69619 86062	*Deschampsia cespitosa*	Tufted hairgrass	9
10	MG9a	g3c7	NS 69619 86062	*Chamaenerion angustifolium*	Rosebay willowherb	4
10	MG9a	g3c7	NS 69619 86062	*Cirsium* sp.	Thistle sp.	4
10	MG9a	g3c7	NS 69619 86062	*Rumex acetosa*	Common sorrel	4
10	MG9a	g3c7	NS 69619 86062	*Rhytidiadelphus squarrosus*	Springy turf-moss	8
10	MG9a	g3c7	NS 69619 86062	*Holcus lanatus*	Yorkshire fog	5
10	MG9a	g3c7	NS 69619 86062	*Anthoxanthum odoratum*	Sweet vernal-grass	4
12	M20a	f1a6	NS 69928 85971	*Eriophorum vaginatum*	Hare's-tail cottongrass	9
12	M20a	f1a6	NS 69928 85971	*Polytrichum commune*	Common haircap	4
12	M20a	f1a6	NS 69928 85971	*Pleurozium schreberi*	Red-stemmed feathermoss	7
12	M20a	f1a6	NS 69928 85971	*Holcus lanatus*	Yorkshire fog	3
12	M20a	f1a6	NS 69928 85971	*Avenella flexuosa*	Wavy hair-grass	4
12	M20a	f1a6	NS 69928 85971	*Carex nigra*	Common sedge	3
12	M20a	f1a6	NS 69928 85971	*Galium saxatile*	Heath bedstraw	3
14	M19	f1a6	NS 69995 85690	*Eriophorum vaginatum*	Hare's-tail cottongrass	7
14	M19	f1a6	NS 69995 85690	*Calluna vulgaris*	Heather	7
14	M19	f1a6	NS 69995 85690	*Vaccinium myrtillus*	Bilberry	4
14	M19	f1a6	NS 69995 85690	*Juncus squarrosus*	Heath rush	4
14	M19	f1a6	NS 69995 85690	*Cladonia* sp.	Cladonia sp.	3
14	M19	f1a6	NS 69995 85690	*Pleurozium schreberi*	Red-stemmed feathermoss	6
14	M19	f1a6	NS 69995 85690	*Sphagnum fallax*	Flat-topped bog-moss	4
14	M19	f1a6	NS 69995 85690	*Hypnum jutlandicum*	Heath plait-moss	4

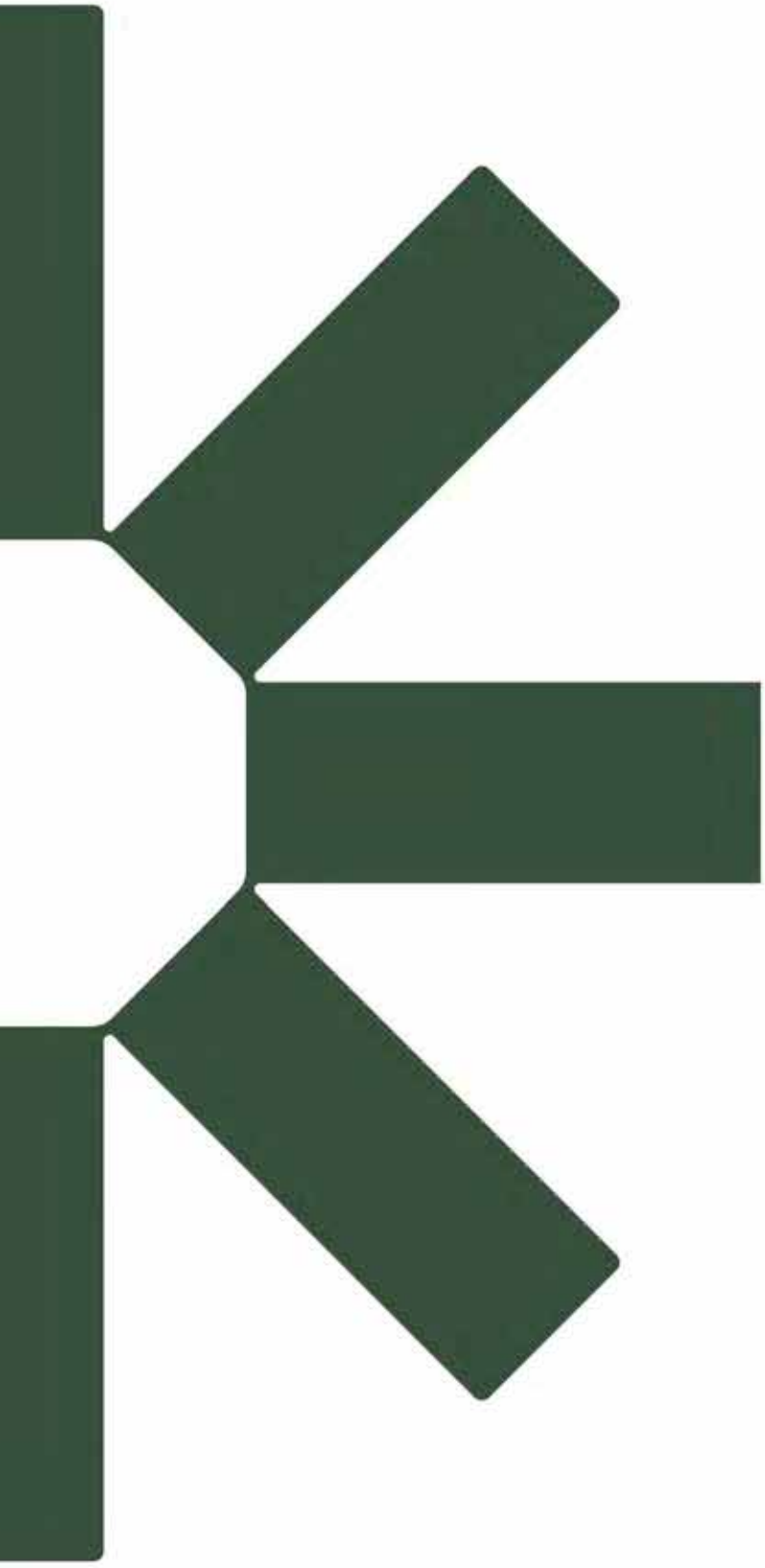
No.	NVC	UKHab	Location	Scientific Name	Common Name	DOMIN
14	M19	f1a6	NS 69995 85690	*Sphagnum capillifolium*	Red bog-moss	4
17	H9-U4	h1b	NS 69793 85007	*Vaccinium myrtillus*	Bilberry	8
17	H9-U4	h1b	NS 69793 85007	*Carex binervis*	Green-ribbed sedge	4
17	H9-U4	h1b	NS 69793 85007	*Avenella flexuosa*	Wavy hair-grass	4
17	H9-U4	h1b	NS 69793 85007	*Pleurozium schreberi*	Red-stemmed feathermoss	8
17	H9-U4	h1b	NS 69793 85007	*Hylocomium splendens*	Glittering woodmoss	4
20	MG10	g3c8	NS 69570 84739	*Juncus effusus*	Soft rush	7
20	MG10	g3c8	NS 69570 84739	*Chamaenerion angustifolium*	Rosebay willowherb	5
20	MG10	g3c8	NS 69570 84739	*Holcus lanatus*	Yorkshire fog	6
20	MG10	g3c8	NS 69570 84739	*Equisetum* sp.	Horsetail species	4
20	MG10	g3c8	NS 69570 84739	*Stellaria alsine*	Bog stitchwort	4
20	MG10	g3c8	NS 69570 84739	*Rumex acetosa*	Common sorrel	4
20	MG10	g3c8	NS 69570 84739	*Urtica dioica*	Common nettle	2
20	MG10	g3c8	NS 69570 84739	*Poa pratensis* s.l.	Smooth meadow-grass	3
20	MG10	g3c8	NS 69570 84739	*Lotus corniculatus*	Birds-foot trefoil	3
23	W10	w1f7	NS 67721 86125	*Betula pubescens*	Downy birch	9
23	W10	w1f7	NS 67721 86125	*Larix decidua*	European larch	4
23	W10	w1f7	NS 67721 86125	*Holcus mollis*	Creeping soft-grass	8
23	W10	w1f7	NS 67721 86125	*Deschampsia cespitosa*	Tufted hairgrass	5
23	W10	w1f7	NS 67721 86125	*Dryopteris dilatata*	Broad buckler-fern	1
23	W10	w1f7	NS 67721 86125	*Poa trivialis*	Rough meadow-grass	3
23	W10	w1f7	NS 67721 86125	*Rhytidiadelphis triquetrus*	Big shaggy moss	4
23	W10	w1f7	NS 67721 86125	*Thuidium tamariscinum*	Common tamarisk-moss	4
23	W10	w1f7	NS 67721 86125	*Hypnum jutlandicum*	Heath plait-moss	5

No.	NVC	UKHab	Location	Scientific Name	Common Name	DOMIN
23	W10	w1f7	NS 67721 86125	*Polytrichum commune*	Common haircap	4
23	W10	w1f7	NS 67721 86125	*Pleurcarp mosses*	Pleurcarp mosses	7
25	W7	w1d	NS 67774 86135	*Salix* sp.	Willow species	6
25	W7	w1d	NS 67774 86135	*Betula pubescens*	Downy birch	4
25	W7	w1d	NS 67774 86135	*Dryopteris filix-mas*	Male-fern	1
25	W7	w1d	NS 67774 86135	*Juncus effusus*	Soft rush	7
25	W7	w1d	NS 67774 86135	*Equisetum* sp.	Horsetail species	7
25	W7	w1d	NS 67774 86135	*Ranunculus repens*	Creeping buttercup	4
25	W7	w1d	NS 67774 86135	*Cirsium palustre*	Marsh thistle	1
25	W7	w1d	NS 67774 86135	*Rumex acetosa*	Common sorrel	3
25	W7	w1d	NS 67774 86135	*Cardamine pratensis*	Cuckooflower	1
25	W7	w1d	NS 67774 86135	*Epilobium* sp.	Willowherb species	3
25	W7	w1d	NS 67774 86135	*Galium palustre*	Marsh bedstraw	3
25	W7	w1d	NS 67774 86135	*Potentilla palustris*	Marsh cinquefoil	3
26	W4	w1d	NS 67832 86100	*Betula pubescens*	Downy birch	7
26	W4	w1d	NS 67832 86100	*Picea abies*	Norway spruce	4
26	W4	w1d	NS 67832 86100	*Polytrichum commune*	Common haircap	8
26	W4	w1d	NS 67832 86100	*Sphagnum fallax*	Flat-topped bog-moss	7
26	W4	w1d	NS 67832 86100	*Carex nigra*	Common sedge	5
27	M28a	f2	NS 68065 85757	*Iris pseudacorus*	Yellow iris	9
27	M28a	f2	NS 68065 85757	*Epilobium* sp.	Willowherb species	4
27	M28a	f2	NS 68065 85757	*Rumex acetosa*	Common sorrel	4
27	M28a	f2	NS 68065 85757	*Stellaria alsine*	Bog stitchwort	4
27	M28a	f2	NS 68065 85757	*Ranunculus repens*	Creeping buttercup	4

No.	NVC	UKHab	Location	Scientific Name	Common Name	DOMIN
27	M28a	f2	NS 68065 85757	*Carex rostrata*	Bottle sedge	2
27	M28a	f2	NS 68065 85757	*Cirsium* sp.	Thistle sp.	1
27	M28a	f2	NS 68065 85757	*Valeriana officinalis*	Common valerian	4
27	M28a	f2	NS 68065 85757	*Viola palustris*	Marsh violet	2
27	M28a	f2	NS 68065 85757	*Caltha palustris*	Marsh marigold	1
29	M23b	f2	NS 68060 85746	*Juncus effusus*	Soft rush	8
29	M23b	f2	NS 68060 85746	*Caltha palustris*	Marsh marigold	3
29	M23b	f2	NS 68060 85746	*Cardamine pratensis*	Cuckooflower	2
29	M23b	f2	NS 68060 85746	*Potentilla palustris*	Marsh cinquefoil	5
29	M23b	f2	NS 68060 85746	*Ranunculus acris*	Meadow buttercup	3
29	M23b	f2	NS 68060 85746	*Galium palustre*	Marsh bedstraw	3
29	M23b	f2	NS 68060 85746	*Equisetum* sp.	Horsetail species	2
29	M23b	f2	NS 68060 85746	*Rumex acetosa*	Common sorrel	4
29	M23b	f2	NS 68060 85746	*Ranunculus repens*	Creeping buttercup	4
29	M23b	f2	NS 68060 85746	*Cirsium palustre*	Marsh thistle	4
29	M23b	f2	NS 68060 85746	*Achillea ptarmica*	Sneezewort	2
29	M23b	f2	NS 68060 85746	*Viola palustris*	Marsh violet	2
30	U4b	g1b	NS 68054 85724	*Holcus lanatus*	Yorkshire fog	8
30	U4b	g1b	NS 68054 85724	*Anthoxanthum odoratum*	Sweet vernal-grass	5
30	U4b	g1b	NS 68054 85724	*Agrostis stolonifera*	Creeping bent	4
30	U4b	g1b	NS 68054 85724	*Festuca rubra* agg.	Red fescue	4
30	U4b	g1b	NS 68054 85724	*Galium saxatile*	Heath bedstraw	4
30	U4b	g1b	NS 68054 85724	*Rhytidiadelphus squarrosus*	Springy turf-moss	6
30	U4b	g1b	NS 68054 85724	*Conopodium majus*	Pignut	2

No.	NVC	UKHab	Location	Scientific Name	Common Name	DOMIN
32	S4/S27	f2d	NS 68162 85562	*Phragmites australis*	Common reed	9
32	S4/S27	f2d	NS 68162 85562	*Carex rostrata*	Bottle sedge	5
32	S4/S27	f2d	NS 68162 85562	*Potentilla palustris*	Marsh cinquefoil	3
32	S4/S27	f2d	NS 68162 85562	*Galium palustre*	Marsh bedstraw	3
32	S4/S27	f2d	NS 68162 85562	*Valeriana officinalis*	Common valerian	4
32	S4/S27	f2d	NS 68162 85562	*Rumex acetosa*	Common sorrel	4
32	S4/S27	f2d	NS 68162 85562	*Juncus effusus*	Soft rush	4
34	M27/M9	f2	NS 68940 84967	*Juncus acutiflorus x articulatus*	Sharp-flowered rush x jointed rush	9
34	M27/M9	f2	NS 68940 84967	*Galium palustre*	Marsh bedstraw	4
34	M27/M9	f2	NS 68940 84967	*Equisetum* sp.	Horsetail species	4
34	M27/M9	f2	NS 68940 84967	*Rumex acetosa*	Common sorrel	4
34	M27/M9	f2	NS 68940 84967	*Caltha palustris*	Marsh marigold	4
34	M27/M9	f2	NS 68940 84967	*Angelica sylvestris*	Wild angelica	5
38	OV27b	g3c	NS 69602 84048	*Chamaenerion angustifolium*	Rosebay willowherb	8
38	OV27b	g3c	NS 69602 84048	*Valeriana officinalis*	Common valerian	4
38	OV27b	g3c	NS 69602 84048	*Holcus lanatus*	Yorkshire fog	6
38	OV27b	g3c	NS 69602 84048	*Rumex acetosa*	Common sorrel	4
38	OV27b	g3c	NS 69602 84048	*Galium palustre*	Marsh bedstraw	2
39	NA	h3h	NS 70046 84010	*Chamaenerion angustifolium*	Rosebay willowherb	6
39	NA	h3h	NS 70046 84010	*Fern* sp.	Fern species	4
39	NA	h3h	NS 70046 84010	*Rubus idaeus*	Raspberry	7
39	NA	h3h	NS 70046 84010	*Urtica dioica*	Common nettle	5
39	NA	h3h	NS 70046 84010	*Deschampsia cespitosa*	Tufted hairgrass	4
40	MG6b	g4	NS 70068 83998	*Anthriscus sylvestris*	Cow parsley	4

No.	NVC	UKHab	Location	Scientific Name	Common Name	DOMIN
40	MG6b	g4	NS 70068 83998	*Rumex acetosa*	Common sorrel	4
40	MG6b	g4	NS 70068 83998	*Luzula campestris*	Field woodrush	4
40	MG6b	g4	NS 70068 83998	*Veronica chamaedrys*	Germander speedwell	4
40	MG6b	g4	NS 70068 83998	*Holcus lanatus*	Yorkshire fog	6
40	MG6b	g4	NS 70068 83998	*Anthoxanthum odoratum*	Sweet vernal-grass	6
40	MG6b	g4	NS 70068 83998	*Festuca rubra* agg.	Red fescue	5
40	MG6b	g4	NS 70068 83998	*Conopodium majus*	Pignut	3
40	MG6b	g4	NS 70068 83998	*Alopecurus pratensis*	Meadow foxtail	4
40	MG6b	g4	NS 70068 83998	*Galium palustre*	Marsh bedstraw	3
40	MG6b	g4	NS 70068 83998	*Poa pratensis* s.l.	Smooth meadow-grass	4
40	MG6b	g4	NS 70068 83998	*Ranunculus acris*	Meadow buttercup	4
42	S10a	f2f	NS 70087 84017	*Equisetum sp.*	Horsetail species	8
42	S10a	f2f	NS 70087 84017	*Cardamine pratensis*	Cuckooflower	3
42	S10a	f2f	NS 70087 84017	*Galium palustre*	Marsh bedstraw	4
42	S10a	f2f	NS 70087 84017	*Epilobium* sp.	Willowherb species	2
42	S10a	f2f	NS 70087 84017	*Juncus effusus*	Soft rush	3
42	S10a	f2f	NS 70087 84017	*Ajuga reptans*	Bugle	2
42	S10a	f2f	NS 70087 84017	*Caltha palustris*	Marsh marigold	2
42	S10a	f2f	NS 70087 84017	*Cirsium palustre*	Marsh thistle	1



Making Sustainability Happen

Technical Appendix 8.3: Protected Species Report

Cairnoch Hill Wind Farm

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SLR Project No.: 428.V12085.00001

3 August 2026

Revision: 01

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
01	3 August 2026	C. Taylor and S. McPeake	R. Smith	S. Toule

Basis of Report

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A.3 Figure 8.3.3 Great Crested Newt Habitat Suitability Index Survey

Appendix B Protected Mammal Survey Target Notes

1.0 Introduction

1.1 Background

SLR Consulting Ltd ('SLR') was appointed by Eurowind Energy Limited ("the Applicant") to undertake protected species surveys for the proposed Cairnoch Hill Wind Farm (hereafter referred to as "the Proposed Development"). The surveys are focused at the location of the Proposed Development ("the Site"), within the Site boundary.

This report presents the results of the protected species surveys carried out over the course of Summer 2024, including badger, otter, water vole, red squirrel, pine marten and great crested newt specific surveys. Refer to **Table 2-1** for exact survey dates for each survey type. The Survey Area comprised the Site plus a 50m buffer for terrestrial mammals and a 250m buffer (where accessible) along watercourses for riparian mammals as shown in **Figures 8.3.1** to **8.3.3.**

Protected species surveys were previously carried out between 10-13 and 19 May 2022 within the Site to inform an earlier variation of the application boundary and turbine layout. Due to the time elapsed between surveys and submission, and alterations to the application boundary and turbine layout, surveys were repeated in 2024 to inform the Environmental Impact Assessment (EIA) report. Results of the 2022 survey are not discussed in depth within this report, however, a summary of the findings are presented in **Appendix B, Table B-2**.

The Proposed Development comprises of up to four wind turbines with associated works and infrastructure including: forestry works; crane hardstandings; access tracks; cabling; a borrow pit; a temporary construction compound; a single substation including control building and a permanent anemometry mast. It is proposed that the maximum blade tip height of the turbines would be 180m. The Site layout is presented on **Figure 8.3.1.**

1.2 Site Description

The Site is centred on National Grid Reference NS 69768 85606, located at Cairnoch Hill, to the north of Carron Valley Reservoir. The Site is approximately 6km north of Kilsyth and 6km east of Fintry and within the administrative area of Stirling Council. The Site predominately lies within the Forth River Trust catchment, with the western zone of the Carron Valley reservoir lying within the Loch Lomond Fisheries Trust catchment.

The Site lies within land managed for its plantation woodland by Forestry and Land Scotland (FLS). The majority habitat within the Site includes coniferous plantation woodland of juvenile and semi-mature trees connected by areas of acid grassland and scattered broadleaved shrub.

Several small watercourses run through the Site draining south in the Carron Valley Reservoir on the southern side of the B818 road. Watercourses at the north west and west side of the Site drain into Endrick Water and those at the north east and east side of the Site drain into Earl's Burn.

1.3 Surrounding Area

The surrounding landscape consists of areas of grazing pasture and coniferous plantations with the Carron Valley reservoir situated south of the Site boundary. There are three operational wind farms (Craigengelt, Earlsburn and Earlsburn North), two consented wind farms (Shelloch, and Earlsburn Extension), and one 'in planning' wind farm (Drummarnock) within 10km of the Site. There are four residential properties/farms close to the Site (within 1km), the nearest of which are located immediately south of the Site on the northern side of the B818.

1.1 Scope of Study

The scope of this study was to carry out a survey for protected mammals within the Survey Area in order to identify presence, potential presence, or likely absence. The following species, considered to be potentially present, following a desk study, were targeted for this survey:

- Water vole *Arvicola amphibius*;
- Otter *Lutra lutra*;
- Red squirrel *Sciurus vulgaris*;
- Badger *Meles meles*;
- Pine marten *Martes martes*;
- Great Crested Newt (*Triturus cristatus*) and,
- Other mammals/fauna of interest – only recorded if evidence of presence observed.

The aim of the survey was to provide baseline data to inform the wind farm design process, the development of any habitat restoration and management proposals and the subsequent EIA Report. The assessment of impacts resulting from the Proposed Development and the development of mitigation measures, if required, are beyond the scope of this report and are covered in **Chapter 8: Ecology** of the EIA Report.

1.2 Survey and Reporting Personnel

The field surveys and reporting were carried out by SLR ecologists Euan MacRae and Amy Green, with prior input from former SLR ecologists Callum Taylor and Sophie McPeake.

Euan is a Project Ecologist and Qualifying member of CIEEM, with over 2 years' experience in ecological consultancy. He has plentiful experience carrying out protected species surveys and report writing for renewables projects throughout Scotland.

Amy is a senior Ecologist based in Glasgow with 4 years' experience in consultancy. Amy has specialised in aquatic ecosystems focusing on understanding project development impacts and ecological mitigation solutions to inform planning applications across a wide range of development types from wind farms to hydropower developments.

Callum is a Senior Ecologist with over 5 years' experience. He is a Qualifying member of CIEEM and holds a great crested newt (GCN) license. Callum has much experience in project management and protected mammal surveys, having spent much of his time at SLR working on similar projects throughout Scotland and the north of England.

Sophie is a Project Ecologist with over a years' experience in ecological consultancy. She is a Qualifying member of CIEEM and has undertaken ecological survey and reporting work on a range of renewables projects throughout Scotland.

1.4 Relevant Legislation

1.4.1 Otter

Otter is a European Protected Species, of which receives full protection under Schedule 2 of the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the 'Habitats Regulations'). They are also fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Nature Conservation (Scotland) Act 2004 (as amended). As such, it is an offence to deliberately or recklessly:

- Capture, injure or kill an otter;
- Harass an otter or group of otters;
- Disturb an otter while it is occupying a structure or place used for shelter or protection;
- Disturb an otter while it is rearing or otherwise caring for its young;
- Obstruct access to a holt or other structure or place otters use for shelter or protection, or otherwise deny the animal use of that place;
- Disturb an otter in a manner or in circumstances likely to significantly affect the local distribution or abundance of the species; and
- Disturb an otter in a manner or in circumstances likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young.

It is also an offence to:

- Damage or destroy a breeding site or resting place of such an animal (whether or not deliberately or recklessly). This applies at all times, whether or not the breeding site or resting place currently being used by an otter; and
- Keep, transport, sell or exchange, or offer for sale or exchange any wild otter (or any part or derivative of one) obtained after 10 June 1994.

Licensing requires an application to NatureScot to request derogation to the legislation for activities that would contravene the above.

The otter is also detailed within the Scottish Biodiversity List (SBL)[1], of which is a list of animals, habitats and plants that Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland.

1.4.2 Water Vole

Water vole receives partial protection through its listing on Schedule 5 of The Wildlife and Countryside Act 1981 (as amended) and the Nature Conservation (Scotland) Act 2004 (as amended). In Scotland, this legal protection is currently restricted only to the water vole places of shelter or protection; it does not extend to the animal itself. It is an offence to intentionally or recklessly:

- Damage, destroy or obstruct access to any structure or place that water voles use for shelter or protection; or
- Disturb a water vole while it is using any such place of shelter or protection.

Licensing requires an application to NatureScot to request derogation to the legislation for activities that would contravene the above.

Water vole is listed within the SBL as a species of principle importance for biodiversity conservation in Scotland.

1.4.3 Badger

Both badgers and their setts are protected under the Nature Conservation (Scotland) Act 2004 (as amended) and Protection of Badgers Act 1992, as amended by the Wildlife and Natural Environment (Scotland) Act 2011. Under this legislation it is an offence to:

[1] Available online at https://www.nature.scot/doc/scottish-biodiversity-list

- Kill, injure, take, possess or cruelly ill-treat a badger;
- Interfere with a sett by damaging or destroying it;
- Obstruct access to a badger sett;
- Disturb a badger whilst it is occupying a sett; and,
- Allow a dog to enter a sett.

Licensing requires an application to NatureScot to request derogation to the legislation for activities that would contravene the above.

1.4.4 Pine Marten

Pine marten receive full protection under Schedule 5 of The Wildlife and Countryside Act 1981 (as amended) and Nature Conservation (Scotland) Act 2004 (as amended). It is an offence to intentionally or recklessly:

- Kill, injure or take a pine marten;
- Damage, destroy or obstruct access to any structure or place a pine marten uses for shelter or protection;
- Disturb a pine marten when it is occupying a nest or den for shelter or protection (except when this is inside a dwelling house); and
- Possess or control, sell, offer for sale or possess or transport for the purpose of sale any living or dead pine marten or any derivative of such an animal.

Licensing requires an application to NatureScot to request derogation to the legislation for activities that would contravene the above.

The pine marten is also listed within the SBL as a species of principal importance for biodiversity conservation in Scotland.

1.4.5 Red Squirrel

Red squirrels and their dreys receive full protection under Schedules 5 and 6 of the Wildlife and Countryside Act 1981 (as amended) and Nature Conservation (Scotland) Act 2004 (as amended). In short, it is an offence to intentionally or recklessly:

- Kill, injure or take a red squirrel;
- Damage, destroy or obstruct access to a drey or any other structure or place which a red squirrel uses for shelter or protection;
- Disturb a red squirrel when it is occupying a structure or place for shelter or protection;
- Possess or control, sell or offer for sale, or possess or transport for the purpose of sale any living or dead red squirrel or any derivative of such an animal; and
- Knowingly causing or permitting any of the above acts to be carried out.

Licensing requires an application to NatureScot to request derogation to the legislation for activities that would contravene the above.

The red squirrel is also listed within the SBL as a species of principal importance for biodiversity conservation in Scotland.

1.4.6 Great Crested Newt

GCN are afforded a high level of protection under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the 'Habitats Regulations') and Nature Conservation (Scotland) Act 2004 (as amended). Under this legislation it is an offence to deliberately and/or recklessly:

- Capture, injure or kill great crested newts;
- Harass a great crested newt or group of newts;
- Damage or destroy a great crested newt breeding site or resting place;
- Disturb a great crested newt while it is occupying a place used for shelter or protection;
- Obstruct access to a breeding site or resting place, or otherwise deny use of such a place;
- Possess, sell, control or transport live or dead great crested newts, or part of a great crested newt; and
- Take great crested newt eggs.

Protection is also afforded under the Wildlife and Countryside Act 1981 (as amended) with respect to disturbance of animals when using places of shelter, and obstruction of access to places of shelter.

Due to the high level of protection afforded to GCN and their habitat, mitigation for this species is governed by a strict licensing procedure administered by NatureScot (normally, planning permission must be obtained before a licence can be sought, however, works which do not require planning permission must still adhere to licensing requirements).

Public bodies (including local planning authorities) have a duty to have regard for the conservation of all protected species when carrying out their functions, including determining planning applications.

1.4.7 Planning Policy

National Planning Policy

In order to accord with the biodiversity provisions of National Planning Framework 4 (NPF4)[2], development proposals should demonstrate that they contribute to the enhancement of biodiversity. Of particular relevance to this study, Policy 3b states:

"Development proposals for national or major development, or for development that requires an Environmental Impact Assessment will only be supported where it can be demonstrated that the proposal will conserve, restore and enhance biodiversity, including nature networks so they are in a demonstrably better state than without intervention. Proposals within these categories will demonstrate how they have met all of the following criteria:

- *The proposal is based on an understanding of existing characteristics of the Site and its local, regional and national ecological context prior to development, including the presence of any irreplaceable habitats;*
- *Wherever feasible, nature-based solutions have been integrated and made best use of;*

[2] National Planning Framework 4 was adopted by Scottish Ministers on 13 February 2023. Further information is available online at https://www.gov.scot/publications/national-planning-framework-4/documents/

- *An assessment of potential negative effects which should be fully mitigated in line with the mitigation hierarchy prior to identifying enhancements;*
- *Significant biodiversity enhancements are provided, in addition to any proposed mitigation. This should include nature networks, linking to and strengthening habitat connectivity within and beyond the development, secured within a reasonable timescale and with reasonable certainty. Management arrangements for their long-term retention and monitoring should be included, wherever appropriate…"*

Wherever possible, opportunities to deliver biodiversity enhancement should therefore be considered and implemented for any new development proposals.

1.4.8 Local Planning Policy

2.0 Methodology

2.1 Desk Study

To inform the desk study (**Technical Appendix 8.1**) a request for records relating to protected and notable species within 2km of the Site within the last 15 years, was made to The Wildlife Information Centre (TWIC). The data was obtained in April 2024.

2.2 Field Survey

The Survey Area consists of the Site boundary plus a 50m buffer for all species apart from otter. The Survey Area for otter was defined as all accessible watercourses within the Site plus a buffer of 250m.

Survey metadata detailing the conditions at the time of survey are set out in **Table 2-1**.

Table 2-1: Mammal Survey Metadata

Date	Survey type	Average Temperature (degrees Celsius)	Average Wind Speed (Beaufort)	Rainfall (0-2)
01.05.2024	GCN eDNA	10	3	0
22.05.2024 – 24.05.2024	Riparian mammals / terrestrial mammals	12	1	1
21.08.2024	Terrestrial mammals	15	5	1
27.08.2024	Terrestrial mammals / riparian mammals	18	3	2
30.08.2024	Riparian mammals	16	2	1

2.2.1 Protected and Notable Species

2.2.1.1 Otter

The surveys for otter comprised a walkover of all accessible watercourses within the Site and 250m of Site. The survey was carried out by two suitably qualified ecologists in order to comply with health and safety requirements associated with working in and/or near water. The dates of survey are shown in **Table 2-1** above.

Otter field signs are described in guidance produced by Bang & Dahlstrøm (2001)[3], Sargent & Morris (2003)[4] and Chanin (2003a & b)[5,6], and include:

- Holts – these are underground shelters where otters live. They can be tunnels within bank sides, underneath root plates or boulder piles and even man-made structures such as disused drains. They can also be excavated from pre-existing badger setts, rabbit burrows and fox *Vulpes vulpes* earths as well as above ground shelters in dense scrubby vegetation. Holts are used by otters to rest during the day and may be used as natal or breeding sites. Otters may use holts permanently or temporarily;
- Couches/hovers – these are above ground resting-up sites. They may be partially sheltered or fully exposed. Couches may be regularly used, especially in reed beds and on in-stream islands. They may be used as natal and breeding sites. Couches can be very difficult to identify and may comprise an area of flattened grass or earth. Where rocks or rock armour are used as couches, these can be almost impossible to identify without observing the otter in-situ;
- Prints and tracks – otters have characteristic footprints that can be found in soft ground and muddy areas;
- Spraints – otter faeces are often used to mark territories, usually deposited on in-stream boulders or similarly prominent features such as raised ground close to water, under tree roots, beneath bridges and at crossing points of fences or walls. They can also be present within or outside the entrances of holts and couches. Spraints have a characteristic smell and often contain fish remains;
- Feeding signs – the remains of prey items may be found at preferred feeding stations. Remains of fish, crabs or skinned amphibians can indicate the presence of otter;
- Paths – these are terrestrial routes that otters take when moving between resting-up sites and watercourses, or during high flow conditions when otters travel along bank sides in preference to swimming; and
- Slides and play areas – slides are typically worn areas on steep slopes where otters slide on their bellies; slides are often found between holts/couches and watercourses. Play areas are used by juvenile otters in play and are usually evident as trampled vegetation and the presence of slides. These are often positioned in sheltered areas adjacent to the natal holt.

Any of the above signs are diagnostic evidence of the presence of otter; but it is often not possible to identify couches with confidence unless other field signs are also present. Spraint is the most reliable identifiable evidence of the presence of this species.

2.2.1.2 Water Vole

The water vole surveys were conducted coincidentally with the otter surveys by the same surveyors and within the same survey buffer.

The survey methods used for water vole were based on the standard methodology detailed in the Water Vole Conservation Handbook (Strachan *et al*., 2011)[7] and the Water Vole

[3] Bang, P. & Dahlstrøm, P. (2001). *Animal Tracks and Signs*. Oxford University Press, Oxford.

[4] Sargent, G. & Morris, P. (2003) *How to find & Identify Mammals*. The Mammal Society, London.

[5] Chanin P (2003a) Ecology of the European Otter. Conserving Natura 2000 Rivers, Ecology Series No. 10. English Nature, Peterborough

[6] Chanin P (2003b) Monitoring the Otter Lutra lutra. Conserving Natura 2000 Rivers Monitoring Series No 10. English Nature, Peterborough

[7] Strachan, R. 2006. Water Vole Conservation Handbook. 2nd Edition.

Mitigation Handbook (Dean *et al*., 2016)[8]. All accessible watercourses within the Survey Area were searched for signs of water vole activity including:

- Live water vole observations;
- Faeces – these are recognisable by their size, shape and content. When reasonably fresh, water vole faeces are also distinguishable from rat droppings by their smell;
- Latrines – faeces are often deposited at discrete locations known as latrines;
- Feeding stations – food items are often brought along pathways and hauled onto platforms which are used as feeding stations. These are recognisable as neat piles of chewed vegetation up to10 cm long. There can be crossover in size with field vole feeding signs, and therefore other signs may be required to provide diagnostic evidence of the presence of water vole;
- Burrows – these appear as a series of holes along the water's edge; they are distinguishable from rat or field vole burrows by their size, position and characteristics;
- Lawns – these may appear as grazed areas around burrows;
- Nests – woven nests may be found above ground in areas where the water table is high;
- Footprints – water vole tracks may occur at the water's edge and lead into bankside vegetation. Clear prints are distinguishable from rat and field vole footprints by their characteristics and size; and
- Runways in vegetation – low tunnels pushed through vegetation near the water's edge may be visible; these are less obvious than rat runs and are only diagnostic of water vole in the presence of other signs.

Any of the above signs (other than feeding stations and runways) can be taken as diagnostic evidence of the presence of water vole.

Current guidance recommends that up to two field survey visits are carried out, but one survey visit may be sufficient in certain circumstances (e.g., where the habitat is of very low suitability for water voles and there is a very low likelihood that water voles are present). In the context of this study, a single survey for water vole was considered sufficient owing to the lack of suitable habitat and lack of signs on the Site (See Section 3.2).

2.2.1.3 Red Squirrel

All suitable habitat within the Survey Area was surveyed for squirrel field signs. A broad-scale walkover assessment was undertaken, which involved assessing habitat suitability and recording any signs of squirrel (e.g., feeding signs and dreys), as described in Gurnell *et al.* 2009[9] including:

- Dreys:
- Feeding signs: and
- Sightings.

[8] Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016). The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series). Eds Fiona Matthews and Paul Chanin. The Mammal Society, London.

[9] Gurnell, J., Lurz, P. & Pepper, H. (2001) Practical Techniques for Surveying and Monitoring Squirrels.

There is no distinguishable difference between the dreys or feeding signs of a red squirrel and a grey squirrel *S. carolinensis* therefore all dreys and feeding signs are counted as potential red squirrel presence unless accompanied by a live sighting.

2.2.1.4 Badger

The badger survey comprised a walkover of suitable habitat within the Survey Area during daylight hours to search for, and record, evidence of badger activity. The survey followed guidance published by Neal & Cheeseman (1996)[10], and SNH (2001)[11] and Reynolds and Harris (2005)[12], Field signs pertaining to badger include:

- Setts - these are underground tunnels where badgers live. Setts can have large spoil heaps or discarded bedding material at the entrance. Badgers may use setts permanently or temporarily, which can thus be classed as active or inactive;
    - Main setts: At least five holes, often with large spoil heaps and obvious pathways originating from and between sett entrances. Usually active;
    - Annexe setts: Sett with several holes, connected to a main sett by a clear badger path, normally less than 150 m from the main sett. Not used all of the time;
    - Subsidiary setts: Usually at least 50 m from the main sett with no obvious paths connecting to other setts. Used intermittently. Outlier setts: One or two holes. No obvious paths connecting to other setts and only used sporadically. Little spoil outside holes. Often used by other mammals;
- Prints - badgers have characteristic footprints that can be found in soft ground and muddy areas;
- Latrines - faeces are often deposited in dung pits at discrete locations. These are known as latrines and are often used as territorial markers;
- Hairs – badgers have characteristic hairs which can often be found in the soil at sett entrances or snagged on fences; and
- Feeding signs (snuffle holes) – scrapes and small holes created in the ground by badgers foraging for earthworms etc.

Any of the above signs can be taken as diagnostic evidence of the presence of badger.

2.2.1.5 Pine Marten

All suitable habitat within the survey was surveyed to determine the presence, or potential presence, of pine marten.

Pine marten field signs are described in Bang and Dahlstrøm (2006)[13] and Balharry *et al.* (1996)[14] and include:

- Scats – These are typically dark in colour and 4-12cm long x 0.8-1.8cm in diameter. They often have a coiled twisted appearance, typical of many mustelid scats. Scats will often contain food remains including fur, feathers, bone, plant content and seeds.

[10] Neal, E. & Cheeseman, C. (1996). *Badgers*. Poyser Natural History, London.

[11] Scottish Natural Heritage (2001). *Scotland's Wildlife: Badgers and Development*. SNH, Battleby.

[12] Reynolds, P. & Harris, M. (2005). Inverness Badger Survey 2003. Scottish Natural Heritage Commissioned Report No. 096

[13] P., Bang & R. Dahlstrom (2006) Animal Tracks and Signs. Oxford University Press.

[14] Balharry, E.A., McGowan, G.M., Kruuk, H., Halliwel, E., 1996. Distribution of Pine Martens in Scotland as Determined by Field Survey and Questionnaire. SNH Survey and Monitoring Report No. 48. Scottish Natural Heritage, Edinburgh, UK.

Scats vary in size, shape and colour, overlapping in these respects with scats of foxes, polecats, mink and stoat. Marten scats are usually long and cylindrical, often tapering at one end and sometimes coiled into a 'U' or 'S' shape. Scats may be 5-14mm in diameter and up to 120mm long. Where scat identification is in doubt, DNA analysis may be used to confirm pine marten.

- Footprints – Five-toed but slightly cat-like forefoot imprints measure approximately 40 x 45mm for females and 55 x 65mm for males; fur on the underside of feet in winter may blur prints and make them look larger, especially in soft snow. Indistinct trails of bounding martens (stride length 60-100cm) may resemble those of hares, with prints in groups of two or three where one or both hind feet have registered over prints of forefeet; and
- Den sites – Dens are usually not distinctive unless revealed by visible concentration of scats. Elevated den sites are preferred to keep martens safe from predators and provide insulation and shelter from the elements, and so hollow trees, owl boxes and the roofs of dwelling houses are often used, as well as purpose-built pine marten den boxes. Where such elevated dens are absent, they may den on the ground in rabbit burrows, rocky outcrops or under tree root plates.

Any of the above signs are diagnostic evidence of the presence of pine marten. However, it is often not possible to identify den sites with confidence unless other field signs are also present. Scats are the most reliable identifiable evidence of the presence of this species.

2.2.1.6 Great Crested Newt

Habitat Suitability Index (HSI)

Habitat Suitability Index (HSI) assessments were undertaken on the ponds within the Study Area to evaluate their potential to support GCN using the standard HSI assessment method (ARG UK, 2010[15]) and (Oldham, Keeble, Swan, & Jeffcote, 2000[16]). HSI surveys encompass the following ten criteria to calculate a suitability score:

- Geographic location;
- Pond area;
- Frequency of pond drying;
- Water quality;
- Shade;
- Presence of Waterfowl;
- Presence of Fish;
- Number of ponds within 1 km;
- Terrestrial habitat quality; and
- Aquatic macrophyte cover.

The following categorical scale is then applied to determine the overall suitability of the waterbody:

[15] ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index (2010).

[16] Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). Evaluating the suitability of habitat for the Great Crested Newt (Triturus cristatus). Herpetological Journal 10(4), 143-155.

Table 2-2 Habitat Suitability Index Scoring

HSI Score	Pond Suitability for GCN
<0.5	Poor
0.5-0.59	Below average
0.6-0.69	Average
0.7-0.79	Good

eDNA Sample Collection

An eDNA survey of two water bodies considered suitable to support newts, within the Survey Area, was carried out in line with the recommended guidelines[15] on 1 May 2024. Prior to the surveys there was a long period of higher temperatures and little rainfall locally. The surveys were carried out under dry conditions.

Samples were taken following the instructions provided with the ADAS sample kits (a company specialising in environmental sampling analysis). From each waterbody, 20 water samples were taken at equidistant intervals around the circumference of the outer edge. The 20 samples were then mixed, and six individual samples were taken and sent to ADAS laboratory for eDNA analysis.

2.2.1.7 Other Protected and/ or Notable Species

Incidental sightings of other protected and/ or notable species, such as amphibians and reptiles, were also recorded during the survey.

2.3 Limitations to Survey

It should be noted that ecological study provides only a ‘snapshot’ of the conditions prevailing at the time of survey. Lack of evidence of any species does not necessarily preclude them from being present on the Site at a later date.

Whilst it is considered unlikely that any significant evidence of protected or otherwise notable mammal species has been overlooked, due to the nature of the subjects of ecological surveys it is feasible that species that use the Site may not have been recorded by virtue of their seasonality, cryptic behaviour, habit or random chance.

As the protected mammal surveys were undertaken at the height of the growing season, several of the Site’s watercourses were greatly obscured by tall vegetation. Additionally, treefall, most notably around the centre of the Survey Area, prevented full access to some of the Site’s plantation woodlands.

Best effort was made to reschedule survey works to avoid periods of heavy rainfall where possible. However, rainfall was still encountered during, or immediately prior to, most site visits for protected mammal survey in 2024 (see **Table 2-1**). As a result, it is likely that some field signs such as scats would have been washed away.

3.0 Results

Details of survey results are displayed in **Figure 8.3.1 to 8.3.3** and all target notes are detailed in **Appendix B.**

3.1 Otter

No records of otter within 2km of the Site within the last 15 years were returned by the desk study data search, however otter were recorded during surveys for nearby developments (see **Technical Appendix 8.1** for further details).

Some evidence of otter utilising the Site was identified during both the May and August surveys. Spraint was noted at five separate locations along four distinct watercourses within the Survey Area. Most spraint encountered during the 2024 surveys was old and dry and located in areas less likely to be washed clean by rainfall, including under bridges to the south east and west of the Site, and within dense areas of plantation woodlands.

A potential holt was identified along an unnamed tributary of the Endrick Water, at the edge of the 250m survey buffer in the north west of the Site (TN 1). This potential otter resting place is located approximately 450m away from the closest site infrastructure – the indicative track to be upgraded. As such, no disturbance is expected, and further investigation of this feature was not deemed necessary.

Habitats within the Site offer suitability for otter with fast flowing watercourses and burns leading from the steeper gradient of Cairnoch Hill where they flush into the Carron Valley Reservoir, Earl's Burn and Endrick Water. The habitats within the Site would support otter presence due to the overhanging banks of tussocky sedge along watercourses surrounded by dense woodland that would limit disturbance. Foraging opportunities are also very good, with the Carron Valley Reservoir easily accessible from all points of the Site and stocked with brown trout *Salmo trutta* and rainbow trout *Oncorhynchus mykiss* by the Carron Valley Fishery. Water quality of burns originating at the top of Cairnoch Hill is moderate as it is subject to run-off from forestry operations and sandy loam that filters into the watercourses which creates high levels of suspended particles and decreases water clarity.

Survey results from both the 2022 and 2024 surveys are shown on **Figure 8.3.1**.

3.2 Water Vole

No confirmed evidence of water vole was found on the Site during the 2022 or 2024 surveys, nor were any records of water vole within 2km of the Site within the last 15 years returned by the desk study data search.

The tributaries of the Endrick Water in the west of the Site provide moderate habitat for water vole, however the drainage channels through conifer plantation are unsuitable due to their heavily modified, ephemeral nature and poor water quality. The waterways in the east of the Site are not considered to be suitable for water vole due to a lack of suitable foraging habitat and suitable banks for burrowing.

The likelihood of water voles being active within the Site is negligible.

3.3 Red Squirrel

The desk study data search returned one record of red squirrel within 2km of the Site, recorded in 2020, however no evidence of red squirrel was found on the Site during the 2024 surveys.

A potential drey and squirrel feeding signs were identified during the 2022 surveys, however, these were not confirmed to be red squirrel. The wider landscape is known to support both

red and grey squirrels, so signs/dreys have been assumed to belong to red squirrel under a precautionary basis[17]. Refer to Figure 8.3.2 for locations.

In terms of habitat suitability, mature and semi-mature coniferous plantation woodlands throughout the Site, most notably in the centre and north west, provide potentially suitable foraging and nesting habitat for squirrels.

3.4 Badger

No records of badger within 2km of the Site within the last 15 years were returned by the desk study data search. This is not uncommon with records of badger setts being restricted.

A well-used main sett was identified in the north of the Site, within mature Scots pine woodland and close to the unnamed watercourse which runs along the northern Site boundary (TN 7). Ten entrances were noted, nine of which had evidence of current use including well-worn edges, fresh digging, fresh spoil heaps, bedding material, guard hairs in spoil, and nearby dung heaps. The remaining sett entrance had partially collapsed and likely not in current use. Snuffle holes were noted throughout the area of the main sett.

This main sett had been previously identified in 2022 with seven active entrances counted at that time. Setts were revisited in 2024 to confirm use. Sett entrances identified in 2022 are not included in Figure 8.3.2 where these overlap.

Approximately 70m to the south west of the main sett was a newly identified annexe sett with five entrances in varying states of use (TN 8). Two entrances had clear evidence of current use including fresh spoil and guard hairs, one entrance had evidence of recent use including old spoil, and the remaining two entrances were assessed as being currently not in use due to having limited/no spoil heaps and overgrown tunnel entrances.

A clear mammal path was evident running between the two nearby setts. Other mammal paths which are likely to be used by badger were frequent crossing the access tracks and rides throughout the Site's northern and western areas of plantation woodland. Due to the density of woodland, most of these paths could not be followed in entirety.

Evidence of foraging was identified in an area of felled woodland in the south west of the Site (TN 9). Digging likely attributable to badger due to the shape and size of excavations, as well as the upturning of large rocks within the spoil, was common here in this more open habitat.

Few territory markings such as dung heaps and latrines were noted throughout the Site, likely due to heavy rainfall and dense seasonal vegetation. One individual dung heap was identified at the edge of coniferous plantation in the north east of the Site, located between the access track and Earl's Burn (TN 10).

Badger survey results are shown on **Figure 8.3.2.**

3.5 Pine Marten

Pine marten was identified as a species present in the local area within the last 15 years from the desk study data search.

Six likely pine marten scats were identified on the Site during the protected mammal surveys (TN 11 – TN 14). These scats have been attributed to pine marten due to a combination of their composition, size, shape, colour and odour closely matching descriptions from the pine

[17] Saving Scotland's Red Squirrels. (2026). Sightings. [Online] Available at: Saving Scotland's Red Squirrels – Transforming hope for Scotland's red squirrels

marten survey methodology. Scats were generally found along edge habitats and natural boundaries such as forest rides and roads and thus have been taken as territory marking.

Additionally, an incidental finding of suspected pine marten scat was recorded along the edge of a track within the plantation on 1 May 2024 during the fish habitat assessment survey (TN 15). The scat was collected and sent to the University of Warwick for analysis to confirm species. Results confirmed the species to be pine marten – therefore confirming presence of this species on the Site.

Pine marten survey results are shown on Figure 8.3.2.

3.6 Great Crested Newt

Two ponds were found within the Survey Area (see **Figure 8.3.3**), and a habitat suitability index survey was carried out for both. Results are detailed in **Table 3-1.** While both ponds were deemed suitable for GCN, scoring 'excellent' and 'average' respectively, results of the eDNA survey found that GCN were not present in the ponds at the time of survey.

Table 3-1 - Summary of HSI and eDNA Results

Pond ID	Grid Ref	HSI Score	Suitability	Pond Area (m^2)	eDNA Result
A	NS 69666 84436	0.82	Excellent	283.47	Negative
B	NS 69672 84420	0.68	Average	97.7	Negative

Photograph 3-1: Pond A



Photograph 3-2: Pond B



3.7 Other Notable Species

3.7.1 Amphibian and Reptiles

No incidental sightings of amphibians or reptiles were made during the protected species surveys in 2024, nor were any records within 2km of the Site within the last 15 years returned by the desk study data search. Surveys in 2022 noted the presence of common toad and common lizard.

Suitable habitat for amphibians exists throughout the Site including the two ponds noted above, and the Site's numerous minor watercourses. Additionally, log piles are occasional throughout the Site which may provide suitable hibernacula for herpetofauna (TN 16). Rocks piles near excavations in the west of the Site could similarly provide hibernacula and basking opportunities for reptiles (TN 17).

4.0 Summary and Conclusions

The following protected species were confirmed to be present or likely to be present within the Site and should be considered within the EIA:

- Otter;
- Red squirrel;
- Badger;
- Pine marten; and
- Amphibians and reptiles.

Appendix A Figures

A.1 Figure 8.3.1 Riparian Protected Species

A.2 Figure 8.3.2 Terrestrial Protected Species

A.3 Figure 8.3.3 Great Crested Newt Habitat Suitability Index Survey

SLR Project No.: 428.V12085.00001

3 August 2026

Revision: 01

268000 269000 270000 271000 272000

687000 686000 685000

T1 T2 T3 T4

Cringate Cairn Kindrick Water Ford Weir Waterfall Sheepfold Easter Cringate Earl's Burn Sluice Wind Fa

Sir John de Graham's Castle Motte & Bailey

Quarry (Stone) Cairnoch Hill 413 Smallburn B818

Craigannet Hill Craigannet Craig Craigannet Easterton

Quarry (disused) Haugh Hill Priest's Croft Burial Gd Muir

Carron Valley Reservoir

0 0.25 0.5 1 Kilometres

N

LEGEND

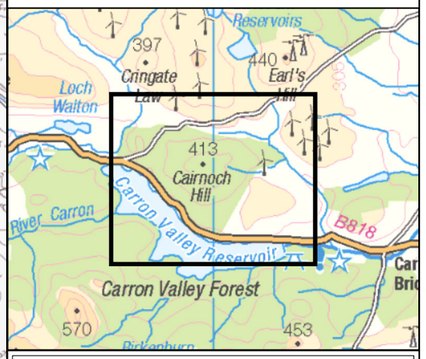
- Site Boundary
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Crane Pad / Hardstanding
- Proposed Substation Compound
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Blade Laydown Area
- Watercourse (OS OpenMap Local)
- Waterbody (OS OpenMap Local)
- Site Boundary 200 m Buffer

Otter Field Sign (2022)

- Potential Holt
- Potential Couch
- Feeding Signs
- Path
- Spraint

Otter Field Sign (2024)

- Potential Holt
- Spraint



Eurowind Energy™

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.3 - PROTECTED SPECIES

RIPARIAN PROTECTED SPECIES

FIGURE 8.3.1

Scale 1:15,000 @ A3

Date JUNE 2026

428.V12085.00001.0129.0 Riparian Protected Species

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268000 269000 270000 271000 272000

687000 686000 685000

N

T1 T2 T3 T4

Pond A

Pond B

0 0.25 0.5 1

Kilometres

LEGEND

- Site Boundary
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Crane Pad / Hardstanding
- Proposed Substation Compound
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Blade Laydown Area
- Watercourse (OS OpenMap Local)
- Waterbody (OS OpenMap Local)

HSI Category

- Excellent
- Average

Eurowind Energy™

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CAIRNOCH HILL WIND FARM

EIAR - TA 8.3 - PROTECTED SPECIES

GREAT CRESTED NEWT HABITAT SUITABILITY INDEX SURVEY

FIGURE 8.3.3

Scale 1:15,000 @ A3

Date JUNE 2026

428.V12085.00001.0131.0 GCN Habitat Suitability Index Survey

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Appendix B Protected Mammal Survey Target Notes

SLR Project No.: 405.065072.00001

3 August 2026

Revision: 01

Table B 1: 2024 Protected Mammal Survey Target Notes

Target Note	Species	Evidence	Date	Grid Reference	Description
1	Otter	Potential Holt	22.05.2024	[redacted]	Potential bankside holt. Tunnel with well-worn edges extends into the bank with a potential old latrine outside
2	Otter	Spraint	30.08.2024		Non-intact spraint under bridge
3	Otter	Spraint	22.05.2024		Intact spraint under culvert
4	Otter	Spraint	30.08.2024		Non-intact spraint close to bridge
5	Otter	Spraint	22.05.2024		Multiple potential spraints under mossy overhang. Limited access so not confirmed
6	Otter	Spraint	30.08.2024		Non-intact spraint on bankside
7	Badger	Main sett	21.08.2024		Main sett with 10 entrances: 9 well used, 1 disused.
8	Badger	Annexe sett	21.08.2024		Annexe sett with 5 entrances: 2 well used, 1 partially used, 2 not in current use
9	Badger	Foraging signs	21.08.2024		Area of fresh digging and snuffling indicative of badger foraging
10	Badger	Territory marking	27.08.2024		Dung heap at woodland edge.
11	Pine marten	Territory marking	30.08.2024		Potential scat within area of dense scrub
12	Pine marten	Territory marking	23.08.2024		Scat at edge of track.

Target Note	Species	Evidence	Date	Grid Reference	Description
13	Pine marten	Territory marking	23.08.2024	[redacted]	Forest ride with 3 individual scats along length
14	Pine marten	Territory marking	27.08.2024		Potential scat along path through felled woodland.
15	Pine marten	Territory marking	1.05.2024		Scat confirmed via eDNA testing
16	Reptile/ amphibian	Suitable hibernacula	23.05.2024		Log pile providing suitable hibernacula for herpetofauna
17	Reptile/ amphibian	Suitable hibernacula	30.08.2024		Rock piles providing suitable hibernacula for herpetofauna

Table B 2: 2022 Protected Mammal Survey Target Notes

Target Note	Species	Evidence	Grid Reference	Description
1	Otter	Potential couch	[redacted]	Sheltered alcove under turned up tree roots on east side of watercourse. Two non-intact spraints present on rocks inside. Mammal path leading from couch to watercourse
2	Otter	Feeding remains		Feeding remains on top of boulder on remains of a dyke wall, located within 30m of a watercourse
3	Otter	Path		Mammal path adjacent to fence line, with otter feeding remains present next to it
4	Otter	Spraint		Non-intact spraint on rock next to culvert outlet
5	Otter	Spraint		Non-intact spraint on rock next to culvert outlet
6	Otter	Spraint		Non-intact spraint on rock next to culvert outlet
7	Otter	Spraint		Non-intact spraint on rock next to culvert outlet
8	Otter	Spraint		Non-intact spraint on rock next to culvert outlet
9	Otter	Spraint		Intact spraint on rock next to culvert outlet
10	Otter	Spraint		Three non-intact spraints on boulder on east bank of watercourse
11	Otter	Spraint		Non-intact spraint close to east bank of watercourse
12	Otter	Spraint		Non-intact spraint on tussock on east bank of watercourse

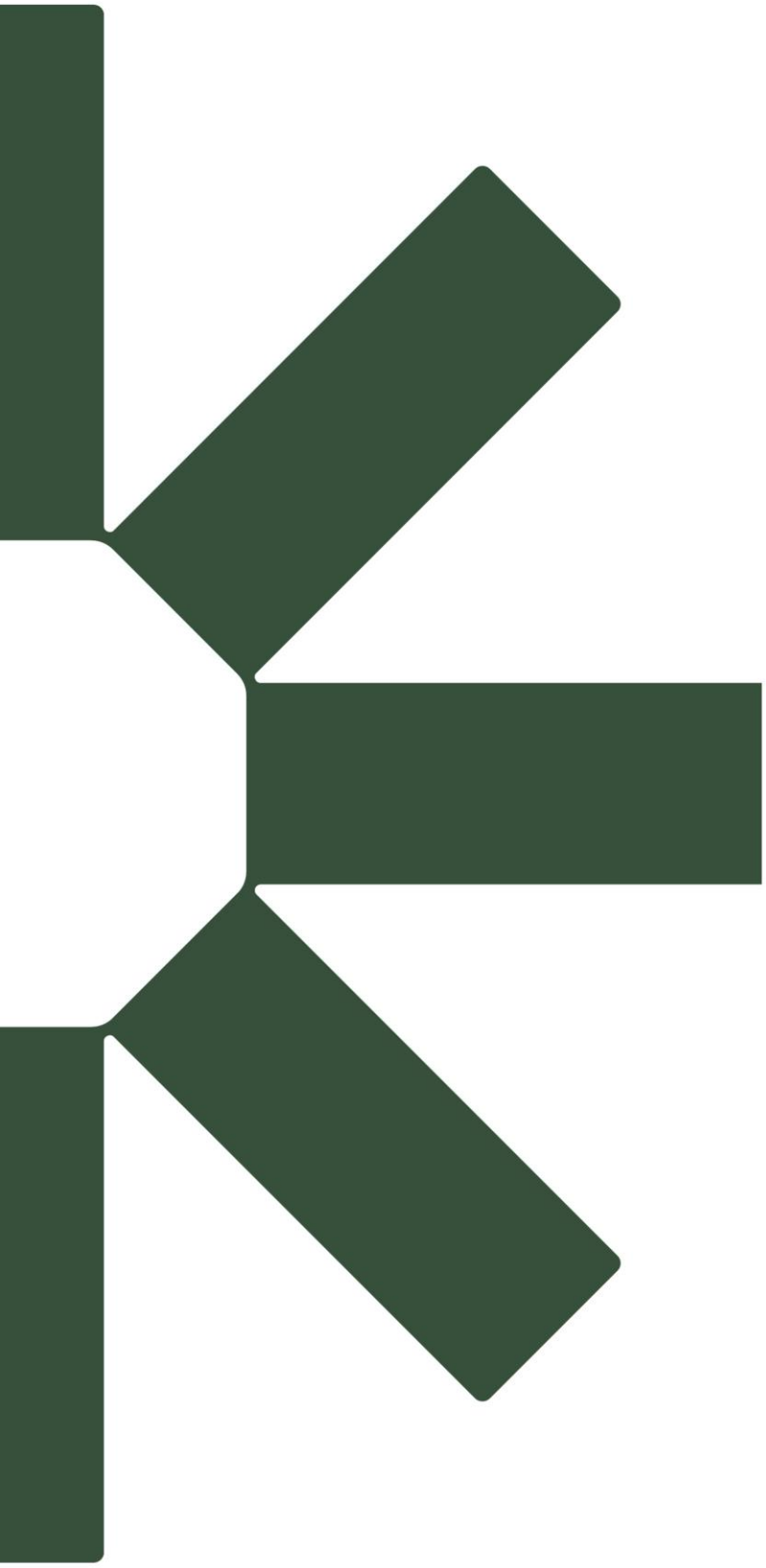
Target Note	Species	Evidence	Grid Reference	Description
13	Otter	Spraint	[redacted]	Two non-intact otter spraints on boulder on south side of watercourse
14	Otter	Spraint		Remains of a non-intact spraint on rock on east bank of watercourse
15	Otter	Spraint		Non-intact on rocks on west bank of watercourse
16	Otter	Spraint		Intact spraint on boulder in centre of watercourse
17	Otter	Spraint		Non-intact spraint on boulder in centre of watercourse
18	Otter	Spraint		Intact spraint on boulder in centre of watercourse
19	Otter	Spraint		Intact spraint on boulder in centre of watercourse
20	Otter	Spraint		Sprainting site
21	Otter	Path		Mammal path (likely otter) running along the western bank of the watercourse
22	Otter	Spraint		Intact spraint next to mammal path on west side of watercourse
23	Otter	Spraint		Intact spraint on rock at edge of watercourse
24	Otter	Feeding remains		Feeding remains on top of mossy stump next to watercourse
25	Otter	Spraint		Non-intact spraint on rock in centre of watercourse, comprised of bones and scales
26	Otter	Potential resting location		Potential resting location (couch) on south bank of watercourse, comprised of a small sheltered alcove extending both into the bank and sideways approximately 50cm. Three large, non-intact spraints present on boulder at entrance to feature.
27	Otter	Spraint		Intact spraint on rock in centre of watercourse
28	Otter	Spraint		Non-intact spraint on rock in centre of watercourse
29	Otter	Spraint		Intact spraint on rock in centre of watercourse
30	Otter	Spraint		Intact spraint on rock in centre of watercourse
31	Otter	Spraint		Several intact otter spraints on cement structures underneath bridge
32	Otter	Spraint		Non-intact spraint on rock in watercourse, contained scales and bones

Target Note	Species	Evidence	Grid Reference	Description
33	Otter	Spraint	[redacted]	Non-intact spraint on rock in watercourse, comprised of scales and bones
34	Otter	Spraint		Non-intact spraint on rock on south bank of watercourse
35	Otter	Spraint		Intact spraint at base of mature Sitka spruce on north bank of watercourse
36	Otter	Spraint		Non-intact otter spraint on small tussock next to watercourse within an area of marshy ground
37	Otter	Spraint		Non-intact spraint noted on spoil mound of badger sett - suggesting potential use by otter
38	Otter	Spraint		Non-intact spraint on rock in centre of watercourse
39	Otter	Spraint		Non-intact spraint on rock on north bank of watercourse
40	Otter	Spraint		Intact otter spraint on rock in centre of watercourse
41	Otter	Spraint		Two non-intact spraints on rock in centre of small watercourse
42	Otter	Spraint		Non-intact spraint on soil mound next to edge of reservoir
43	Otter	Spraint		Non-intact spraint on peat substrate next to reservoir
44	Otter	Spraint		Non-intact spraint on peat substrate next to reservoir
45	Otter	Spraint		Intact spraint on rock in centre of watercourse
46	Otter	Spraint		Non-intact spraint on rock in centre of watercourse
47	Otter	Spraint		Non-intact spraint on rock in centre of watercourse
48	Otter	Spraint		Multiple non-intact spraints
49	Otter	Spraint		Non-intact spraint and area of lying up under tree fall roots next to watercourse
50	Otter	Spraint		Non-intact spraints at side of stream
51	Otter	Spraint		Non-intact spraint on bank of watercourse
52	Otter	Spraint		On rock in stream
53	Otter	Couch		Multiple spraint found under covered sections of watercourse
54	Otter	Spraint		Non-intact otter spraint on rock in centre of watercourse
55	Otter	Potential holt		Multiple spraints found under moss tunnel that extends across watercourse 70cm

Target Note	Species	Evidence	Grid Reference	Description
56	Otter	Spraint	[redacted]	Multiple spraints under bridge
57	Otter	Couch		Multiple spraints found within concrete tunnel at the side of watercourse
58	Otter	Spraint		Non-intact spraint found on rock
59	Otter	Spraint		Non-intact spraint on small wooden bridge
60	Otter	Feeding remains		Amphibian feeding remains on top of log
61	Otter	Spraint		Non-intact spraint on rock next to sedge overhang
62	Otter	Spraint		Non-intact spraint 10m from shoreline
63	Otter	Spraint		Non-intact spraint on rock at edge of reservoir
64	Otter	Spraint		3x non-intact spraints on rock
65	Otter	Spraint		2x non-intact spraints on rock
66	Otter	Spraint		Non-intact spraint
67	Otter	Spraint		Non-intact spraint on rock ledge
68	Otter	Spraint		2x non-intact spraints on tussock ledge
69	Otter	Spraint		Non-intact spraint in reeds
70	Otter	Spraint		Non-intact spraint on grass
71	Otter	Spraint		Non-intact spraint on grass
72	Otter	Spraint		x5 non-intact spraints on large boulder
73	Otter	Spraint		Intact spraint on rock
74	Otter	Spraint		Remains of non-intact spraint
75	Otter	Spraint		x2 non-intact spraint on rock amongst willow
76	Otter	Spraint		1 non-intact and 1 intact spraint at edge of reservoir
77	Otter	Spraint		Non-intact spraint at east bank
78	Otter	Spraint		x2 non-intact spraints on small rock
79	Water vole	Potential burrow		One burrow within the bank of the watercourse large enough for water vole but with no further evidence
80	Badger	Feeding signs		Snuffle holes in grass on west bank of watercourse
81	Badger	Path		Mammal path next to watercourse leading under fence
82	Badger	Sett		Two sett entrances on south facing slope within mature Scots pine woodland - large spoil heaps and fresh bedding, suggesting active. A well-defined path leading E-W to and from setts was also evident.

Target Note	Species	Evidence	Grid Reference	Description
83	Badger	Sett	[redacted]	Following a mammal path E-W through woodland leads to two further sett entrances. One contained a very large spoil heap and bedding material at entrance. The second, slightly less active entrance was located approximately 12m from larger entrance
84	Badger	Sett		Recently excavated sett entrance with fresh, sandy spoil mound. Badger prints and a single hair identified at entrance. Mammal path continuing between sett entrances.
85	Badger	Sett		Two further sett entrances with relatively recent spoil mounds. Badger print evident on one spoil mound, while an old otter spraint was noted on the other.
86	Badger	Latrine		Latrine within 20m of watercourse
87	Badger	Outlier sett		No evidence of recent use but spoil heap and clear entrance indicates it can be used with little effort
88	Pine marten	Territory marking		Fresh scat on forest track.
89	Pine marten	Territory marking		Potential scat on old overgrown forestry track. Curled and composed primarily of fur. No strong smell.
90	Pine marten	Territory marking		Potential scat on forest ride. Curled and composed bones and fur. No strong smell.
91	Red squirrel	Feeding signs		Numerous chewed cones at base of Sitka spruce trees in woodland
92	Red squirrel	Feeding signs		Numerous chewed cones at base of Sitka spruce trees in woodland
93	Red squirrel	Potential drey		Numerous chewed cones at base of Sitka spruce trees in woodland
94	Red squirrel	Feeding signs		Potential drey near crown of Sitka spruce tree in centre of woodland block. Located on NE aspect of tree, approximately 18m above ground level. Small, spherical structure measuring approximately 25x30cm. No feeding signs nearby. Surrounding ground cover is wet.
95	Common toad	Observation		N/A
96	Common lizard	Observation		N/A
97	Common lizard	Observation		N/A
98	Common lizard	Observation		N/A

Target Note	Species	Evidence	Grid Reference	Description
99	Great crested newt	Suitable waterbody	[redacted]	Pond with Average suitability for GCN
100	Brown hare	Observation		N/A
101	Bank vole	Burrows and droppings		Burrows and runways all around the edge of two ponds found close to remains of ruins



Making Sustainability Happen

Technical Appendix 8.4: Bat Report

Cairnoch Hill Wind Farm

Eurowind Energy Limited

58 Morrison Street, Edinburgh, Scotland, EH3 8BP

Prepared by:

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SLR Project No: 428.V12085.00001

3 August 2026

Revision: 01

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
01	3 August 2026	E. MacRae	S. Toule	S. Toule

Basis of Report

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1.0 Introduction

1.1 Background

SLR Consulting Ltd ('SLR') was appointed by Eurowind Energy Limited ("the Applicant") to undertake bat surveys for the proposed Cairnoch Hill Wind Farm (hereafter referred to as "the Proposed Development"). The surveys are focused on the Proposed Development location ("the Site"), specifically the area within the Site boundary.

The Proposed Development comprises of up to four wind turbines with associated works and infrastructure including: forestry works; crane hardstandings; access tracks; cabling; a borrow pit; temporary construction compounds; a single substation including control building and a permanent anemometry mast. The maximum blade tip height of the wind turbines would be 180m. The Site layout is presented on **Figure 8.4.1**.

This report presents the results of the bat surveys carried out between April and October 2024 across the Site plus a 50m buffer (where accessible), hereafter the 'Study Area', as shown on **Figure 8.4.1**. This report was written in 2024 upon completion of the bat surveys, and only minor changes have been made subsequently.

Bat activity surveys were previously conducted within the 2022 bat activity season (April to October) within the Site to inform an earlier variation of the application boundary and turbine layout. Due to the time elapsed between surveys and submission, and designs changes, surveys were repeated in 2024, with surveys targeting the most recent turbine layout within the Site at the time of deployment. Due to the movement of turbines within the Site boundary after the bat activity surveys, three of the 2022 bat static data sets were analysed to provide greater spatial coverage within the Site as these were closer to the final turbine locations. This was to ensure that no additional species, or significantly different levels of activity were identified at the location of the new turbines; the 2022 data has not been used to inform the collision risk assessment in the EIA Report. Statics B, D and F from the 2022 monitoring period were analysed, their locations are provided in **Appendix F**. The results of the 2022 survey are not discussed in depth within this report, however, a summary of the findings are presented in **Appendix F**.

1.2 Site Description

The Site is centred on National Grid Reference NS 69768 85606, located at Cairnoch Hill, to the north of Carron Valley Reservoir. The Site is approximately 6km north of Kilsyth and 6km east of Fintry, within the Stirling Council administrative area. The Site predominately lies within the Forth River Trust catchment, with the western zone of the Carron Valley reservoir lying within the Loch Lomond Fisheries Trust catchment.

The land within the Site boundary is managed as plantation woodland by Forestry Land Scotland. Several small watercourses run through the Site draining south in the Carron Valley Reservoir on the southern side of the B818 road. Watercourses at the north west and west side of the Site drain into Endrick Water and those at the north east and east side of the Site drain into Earl's Burn.

1.3 Surrounding Area

The surrounding landscape consists of areas of grazing pasture and coniferous plantations with the Carron Valley reservoir situated south of the Site boundary. There are three operational wind farms (Craigengelt, Earlsburn and Earlsburn North), two consented wind farms (Shelloch, and Earlsburn Extension), and one 'in planning' wind farm (Drummarnock) within 10km of the Site. There are four residential properties/farms close to the Site (within

1km), the nearest of which are located immediately south of the Site on the northern side of the B818.

1.4 Scope of Study

The aim of the surveys was to obtain baseline information relating to use of the Site by bats and associated levels of activity.

Specific study objectives were to:

- Assess the suitability of habitats within the Site for supporting commuting, foraging and roosting bats;
- Identify the bat species assemblage using the Site;
- Assess the level of activity of all bat species recorded at the Site, both spatially and temporally; and
- Where possible, assess the potential risk of wind turbine-related impacts for each bat species recorded within the Site.

The assessment of ecological effects as a result of the Proposed Development and any recommended mitigation, compensation and enhancement measures is beyond the scope of this study and is instead presented separately within **Chapter 8: Ecology** of the Environmental Impact Assessment (EIA) Report.

1.5 Relevant Legislation

All bats in Scotland are classed as European protected species and receive full protection under both national and international legislation (**Appendix A**). The overarching aim of this legislation is to protect, restore and maintain populations of protected bat species at favourable conservation status[1] . It is therefore an offence to intentionally or recklessly kill, injure or disturb any bat, or damage or destroy a bat roost.

While bat fatalities associated with wind farms are generally considered to relate to 'incidental' killing[2] and are unlikely to class as an offence, once a certain level of fatality impact is reached, such killing may cease to be incidental and become classified as intentional or reckless. It is therefore important to understand what species of bat utilise the Site, and how they use it, so that any potential impacts on populations can be adequately assessed, avoided, and/or mitigated for, to ensure compliance with relevant legislation.

2.0 Methodology

2.1 Desk Study

A desk-based study was carried out in April 2024 to gather information relating to existing records of bat species within the Site and surrounding area. This included:

- A search for statutory designated sites (for which bats are a qualifying feature) within 10km of the Site boundary, conducted through the NatureScot Sitelink website[3];

[1]'Favourable conservation status' describes as situation on which a species is thriving throughout its natural range and is expected to continue to thrive in the future.

[2] As described in page 49, paragraph 83 of 'Guidance document on the strict protection of animal species of Community interest under the Habitats Directive 92/43/EEC (2007)'. Available at: https://ec.europa.eu/environment/nature/conservation/species/guidance/pdf/guidance_en.pdf

[3] https://sitelink.nature.scot.home

- A data request for bat records (relating to flight records and roosting bats) within 10 km of the Site boundary, submitted to The Wildlife Information Centre (TWIC);
- A review of aerial imagery (Google Earth[4]) to identify habitats within the Site and surrounding area that bats may utilise for commuting, foraging or roosting purposes.

Where possible, data relating to bats were also gathered from existing ecological records collected to inform Environmental Statements (ESs) and EIA Reports for nearby renewable development projects, including:

- Shelloch Wind Farm;
- Craigton and Spittalhill Wind Farm;
- Craigengelt Wind Farm; and
- Earlsburn Wind Farm.

2.2 Field Surveys

The field survey methodology was designed in accordance with current wind farm specific guidelines developed by NatureScot [5] and general bat survey good practice guidelines developed by the Bat Conservation Trust (BCT) [6]. Full details of each survey type are provided in Sections 2.2.1 to 2.2.3; in instances where the methodology deviates from current guidelines, a rationale has been provided.

Automated bat surveys at height were excluded on the basis that they are unlikely to detect the presence of any species not already recorded using detectors at ground level.

Walked transect surveys for bats were also excluded at this stage; the NatureScot guidelines state that their applicability is discretionary and site-specific. At this Site there are health and safety issues associated with walked transect surveys over felled woodland and coniferous plantation at night.

2.2.1 Daytime Bat Walkover

In accordance with BCT guidelines, a Daytime Bat Walkover (DBW) of the Site was undertaken in May 2024. A DBW is a high-level appraisal of the Site and surrounding habitats suitability to support roosting, foraging and commuting bats, with the aim to assess the requirement and scope of further bat surveys.

Any trees, structure and other features on the Site that could be suitable for bats to roost in, and any habitats that could be suitable for commuting, foraging or swarming, were identified and recorded. A preliminary assessment of suitability was given at this stage (e.g. negligible, low, moderate, high), to be refined during the more detailed assessments.

The DBW was focussed primarily on mature trees and standing deadwood as these are significantly more likely to have features than the Site's juvenile and semi-mature coniferous plantations. These dense plantation woodlands were minimally entered due to access constraints and the lack of suitable roosting features as identified from the woodland edge.

[4] https://earth.google.co.uk/

[5] NatureScot (2021) Bats and onshore wind turbines – survey, assessment and mitigation. Available online at https://www.nature.scot/doc/bats-and-onshore-wind-turbines-survey-assessment-and-mitigation#:~:text=3.-,ASSESSING%20POTENTIAL%20IMPACTS,other%20forms%20of%20anthropogenic%20mortality)

[6] Collins, J. (ed.) (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition). The Bat Conservation Trust, London. ISBN-978-1-7395126-0-06.

2.2.2 Ground-Level Tree Assessment

Any trees on the Site that were identified as having potential suitability for roosting bats during the DBW were subject to a Ground-level Tree Assessment (GLTA) on 23 May 2024.

Trees were systematically inspected around the entire trunk for Potential Roosting Features (PRFs). Features that were searched for included, but were not limited to; woodpecker holes, squirrel holes, knot holes, tear outs, wounds, cankers, butt rots, lightning strikes, hazard beams, cracks, snaps, lifting bark, fluting and dense ivy. Torches were used to inspect any lower features and binoculars employed to inspect the upper trunk and any high branches. External evidence of bat use such as droppings, urine staining, audible squeaking and odour were searched for.

The suitability of trees to support bats was categorised under BCT guidelines, see **Table 2-1.**

Table 2-1: BCT Guidelines for Assessing Suitability of Trees for Bats

Suitability	Description
NONE	Either no PRFs in the tree or highly unlikely to be any.
FAR	Further assessment required to establish if PRFs are present in the tree.
PRF	A tree with at least one PRF present.

Any PRFs identified were then further categorised under BCT guidelines, see **Table 2-2**.

Table 2-2: BCT Guidelines for Categorising the Potential Suitability of PRFs for Bats

Suitability	Description
PRF-I	PRF is only suitable for individual bats or very small numbers of bats either due to lack of size or lack of suitable surrounding habitats.
PRF-M	PRF is suitable for multiple bats and may therefore be used by a maternity colony.

2.2.3 Bat Activity Surveys

NatureScot guidance[5] states that the survey effort should be focused in areas of the Site where wind turbines are proposed, in order to provide a representative sample of bat activity at or close to these points. For sites containing less than 10 wind turbines, detectors should be placed at each proposed turbine location.

Based on the proposed four wind turbine layout that was the most up to date at the time of the surveys in 2024, a programme of bat activity surveys using full spectrum static bat detector units (Wildlife Acoustics SM4BAT-FS Ultrasonic Bat Detectors) was planned and carried out near each of the proposed wind turbine locations, during the 2024 active bat season (extending from April to mid-September in Scotland). A total of eight detectors were deployed to provide coverage of a large part of the Site and account for likely changes to the design during and after the survey period. Details relating to the location and positioning of each static detector are detailed in **Appendix B** and shown on **Figure 8.4.2**.

Each static detector unit was set to record bat activity for a minimum period of 10 consecutive nights per season, with each night of monitoring commencing approximately 30 minutes before sunset and ending 30 minutes after sunrise. The dates and timings of each static detector survey period are provided in **Table 2-3**.

The 2022 surveys were conducted in accordance with NatureScot guidance[5] and targeted the proposed turbine layout at the point of survey. A total of 11 bat statics were deployed throughout the Site. As stated in Section 1.1 only three of these were analysed to provide

greater spatial coverage within the Site as these were closer to the final turbine locations. Statics B, D and F from the 2022 monitoring period were analysed, their locations are provided in **Appendix F.**

Table 2-3: Summary of Static Detector Survey Dates

Survey Period	Deployment – Collection Dates	Dates Chosen for Analysis
Spring	1 April – 1 May 2024	21 April – 30 April
Summer	25 July – 12 August 2024	25 July – 4 August
Autumn	24 September – 8 October 2024	26 September – 5 October

Where possible, static detector deployment was targeted for periods where the weather forecast indicated the best possible chance for suitable weather conditions (i.e. dusk temperature of 8^{o}C or above (in Scotland), ground level wind speed of 5 m/s or lower, and no rain/very light rainfall). To accommodate for variable weather conditions, static detectors were deployed for a minimum period of 14 nights during each season to maximise the chances of obtaining 10 nights of data recorded during optimal weather conditions.

2.2.3.1 Weather data

Due to technical issues associated with set-up of SLR's own Davis VantageVue weather station, it was not possible to collect on-Site data for the survey periods. Instead, rainfall data for the deployment periods was obtained by request from the Scottish Environmental Protection Agency (SEPA) from the nearby Earlsburn reservoir weather station, located approximately 3km north of the Site.

Additional historic weather data for the Site, including sunset/sunrise times and temperature, were collected online[7]. Weather data is available in **Appendix D**.

2.3 Bat Sonogram Analysis

Bat echolocation calls recorded during activity surveys were analysed in full spectrum format using Kaleidoscope Pro software. An automatic identification (auto-ID) filter within Kaleidoscope Pro was initially applied to assign calls to likely species, using a 'Bats of Europe' filter. This software is designed to automatically assign recorded echolocation calls with bat species that produce the same echolocation call structure. While the software is efficient, it is not totally infallible. Manual classification of echolocation files was therefore carried out by an experienced member of staff, with reference to guidance outlined in Russ (2021)[8], for the following:

- All files (100%) recorded as bat species through the auto-ID system;
- All files (100%) recorded as 'no-ID' through the auto-ID system; and
- Spot checks and amendment, where required, of at least 25% of total noise files recorded through the auto-ID system.

Due to close similarities in the echolocation call structure of certain species, some echolocation files were identified to genus level only. This is of relevance to species of the following genera:

[7] Time and Date historic weather for Denny, Scotland. Available online: https://www.timeanddate.com/weather/@2651366/historic [accessed 05/11/2024]

[8] Russ, J. (ed) (2021) *Bat Calls of Britain and Europe. A Guide to Species Identification*. Pelagic Publishing, Exeter.

- *Myotis* species – Daubentons *Myotis daubentonii*, Natterers *Myotis nattereri*, or whiskered bat *Myotis mystacinus*;
- *Nyctalus* species – Noctule *Nyctalus noctula* or Leislers bat *Nyctalus leisleri*; and
- *Pipistrellus* species – common, soprano, or Nathusius' pipistrelle *Pipistrellus nathusii*.

For the comparison of results, a quantity called a 'bat pass' has been applied within this report. A bat pass has been defined as a file generated by the bat detector, which contains two or more bat echolocation pulses (likely attributed to the same bat). The detectors are programmed to generate a new file when no bat call has been detected for at least one second. The number of bat passes may not relate to the number of bats present in one sample location (as one bat may make several passes); yet rather, gives an indication of the level of bat activity in that location over each recording period.

2.4 Collision Risk Assessment

The vulnerability of bat related injury or mortality associated with collision with wind turbines or barotrauma[9] is largely dependent on the positioning of wind turbines in relation to bat activity levels[5].

Bat species data, and associated activity levels recorded within the Site can therefore be assessed to establish their vulnerability to collision as a result of the Proposed Development. This assessment is based on three main factors:

- Relative abundance;
- Collision risk; and
- Bat activity recorded within the Site.

Table 2-4 sets out relative abundance and potential collision risk of each species known to be present in Scotland and indicates potential vulnerability of such species populations.

Table 2-4: Potential Collision Risk and Population Vulnerability of Bat Species Known to be Present in Scotland

	Low Collision Risk	Medium Collision Risk	High Collision Risk
Common species	N/A	N/A	Common pipistrelle Soprano pipistrelle
	Low vulnerability	**Low vulnerability**	**Medium vulnerability**
Rarer species	Brown long-eared Daubentons Natterers	N/A	N/A
	Low vulnerability	**Medium vulnerability**	**High vulnerability**
Rarest species	Whiskered Brandt's	N/A	Nathusius' pipistrelle Noctule Leislers
	Medium vulnerability	**High vulnerability**	**High vulnerability**

[9] Barotrauma describes injuries that occur when a bat encounters sudden and extreme changes in atmospheric pressure as a result of rotating turbine blades. This rapid change in pressure can rupture air containing tissues in bats (e.g. the lungs), resulting in fatal internal bleeding.

The assessment of the potential risk to bats as a result of Proposed Development is conducted through a two-stage process, as summarised in Sections 2.4.1 and 2.4.2.

2.4.1 Stage 1 – Initial Site Risk Assessment

The initial site risk assessment considers an assessment of habitat risk (based on results of the habitat suitability appraisal for the Site) and the size of the Proposed Development. The full method for assessing potential Site risk is outlined in **Appendix E**.

2.4.2 Stage 2 – Overall Risk Assessment

The overall risk to populations of bat species is usually calculated by multiplying the initial Site risk (**Appendix E**) with the level of bat activity generated through an online tool called Ecobat[10]. Ecobat was designed to compare activity data recorded on-site (entered by the user) with bat data collected within a defined search area at the same time of year and, (where possible) in comparable weather conditions. However, as Ecobat was shut down at the time of writing, it was not possible to generate results for bat activity levels within the Site relative to those in the surrounding area and quantitative collision risk scores for high collision risk bat species. Please refer to Section 2.6 for further details.

2.5 Survey and Data Analysis Personnel

Table 2-5 provides detail of the SLR staff who carried out baseline bat survey work and assessment as part of this study.

Table 2-5: SLR Survey Personnel

Name and Position	Professional Membership	Experience	Tasks conducted
Dr Amy Green (Senior Ecologist)	Qualifying member of CIEEM	3 years	Static detector/weather station deployment and collection
Euan Macrae (Project Ecologist)	Qualifying member of CIEEM	2 years	Static detector/weather station deployment and collection
Sophie McPeake (Project Ecologist)	Qualifying member of CIEEM	1.5 years	Static detector/weather station deployment and collection and GLTA
Rachel McLeod (Project Ecologist)	Qualifying member of CIEEM	3.5 years	Sound analysis
Amy Gill (Senior Ecologist)	Associate member of CIEEM (ACIEEM)	8 years	Sound analysis quality assurance review and technical reporting
Callum Taylor (Senior Ecologist)	Qualifying member of CIEEM	5 Years	GLTA and DBW

[10] Lintott, P. R., Davison, S., Breda, J., Kubasiewicz, L., Dowse, D., Daisley, J. & Mathews, F. (2018). *Ecobat: An online resource to facilitate transparent, evidence-based interpretation of bat activity data.* Ecology and Evolution 8(2): 935-941.

2.6 Limitations

2.6.1 Bat Activity Survey

2.6.1.1 General

This study provides a 'snapshot' of bat activity prevailing at the time of the survey. Lack of evidence of any one protected bat species does not necessarily preclude them from being present on the Site at a later date. Whilst it is considered unlikely that evidence of additional bat species has been overlooked, due to the nature of the survey, it is feasible that some species may not have been recorded by virtue of habit or random chance.

2.6.1.2 Equipment

Due to an equipment malfunction, no data were collected at Static A during the spring survey period, nor at Statics C and H during the autumn survey period (See **Figure 8.4.2** and **Appendix B** for location details). Whilst unfortunate, malfunctions are relatively common when using static detectors at such sites. Despite this limitation, it is considered that data collected from the remaining statics during these time periods provide sufficient coverage and a suitable representation of bat activity within the survey area.

2.6.2 Sonogram analysis

Following analysis of echolocation recordings, data files are usually processed using the Ecobat online tool as detailed in Section 2.4.2. However, as the Ecobat online tool was shut down at the time of writing, it was not possible to generate results for bat activity levels within the Site relative to those in the surrounding area and provide collision risk scores for high collision risk bat species. Instead, the data gathered has been analysed and processed to show overall bat activity levels across the Site, as well as spatial and temporal variations recorded within the Site during the 2024 survey period. This data is considered to provide an accurate representation of bat activity within the Site at the time of the surveys and serves to effectively inform the EIA for the project.

3.0 Results

3.1 Desk Study

3.1.1 Statutory Designated Sites

No statutory or non-statutory designated sites for bats were identified within a 10km radius of the Site boundary.

3.1.2 Data Search

Data returned from TWIC identified historic records relating to at least five species of bats in flight within 10km of the Site; common pipistrelle, soprano pipistrelle, Daubenton's bat, Natterer's bat, Noctule, and species of the genera *Pipistrellus* and *Myotis*.

3.1.3 Existing Ecological Records

Records of common pipistrelle, soprano pipistrelle and *Myotis* species were recorded within the Shelloch, Spittalhill, and Craigton wind farms Environmental Statements.

3.2 Field Surveys

3.2.1 Daytime Bat Walkover

The coniferous plantation, which makes up the majority of the Site, is densely planted and the trees present are predominantly coniferous (Sitka spruce *Picea sitchensis* and lodgepole pine *Pinus contorta*). The plantation areas vary in age, with some areas of mature trees, in the north west and north east of the Site and felled and replanted areas through the rest of the Site. The four proposed turbine locations lie within or adjacent to coniferous plantation areas.

Full inspection of the Site's plantation areas was limited by the dense branches of the trees, and lack of accessibility into the coupes. All plantation woodland edge was fully inspected and no features suitable for roosting were identified in these areas during site surveys. Conifer plantation is generally considered unsuitable for roosting bats due to extremely cluttered drop zone from any roost feature. However, trees on the edge of plantation/rides may offer some suitability for roosting, as such bat roosting cannot be completely ruled out. Built structures on the Site included dilapidated walls and a ruined building, where no features suitable for roosting were identified. Overall, it is considered that **the Site has low suitability for bat roosting**.

The remaining habitats which largely comprise the rest of the Site include wet woodland, heath, degraded bog and neutral grassland. Open areas such as heath and grassland, and linear features such as forest rides and the Site's watercourses provide suitable foraging and commuting habitat for bats and connect the Site to the wider landscape. Overall, it is considered that **the Site has high suitability for foraging and commuting bats**.

In total, three trees with potential roosting features were identified within the Site during the DBW, as detailed in **Table 3-1**. Noted features included cracked limbs and trunk, peeling bark and woodpecker holes. The initial DBW assessment for all identified trees was **'Low'**. None of the three trees identified were within 100m of a proposed wind turbine location.

3.2.2 Ground-Level Tree Assessment

The three trees with PRFs were revisited for a full ground-level inspection during the GLTA. The GLTA confirmed that no tree or structure identified on the Site had features that were suitable for roosting bats. The three trees have therefore been given a GLTA assessment of **'None'**. No additional trees or structure within the Site which could be used by roosting bats were identified during the GLTA.

Table 3-1: DBW and GLTA Survey Target Notes

Target Note	Species	Grid Reference	Nearby Turbine Location(s)	Potential Roosting Features	DBW Assessment	GLTA Assessment	Photograph
1	Large-leaved lime *Tilia platyphyllos*	NS 69637 84427	None	Cracked limb, peeling bark	Low	NONE	
2	Standing deadwood	NS 69231 85593	T2, 200 m west of tree	Woodpecker hole, peeling bark	Low	NONE	

Target Note	Species	Grid Reference	Nearby Turbine Location(s)	Potential Roosting Features	DBW Assessment	GLTA Assessment	Photograph
3	Downy birch *Betula pubescens*	NS 68155 85679	T1, 300 m north-east of tree	Woodpecker holes, cracked trunk	Low	NONE	

3.2.3 Bat Activity Survey

Eight static detectors were deployed within the Site for a total of 536 nights during the 2024 active bat season, of which 240 nights were used for analysis. During this time, a total of 10,526 bat passes were recorded across the eight detectors combined. A summary of spatial and temporal patterns of bat activity for the Site as a whole, and general activity levels demonstrated by each species, is provided in Sections 3.2.3.1 to 3.2.3.4.

For a full set of tabulated results, please refer to **Appendix C**. Weather data corresponding with dates of the bat activity surveys are provided in **Appendix D**.

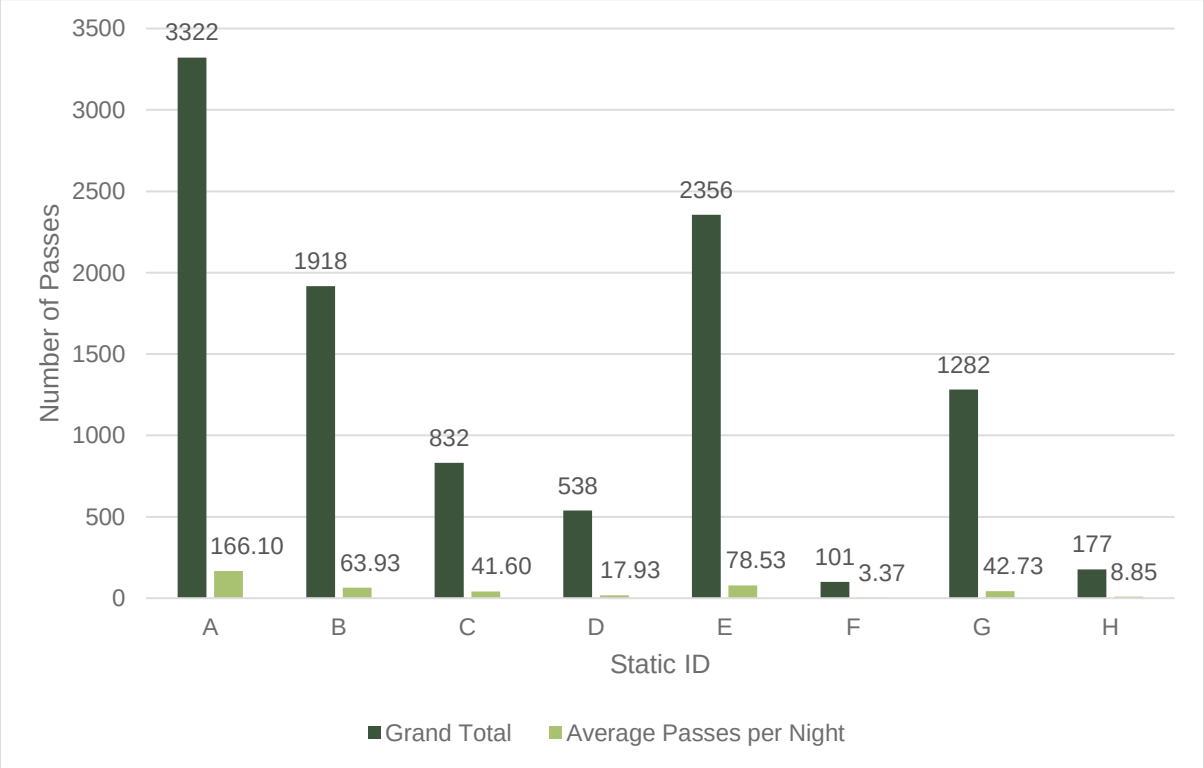
Results of the three static detectors analysed are not discussed within the report and provided in **Appendix F.**

3.2.3.1 Spatial Overview

The total number of bat passes recorded, and the average (mean) number of passes per night, at each static detector location within the Site, across the entire 2024 survey period, is shown in **Chart 3-1**. The information presented indicates that:

- The greatest number of passes overall was recorded at Static A, with a total of 3322 passes over 20 nights (averaging 166.10 passes per night[11]).
- Lowest overall bat activity was recorded at Static F, with a total of 101 passes over 30 nights (averaging 3.37 passes per night).

Chart 3-1: Total and average bat passes per night, per detector, recorded over the 2024 survey period



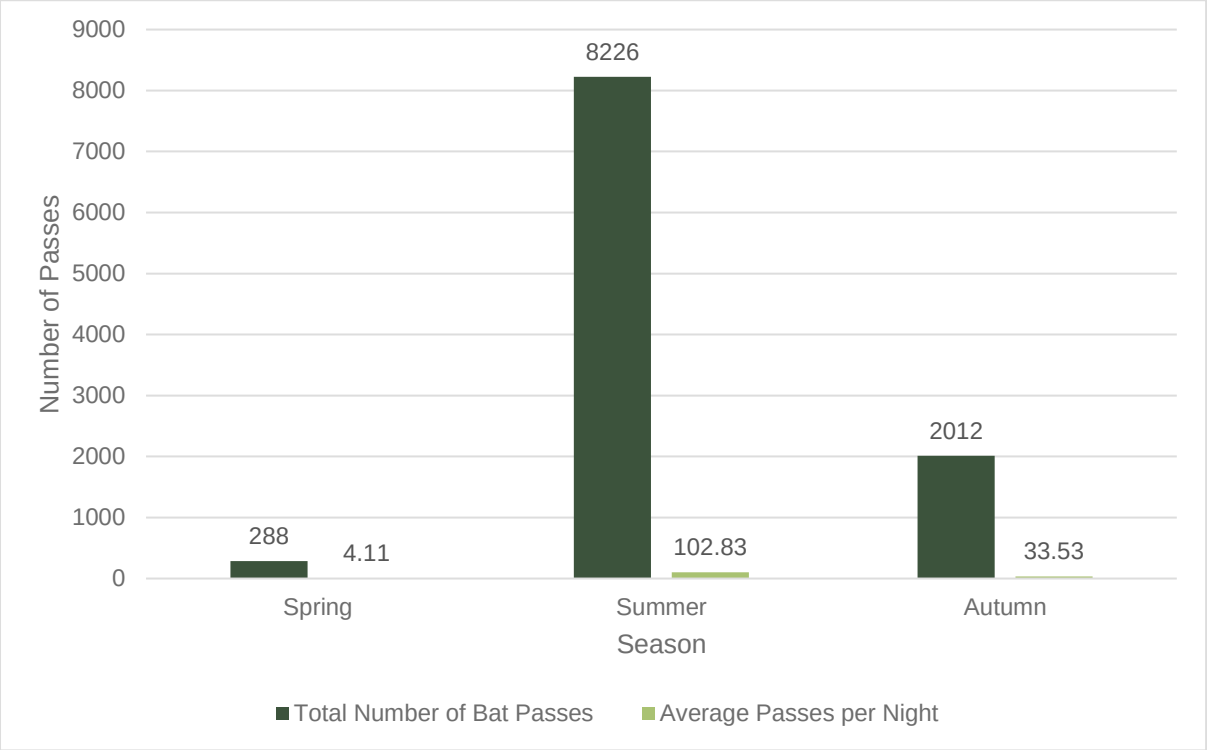
[11] Average passes per night, per static detector, were obtained by dividing the total number of passes at each detector by the total number of survey nights per detector. (The total number of survey nights per detector was 30, with the exception of Statics A, C and H which were active for 20 nights).

3.2.3.2 Temporal Overview

The total number of bat passes, and the average (mean) number of passes per night, recorded across the Site as a whole during each survey season is shown in **Chart 3-2**. The information presented indicates that:

- The greatest level of bat activity was recorded during the summer survey period, with a total of 8,226 passes (averaging 102.83 passes per night[12]);
- Lowest overall bat activity was recorded during spring, with a total of 288 passes (averaging 4.11 passes per night). It should however be noted that the true overall level of bat activity across the Site in spring and autumn may be slightly higher than reported due to a lack of data obtained at Static A during the spring, and Static C and H during the autumn (see Section 2.6 for details).

Chart 3-2: Total and average passes per night, per season, across the whole site



3.2.3.3 Activity by Species

Whole Site Overview

Data analysis identified at least six species of bat (including bat echolocation files classified into broader genera) utilising the Site during the survey period:

- Common pipistrelle;
- Soprano pipistrelle;
- Nathusius' pipistrelle;

[12] Average passes per night was obtained by dividing total number of passes per season by total number of survey nights (for all static detectors combined) per season. (Total number of survey nights per season: Spring - 70; Summer - 80; and Autumn - 60).

- *Pipistrellus* species;
- *Myotis* species;
- *Nyctalus* species; and
- Brown long-eared bat.

Chart 3-3 indicates that the most frequently recorded species within the Site was soprano pipistrelle, with a total of 7,856 passes recorded. This equates to 74.63% of total bat passes recorded within the Site during the survey period (**Table C1, Appendix C**). Overall levels of activity were generally moderate, averaging 37.41 passes per night during the full survey period.

Common pipistrelle was the second most frequently encountered species within the Site, with a total of 2,442 passes recorded (averaging around 11.63 passes per night). This equates to 23.20% of total bat passes recorded within the Site during the survey period.

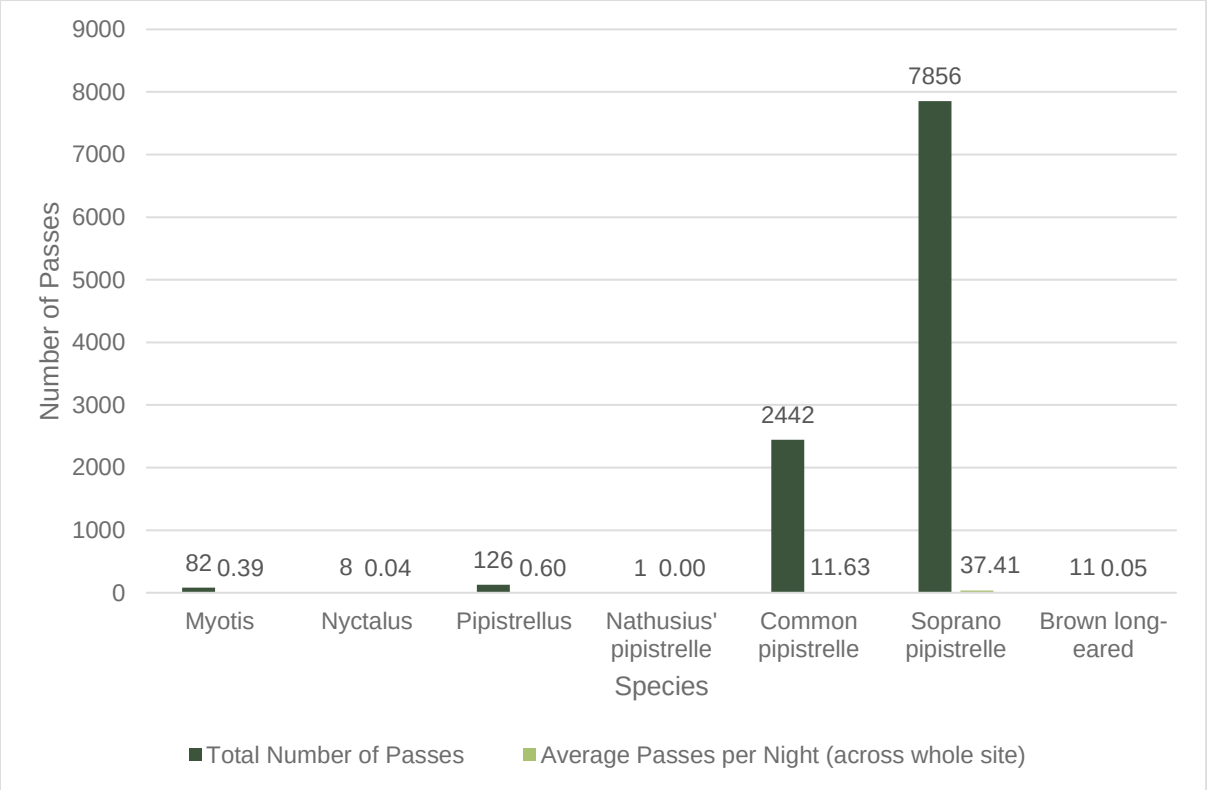
A further 126 passes were attributed to the genus *Pipistrellus* (common pipistrelle or soprano pipistrelle bats for which call frequency parameters overlapped). A single pass was attributed to Nathusius' pipistrelle.

Pipistrellus species as a whole accounted for over 99% of recorded bats within the Site during the survey period.

The remaining echolocation files were attributed to *Myotis* species (82 passes recorded during the entire survey period, equating to 0.78% of total passes), brown long-eared bat (11 passes recorded during the entire survey period, equating to 0.10% of total passes), and *Nyctalus* species (including both noctule and Leisler's bat[13]) (eight passes recorded during the entire survey period, equating to 0.08% of total passes).

[13] In accordance with Table 2-3, both noctule and Leisler's bat populations have high vulnerability to wind farms. Due to overlapping echolocation call parameters, separating between species can be challenging. For the purpose of this assessment, all echolocation calls associated with either noctule or Leisler's bat have therefore been grouped into the genus *Nyctalus*.

Chart 3-3: Total and average passes per night per species, across the whole site



Species-specific Temporal and Spatial Overview

Data relating to the total number of bat passes recorded at each static detector, per survey season, is provided in **Appendix C**. Species-specific total, mean and median bat passes per night, recorded at each static detector, per survey season, are provided in **Chart 3-4** to **Chart 3-9**. A summary account of the spatial and temporal occurrence of each species is provided below.

Common pipistrelle

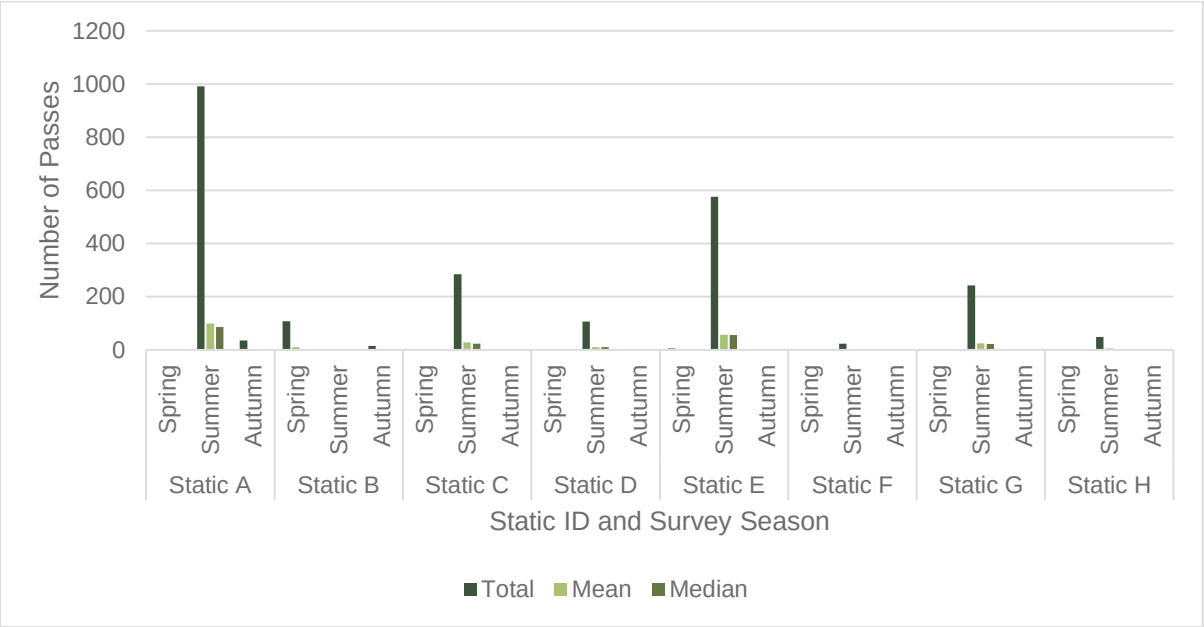
A summary of total, mean and median common pipistrelle passes per night, recorded at each static detector, per survey season, is provided in **Chart 3-4**. The data presented illustrate that:

- Common pipistrelle was recorded at all static detector locations during certain periods of the active bat season;
- The greatest levels of common pipistrelle activity were recorded during the summer survey period across all static detectors except for Static B which recorded no common pipistrelle passes during this time;
- The greatest overall activity in summer was recorded at Static A, during which time a total of 991 passes were recorded, averaging 99.1 passes per night, and median of 86 passes per night;
- Discounting Static B which recorded no passes, common pipistrelle activity was mostly evenly spread across survey nights over the summer, with no significant outliers. This resulted in a close mean and median value for each static;
- The lowest levels of common pipistrelle activity were recorded in autumn with a total of 54 passes. However, Static C and Static H failed to record due to equipment

malfunction during this survey period. 115 total passes were recorded in Spring when Static A failed to record; and

- In terms of overall activity levels at each static detector location, lowest levels of common pipistrelle activity were recorded at Static F, with a total of 23 passes recorded during the entire 2024 survey season.

Chart 3-4: Total, average and median number of common pipistrelle passes per night, per detector, during each survey season



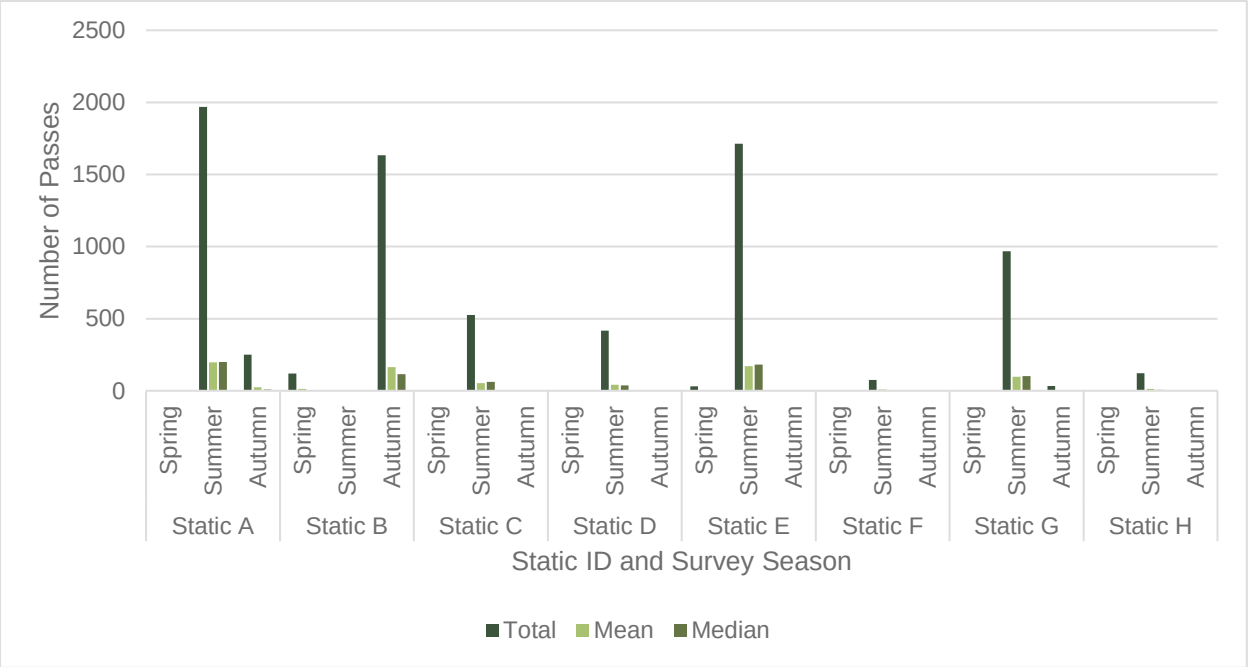
Soprano pipistrelle

A summary of total, mean and median soprano pipistrelle passes per night, recorded at each static detector, per survey season, is provided in **Chart 3-5**. The data presented illustrate that:

- Soprano pipistrelle was recorded at all static detector locations during certain periods of the active bat season;
- The greatest levels of soprano pipistrelle activity were recorded during the summer survey period across all static detectors except for Static B which recorded no soprano pipistrelle passes during this time. However, the greatest level of soprano pipistrelle activity during the autumn survey period was recorded at Static B with 1,633 total passes, averaging 163.3 passes per night, with a median of 116 passes per night;
- The greatest overall activity in summer was recorded at Static A, during which time a total of 1,969 passes were recorded, averaging 196.9 passes per night, and median of 200 passes per night;
- Discounting Static B which recorded no passes, soprano pipistrelle activity was mostly evenly spread across survey nights over the summer, with no significant outliers. This resulted in a close mean and median value for each static;
- The lowest levels of soprano pipistrelle activity were recorded in spring with a total of 152 passes; and

- In terms of overall activity levels at each static detector location, lowest levels of common pipistrelle activity were recorded at Static F, with a total of 76 passes recorded during the entire 2024 survey season.

Chart 3-5: Total, average and median number of soprano pipistrelle passes per night, per detector, during each survey season

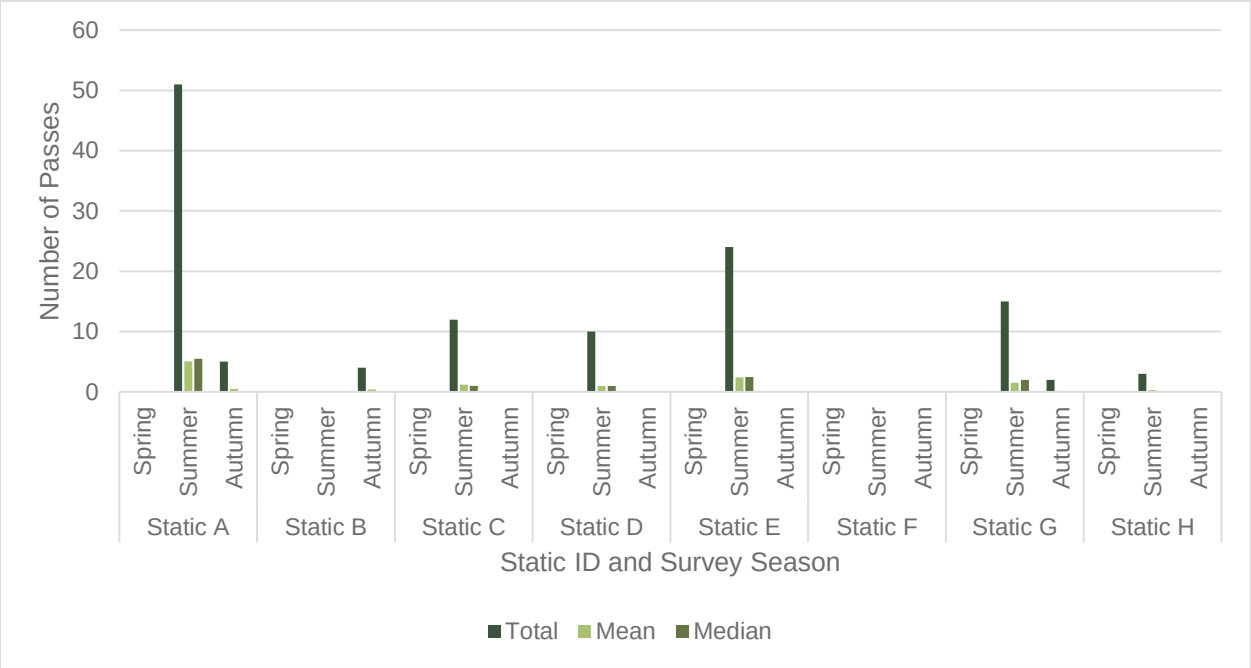


Pipistrellus species

Echolocation files containing bat passes that were not easily identifiable as either common pipistrelle or soprano pipistrelle (due to overlapping echolocation call parameters) have been classified to genus level only. These data are presented in **Chart 3-6** and indicate that:

- Bat activity attributed to species of the genus *Pipistrellus* was identified at all static locations besides Static F. As might be expected, peaks in *pipistrellus* activity coincided with peaks in common and soprano pipistrelle activity;
- The greatest levels of *Pipistrellus* activity were recorded at Static A in summer with a total of 51 passes, averaging 5.1 passes per night, with a median of 5.5 passes per night; and
- A single pass attributable to Nathusius' pipistrelle was recorded at Static C during the summer survey period.

Chart 3-6: Total, average and median number of *Pipistrellus* passes per night, per detector, during each survey season

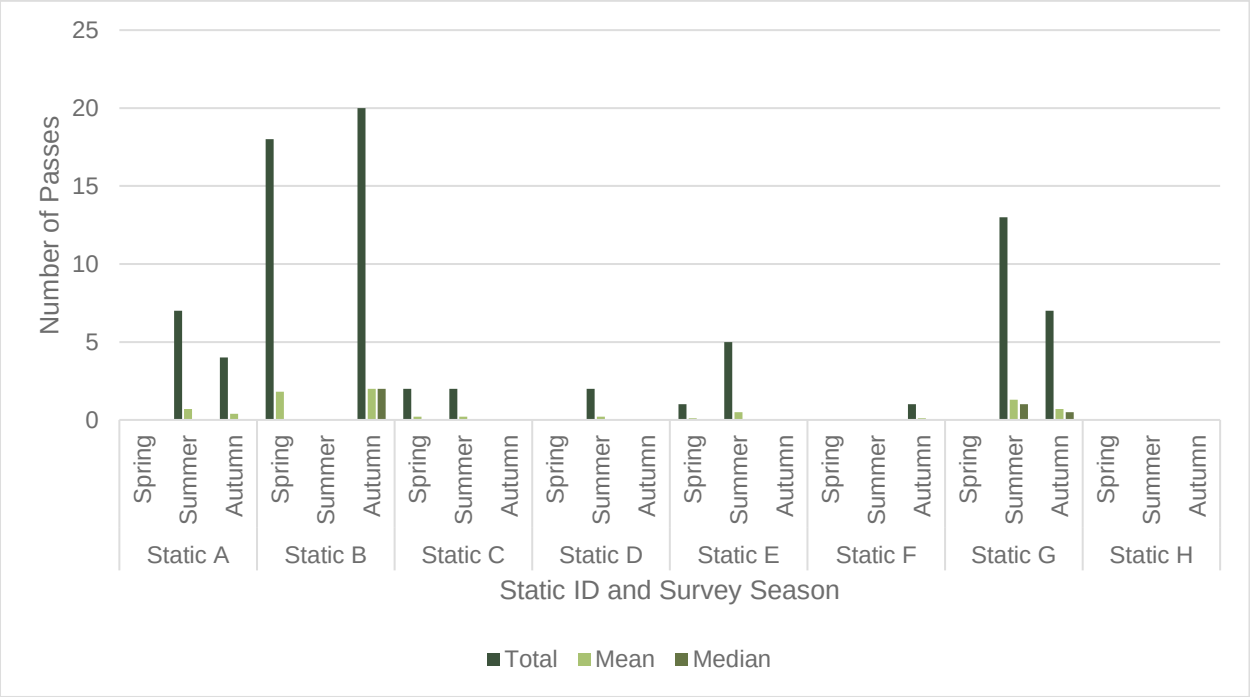


Myotis species

Data presented in **Chart 3-7** illustrate that:

- *Myotis* species were recorded at all static locations within the Site besides Static H;
- Bats of the genus *Myotis* were most active within the Site during summer and autumn with 29 and 32 total passes respectively. 21 total passes were recorded during the spring. The greatest overall level of activity was recorded at Static B during the autumn (total of 20 passes, averaging two passes per night, with a median of two passes per night); and
- *Myotis* activity was consistently low at Statics C, D, E and F throughout the 2024 survey season, and no activity was recorded at Static H.

Chart 3-7: Total, average and median number of *Myotis* passes per night, per detector, during each survey season

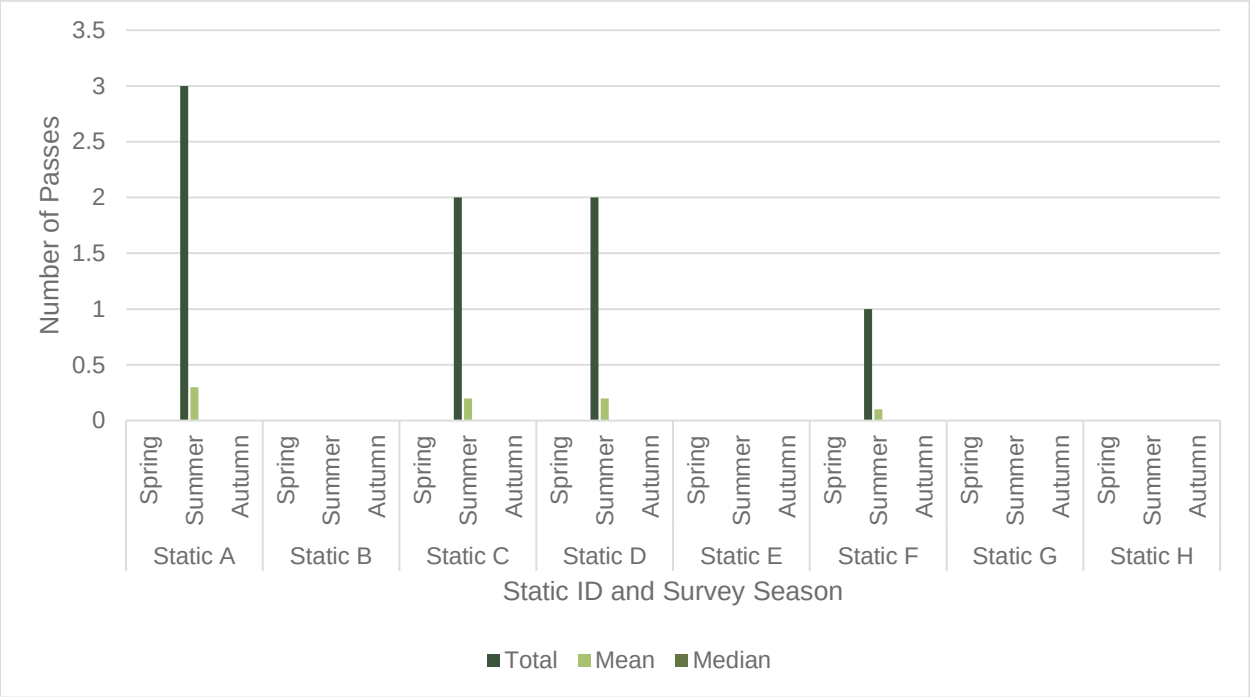


Nyctalus species

Data presented in **Chart 3-8** indicate that:

- Species of the genus *Nyctalus* were recorded rarely on the Site during the 2024 survey season, with eight total passes across four different statics (Static A, C, D and F). All *Nyctalus* passes occurred during the summer survey period;
- The greatest level of *Nyctalus* activity was recorded at Static A during the summer survey period, with a total of three passes (averaging 0.3 passes per night); and
- The median pass value for all statics was 0, with all passes occurring between 29 July and 1 August.

Chart 3-8: Total, average and median number of *Nyctalus* passes per night, per detector, during each survey season

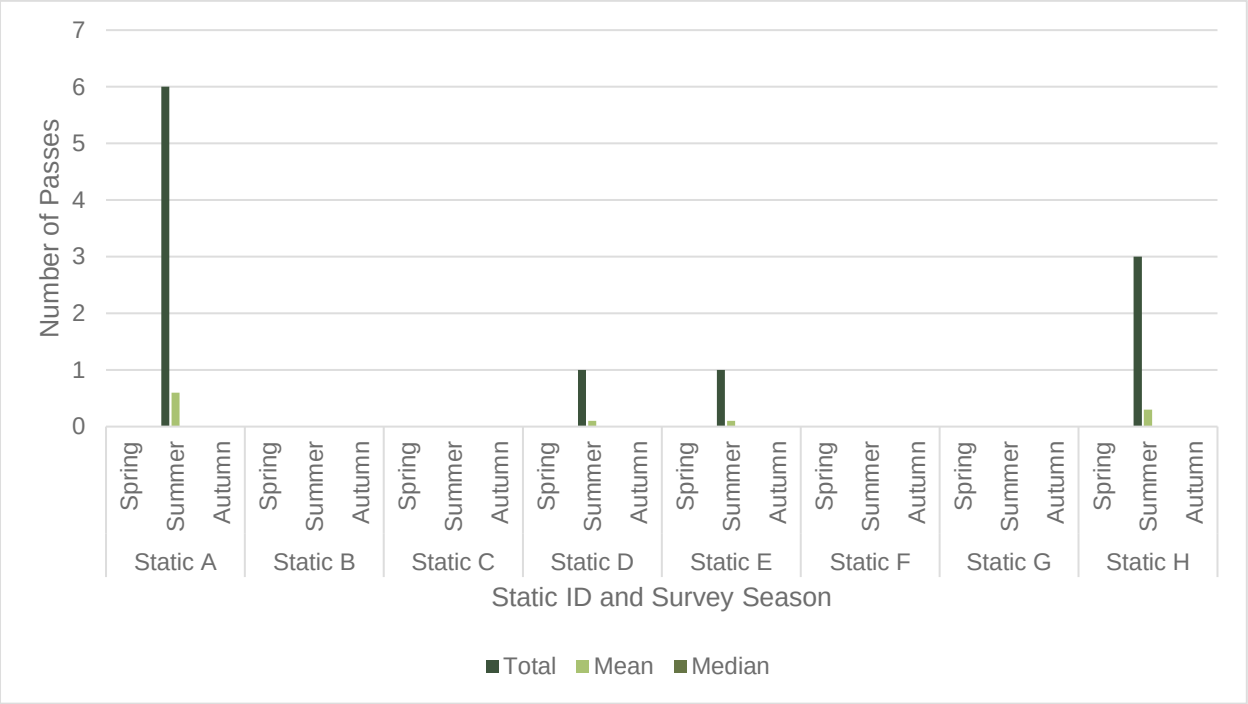


Brown long-eared bat

Data relating to brown long-eared bat activity are presented in **Chart 3-9**. The data show that:

- Brown long-eared bat was recorded rarely on the Site during the 2024 survey season, with 11 total passes across four different statics (Static A, D, E and H). All passes occurred during the summer survey period;
- The greatest level of brown long-eared bat activity was recorded at Static A during the summer survey period, with a total of six passes (averaging 0.6 passes per night); and
- The median pass value for all statics was 0.

Chart 3-9: Total, average and median number of brown long-eared bat passes per night, per detector, during each survey season



3.2.3.4 Sunset and Sunrise Activity

The number of bat passes recorded around sunset and sunrise (+/-45 min) totalled 194, of which 37 passes have been attributed to common pipistrelle, 155 to soprano pipistrelle, and two to unidentified bats of the genus *Pipistrellus*. Passes by other species were not recorded during this time period.

Static B recorded the greatest number of passes with 89 in total consisting of 12 common pipistrelle and 77 soprano pipistrelle. Activity levels were greatest in autumn with 70 passes compared to 19 in spring and 0 recorded passes in summer. Full details can be seen in **Table 3-2**.

Table 3-2: Number of Bat Passes Recorded Around Sunrise/Sunset (+/- 45 mins)

Static ID	Season	Common pipistrelle	Soprano pipistrelle	*Pipistrellus*	Total	
A	Spring	n/a	n/a	n/a	n/a	**54**
	Summer	6	1	0	7	
	Autumn	12	35	0	47	
B	Spring	8	11	0	19	**89**
	Summer	0	0	0	0	
	Autumn	4	66	0	70	
C	Spring	0	0	0	0	**6**
	Summer	1	5	0	6	
	Autumn	n/a	n/a	n/a	n/a	
D	Spring	0	0	0	0	**2**

Static ID	Season	Common pipistrelle	Soprano pipistrelle	*Pipistrellus*	Total	
	Summer	0	2	0	2	
	Autumn	0	0	0	0	
E	Spring	1	3	0	4	**36**
	Summer	3	29	0	32	
	Autumn	0	0	0	0	
F	Spring	0	0	0	0	**0**
	Summer	0	0	0	0	
	Autumn	0	0	0	0	
G	Spring	0	0	0	0	**7**
	Summer	0	0	0	0	
	Autumn	2	3	2	7	
H	Spring	0	0	0	0	**0**
	Summer	0	0	0	0	
	Autumn	n/a	n/a	n/a	n/a	
Total		**37**	**155**	**2**	**194**	

3.3 Collision Risk Assessment

3.3.1 Initial Site Risk Assessment

Based on the assessment of the Site's suitability for bats as discussed in **Section 3.2.1**, and the criteria for risk assessment provided in **Appendix E**, the following applies:

- Small number of potential roost features, of low quality (low habitat risk);
- Habitat could be used extensively by foraging bats (moderate habitat risk); and
- The Site is connected to the wider landscape by a network of strong linear features such as rivers, blocks of woodland and built linear features (high habitat risk).

Due to the mixture of features ranging from low to high the habitat risk was overall considered to be moderate.

Under NatureScot guidance in categorising project size, projects comprising less than 10 wind turbines fall into the 'small project size category'. However, other elements of the Proposed Development fall into the 'large project size category' including blade tip height >100m and the presence of other known wind energy developments within 5km. As such a precautionary approach was adopted and project size has been assessed as 'medium project size' for the purposes of the collision risk assessment.

Through combining results of project size and habitat risk, the results of the initial site risk assessment indicate that the Proposed Development presents a **medium initial risk** level to populations of bat species (score of 3 – **Appendix E**).

3.3.2 Overall Risk Assessment

Based on data presented in **Table 2-4**, the following bat species / genera recorded within the Site are classified as **high risk** for collision with wind turbines:

- Common pipistrelle;

- Soprano pipistrelle;
- Nathusius' pipistrelle;
- *Pipistrellus* species; and
- *Nyctalus* species.

The results of the collision risk assessment for each high-risk species identified within the Site are summarised below (for 2024 only).

3.3.2.1 Common pipistrelle

The results presented in **Table 3-3** indicate that during periods of typical activity levels, the collision risk to common pipistrelle was 'medium' at Static A increasing to 'high' during periods of peak activity.

During periods of typical activity levels, the collision risk was 'low' at all other static locations. However, this risk increases to 'high' at Static E and 'medium' at Statics C and G during periods of peak activity.

Based on activity levels and associated collision risk assessed for each sample location, and through applying a precautionary approach, the overall Site collision risk for common pipistrelle during typical activity levels can be classified as **'medium'** rising to **'high'** during periods of peak activity.

Table 3-3: Collision Risk Assessment - Common pipistrelle

Static ID	Associated turbine	Average bat activity (median bat passes per night)	Typical Activity Level[14]	Typical Activity Risk Assessment	Maximum bat activity (bat passes per night)	Peak Activity Level[15]	Peak Activity Risk Assessment
A	T1	16	Moderate	Medium (9)	204	High	High (15)
B	T2	0	Low	Low (3)	9	Low	Low (3)
C	T2	0.5	Low	Low (3)	95	Moderate-high	Medium (12)
D	n/a	0	Low	Low (3)	19	Low	Low (3)
E	n/a	0	Low	Low (3)	109	High	High (15)
F	n/a	0	Low	Low (3)	7	Low	Low (3)
G	T4	0	Low	Low (3)	40	Low-moderate	Medium (6)
H	T3	0	Low	Low (3)	16	Low	Low (3)

3.3.2.2 Soprano pipistrelle

The results presented in **Table 3-4** indicate that during periods of typical activity levels, the collision risk to soprano pipistrelle was 'high' at Static A, remaining 'high' during periods of peak activity.

[14] Low 0-4, low-moderate 5-9, moderate 10-19, moderate-high 20-29, high 30+

[15] Low 0-19, low-moderate 20-49, moderate 50-74, moderate-high 75-99, high 100+

During periods of typical activity levels, the collision risk was 'low' at all other static locations. However, this risk increases to 'high' at Statics B, D, E and G, and 'medium' at Statics C, F and H during periods of peak activity.

Based on activity levels and associated collision risk assessed for each sample location, and through applying a precautionary approach, the overall Site collision risk for soprano pipistrelle during typical activity levels can be classified as **'high'** and maintained at **'high'** during periods of peak activity.

Table 3-4: Collision Risk Assessment - Soprano pipistrelle

Static ID	Associated turbine	Average bat activity (median bat passes per night)	Typical Activity Level	Typical Activity Risk Assessment	Maximum bat activity (bat passes per night)	Peak Activity Level	Peak Activity Risk Assessment
A	T1	50.5	High	High (15)	353	High	High (15)
B	T2	0	Low	Low (3)	568	High	High (15)
C	T2	1	Low	Low (3)	97	Moderate-high	Medium (12)
D	n/a	0	Low	Low (3)	113	High	High (15)
E	n/a	0	Low	Low (3)	311	High	High (15)
F	n/a	0	Low	Low (3)	29	Low-moderate	Medium (6)
G	T4	2.5	Low	Low (3)	162	High	High (15)
H	T3	0.5	Low	Low (3)	37	Low-moderate	Medium (6)

3.3.2.3 *Pipistrellus* species combined

The results presented in **Table 3-5** indicate that during periods of typical activity levels, the collision risk for all *Pipistrellus* species combined was 'high' at Static A, remaining 'high' during periods of peak activity.

During periods of typical activity levels, the collision risk was 'low' at all other static locations. However, this risk increases to 'high' at every static location during periods of peak activity.

Based on activity levels and associated collision risk assessed for each sample location, and through applying a precautionary approach, the overall Site collision risk for *Pipistrellus* species during typical activity levels can be classified as **'high',** and maintained at **'high'** during periods of peak activity.

Table 3-5: Collision Risk Assessment - *Pipistrellus* species combined

Static ID	Associated turbine	Average bat activity (median bat passes per night)	Typical Activity Level	Typical Activity Risk Assessment	Maximum bat activity (bat passes per night)	Peak Activity Level	Peak Activity Risk Assessment
A	T1	71	High	High (15)	555	High	High (15)
B	T2	0	Low	Low (3)	570	High	High (15)
C	T2	1.5	Low	Low (3)	172	High	High (15)

Static ID	Associated turbine	Average bat activity (median bat passes per night)	Typical Activity Level	Typical Activity Risk Assessment	Maximum bat activity (bat passes per night)	Peak Activity Level	Peak Activity Risk Assessment
D	n/a	0	Low	Low (3)	135	High	High (15)
E	n/a	0	Low	Low (3)	401	High	High (15)
F	n/a	0	Low	Low (3)	36	Low	Low-moderate
G	T4	2.5	Low	Low (3)	201	High	High (15)
H	T3	0.5	Low	Low (3)	56	Moderate	Medium (9)

3.3.2.4 *Nyctalus* species

The results presented in **Table 3-6** indicate that during periods of both typical and peak activity levels, the collision risk for *Nyctalus* species combined was 'low' at all static locations.

Based on activity levels and associated collision risk assessed for each sample location, and through applying a precautionary approach, the overall Site collision risk for *Nyctalus* species during typical activity levels can be classified as **'low'**, remaining **'low'** during periods of peak activity.

Table 3-6: Collision Risk Assessment - *Nyctalus* species

Static ID	Associated turbine	Average bat activity (median bat passes per night)	Typical Activity Level	Typical Activity Risk Assessment	Maximum bat activity (bat passes per night)	Peak Activity Level	Peak Activity Risk Assessment
A	T1	0	Low	Low (3)	2	Low	Low (3)
B	T2	0	Low	Low (3)	0	Low	Low (3)
C	T2	0	Low	Low (3)	1	Low	Low (3)
D	n/a	0	Low	Low (3)	2	Low	Low (3)
E	n/a	0	Low	Low (3)	0	Low	Low (3)
F	n/a	0	Low	Low (3)	1	Low	Low (3)
G	T4	0	Low	Low (3)	0	Low	Low (3)
H	T3	0	Low	Low (3)	0	Low	Low (3)

4.0 Summary and Conclusions

A programme of bat activity surveys and assessment was carried out by SLR during the 2024 active bat season to obtain baseline data relating to use of the Site by bats. A summary of key findings is presented below:

- The majority of habitats within the Site comprise conifer plantation, which is densely planted and the trees present are predominantly coniferous which limits the habitat suitability for bats. However, open areas of heath, scrub and grassland, and linear

features such as forest rides and watercourses provide suitable foraging and commuting habitat for bats. Overall roosting suitability has been assessed as **low**, with foraging and commuting suitability assessed as **high**.

- Data recorded during 2024 bat activity surveys confirmed at least **seven bat species** utilise the Site for commuting and foraging purposes: common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, *Pipistrellus* species, *Nyctalus* species, *Myotis* species and brown long-eared bat;
- The greatest level of bat activity was recorded during the summer survey period, with a total of 8,226 passes (averaging 102.83 passes per night) and the lowest overall bat activity was recorded during spring, with a total of 288 passes (averaging 4.11 passes per night). It should however be noted that the true overall level of bat activity across the Site in spring and autumn may be slightly higher than reported due to a lack of data obtained at Static A during the spring, and Static C and H during the autumn;
- Soprano pipistrelle was by far the most frequently recorded species on the Site, with a total of 7856 passes (accounting for 74.63% of total passes). Common pipistrelle was the second most frequently recorded species with a total of 2442 passes (accounting for 23.20% of total passes). *Pipistrellus* species as a whole (including soprano, common, Nathusius' and unassigned pipistrelle species) accounted for more than 99% of total passes recorded during the survey period;
- The remaining echolocation files were attributed to *Myotis* species (82 passes recorded during the entire survey period, equating to 0.78% of total passes), brown long-eared bat (11 passes recorded during the entire survey period, equating to 0.10% of total passes), and *Nyctalus* species (including both noctule and Leisler's bat) (eight passes recorded during the entire survey period, equating to 0.08% of total passes);
- *Pipistrellus* species were recorded at all static detector locations during certain periods of the active bat season. The greatest levels of *Pipistrellus* activity across the Site were recorded during the summer, despite no passes having been recorded by Static B during this time;
- *Pipistrellus* activity across the Site during the summer was evenly spread with a close mean and median value calculated for each static i.e. a similar number of passes were recorded each night over the survey period, with no outlying nights of significantly greater or lower activity;
- The greatest overall activity for both common and soprano pipistrelle was recorded at Static A during the summer, during which time a total of 991 and 1,969 passes were recorded respectively;
- The number of bat passes recorded around sunset and sunrise (+/-45 min) totalled 194, of which 37 passes were attributed to common pipistrelle, 155 to soprano pipistrelle, and two to unidentified bats of the genus *Pipistrellus*. Static B recorded the greatest number of sunset/sunrise passes with a total of 89, consisting of 12 common pipistrelle and 77 soprano pipistrelle. Sunset/sunrise activity levels were greatest in autumn with a total of 70 passes compared to 19 in spring and 0 recorded passes in summer;
- As the Ecobat online tool was shut down for maintenance at the time of writing professional judgement was used when assessing bat activity data using median bat passes per night to illustrate average bat activity on-site and peak bat passes per night to illustrate peak bat activity on-site following NatureScot guidance. Based on

overall activity levels recorded during each year across each season, it was determined that the overall collision risk to:

- Common pipistrelle during typical activity levels can be classified as **'medium'** and during peak activity levels as '**high'**;
- Soprano pipistrelle during periods of typical activity levels can be classified as **'high'** during both typical and peak activity periods;
- Combined *Pipistrellus* sp. during periods of typical activity levels can be classified as **'high'** during both typical and peak activity periods; and
- *Nyctalus* sp. was assessed as **low** during periods of both typical and peak activity levels.

Figures

268000 269000 270000 271000 272000

687000 686000 685000

LEGEND

- Site Boundary
- Site Boundary 50 m Buffer
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Crane Pad / Hardstanding
- Proposed Substation Compound
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Blade Laydown Area

Ground Level Tree Assessment (GLTA)

- NONE

T1 T2 T3 T4

1 2 3

Cairnoch Hill 413

Craigannet Hill

Carron Valley

Sir John de Graham's Castle (Motte & Bailey)

Haugh Hill

Priest's Croft

Burial Gd

Quarry (Stone)

Easter Cringate

Sheepfold

Earl's Burn

Craigannet Craig

N

0 0.25 0.5 1

Kilometres

Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.4 - BATS

GROUND LEVEL TREE ASSESSMENT

FIGURE 8.4.1

Scale 1:12,500 @ A3

Date JULY 2026

428.V12085.00001.0143.0 Ground Level Tree Assessment

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268000 269000 270000 271000 272000

687000 686000 685000

LEGEND

- Site Boundary
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Crane Pad / Hardstanding
- Proposed Substation Compound
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Blade Laydown Area

Bat Static Locations

- 2024 Locations
- 2022 Locations

N

0 0.25 0.5 1 Kilometres

Eurowind Energy™

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.4 - BATS

BAT ACTIVITY SURVEY DETECTOR LOCATIONS

FIGURE 8.4.2

Scale 1:12,500 @ A3

Date JULY 2026

428.V12085.00001.0144.0 Bat Activity Survey Detector Locations

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Appendix A Relevant Legislation

Conservation (Natural Habitats, &c.) Regulations 1994 (as amended)

All bat species found in Scotland are classed as European protected species. They receive full protection under the Conservation (Natural Habitats, & c.) Regulations 1994 (as amended in Scotland). This legislation makes it an offence to deliberately or recklessly:

- Capture, injure or kill a wild bat;
- Harass a wild bat or group of bats;
- Disturb a wild bat in a roost (any structure or place it uses for shelter or protection);
- Disturb a wild bat while it is rearing or otherwise caring for its young (this would be a 'maternity' roost);
- Obstruct access to a bat roost or to otherwise deny the animal use of the roost;
- Disturb such a wild bat in a manner that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of that species; and to
- Disturb a wild bat in a manner that is, or in circumstances which are, likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young.

It is also an offence to:

- Damage or destroy a breeding site or resting place of such an animal (whether or not deliberately or recklessly); and to
- Keep, transport, sell or exchange, or offer for sale or exchange any wild bat (or any part or derivative of one) obtained after 10 June 1994.

Nature Conservation (Scotland) Act 2004

The Nature Conservation (Scotland) Act 2004 places a duty on public bodies to further the conservation of biodiversity in Scotland. Under this Act, Scottish Ministers must designate one or more strategies for biodiversity conservation, as defined within the Scottish Biodiversity Strategy. They are also required publish lists of species of flora and fauna and habitats considered to be of principal importance for biodiversity conservation in Scotland.

The Scottish Biodiversity List (SBL) is a list of plants, animals and habitats that Scottish ministers consider to be of principal importance for biodiversity conservation in Scotland. The following bat species are identified as a conservation priority through their listing on the SBL:

- Common pipistrelle *Pipistrellus pipistrellus;*
- Soprano pipistrelle *Pipistrellus pygmaeus;*
- Nathusius' pipistrelle *Pipistrellus nathusii;*
- Daubentons bat *Myotis daubentonii;*
- Natterers bat *Myotis nattereri;*
- Whiskered bat *Myotis mystacinus;*
- Brandt's bat *Myotis brandtii;*
- Noctule *Nyctalus noctula;* and
- Brown long-eared bat *Plecotus auritus.*

Appendix B Static Detector Locations

Table B 1 2024 Static Detector Locations

Static ID	Grid Reference	Associated Turbine(s)
A	NS 68630 85813	n/a
B	NS 68966 85866	T2
C	NS 69248 85656	T2
D	NS 70320 84914	n/a
E	NS 69290 84977	n/a
F	NS 69772 85623	n/a
G	NS 70623 85202	T4
H	NS 70017 85349	T3

Table B 2 2022 Static Detector Locations

Static ID	Grid Reference	Associated Turbine(s)
B	NS 69270 86516	T1
D	NS 69473 86266	T1/T2
F	NS 69638 86013	T2



Appendix C Static Detector Results

Table C 1 Spring 2024 Static Data

Recording Night	*Myotis*	*Nyctalus*	*Pipistrellus*	Nathusius' pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared	Total
Static A								
21/04/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
22/04/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
23/04/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
24/04/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
25/04/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
26/04/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
27/04/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
28/04/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
29/04/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
30/04/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Static B								
21/04/2024	0	0	0	0	39	6	0	**45**
22/04/2024	0	0	0	0	54	7	0	**61**
23/04/2024	10	0	0	0	8	8	0	**26**
24/04/2024	0	0	0	0	0	6	0	**6**
25/04/2024	0	0	0	0	0	0	0	**0**
26/04/2024	2	0	0	0	0	1	0	**3**
27/04/2024	5	0	0	0	0	0	0	**5**
28/04/2024	0	0	0	0	0	0	0	**0**
29/04/2024	0	0	0	0	0	0	0	**0**
30/04/2024	1	0	0	0	7	92	0	**100**
Total	**18**	**0**	**0**	**0**	**108**	**120**	**0**	**246**

Recording Night	*Myotis*	*Nyctalus*	*Pipistrellus*	Nathusius' pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared	Total
Mean	**1.8**	**0**	**0**	**0**	**10.8**	**12**	**0**	**24.6**
Median	**0**	**0**	**0**	**0**	**0**	**3.5**	**0**	**5.5**
Static C								
21/04/2024	0	0	0	0	1	2	0	**3**
22/04/2024	0	0	0	0	0	0	0	**0**
23/04/2024	0	0	0	0	0	0	0	**0**
24/04/2024	0	0	0	0	0	0	0	**0**
25/04/2024	0	0	0	0	0	0	0	**0**
26/04/2024	0	0	0	0	0	0	0	**0**
27/04/2024	0	0	0	0	0	0	0	**0**
28/04/2024	0	0	0	0	0	0	0	**0**
29/04/2024	2	0	0	0	0	0	0	**2**
30/04/2024	0	0	0	0	0	0	0	**0**
Total	**2**	**0**	**0**	**0**	**1**	**2**	**0**	**5**
Mean	**0.2**	**0**	**0**	**0**	**0.1**	**0.2**	**0**	**0.5**
Median	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Static D								
21/04/2024	0	0	0	0	0	0	0	**0**
22/04/2024	0	0	0	0	0	0	0	**0**
23/04/2024	0	0	0	0	0	0	0	**0**
24/04/2024	0	0	0	0	0	0	0	**0**
25/04/2024	0	0	0	0	0	0	0	**0**
26/04/2024	0	0	0	0	0	0	0	**0**
27/04/2024	0	0	0	0	0	0	0	**0**

Recording Night	*Myotis*	*Nyctalus*	*Pipistrellus*	Nathusius' pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared	Total
28/04/2024	0	0	0	0	0	0	0	**0**
29/04/2024	0	0	0	0	0	0	0	**0**
30/04/2024	0	0	0	0	0	0	0	**0**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Mean	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Median	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Static E								
21/04/2024	0	0	0	0	4	21	0	**25**
22/04/2024	0	0	0	0	0	0	0	**0**
23/04/2024	1	0	0	0	0	0	0	**1**
24/04/2024	0	0	0	0	0	0	0	**0**
25/04/2024	0	0	0	0	0	0	0	**0**
26/04/2024	0	0	0	0	1	0	0	**1**
27/04/2024	0	0	0	0	0	0	0	**0**
28/04/2024	0	0	0	0	0	0	0	**0**
29/04/2024	0	0	0	0	0	0	0	**0**
30/04/2024	0	0	0	0	1	9	0	**10**
Total	**1**	**0**	**0**	**0**	**6**	**30**	**0**	**37**
Mean	**0.1**	**0**	**0**	**0**	**0.6**	**3**	**0**	**3.7**
Median	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Static F								
21/04/2024	0	0	0	0	0	0	0	**0**
22/04/2024	0	0	0	0	0	0	0	**0**
23/04/2024	0	0	0	0	0	0	0	**0**

Recording Night	*Myotis*	*Nyctalus*	*Pipistrellus*	Nathusius' pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared	Total
24/04/2024	0	0	0	0	0	0	0	**0**
25/04/2024	0	0	0	0	0	0	0	**0**
26/04/2024	0	0	0	0	0	0	0	**0**
27/04/2024	0	0	0	0	0	0	0	**0**
28/04/2024	0	0	0	0	0	0	0	**0**
29/04/2024	0	0	0	0	0	0	0	**0**
30/04/2024	0	0	0	0	0	0	0	**0**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Mean	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Median	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Static G								
21/04/2024	0	0	0	0	0	0	0	**0**
22/04/2024	0	0	0	0	0	0	0	**0**
23/04/2024	0	0	0	0	0	0	0	**0**
24/04/2024	0	0	0	0	0	0	0	**0**
25/04/2024	0	0	0	0	0	0	0	**0**
26/04/2024	0	0	0	0	0	0	0	**0**
27/04/2024	0	0	0	0	0	0	0	**0**
28/04/2024	0	0	0	0	0	0	0	**0**
29/04/2024	0	0	0	0	0	0	0	**0**
30/04/2024	0	0	0	0	0	0	0	**0**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Mean	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Median	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Recording Night	*Myotis*	*Nyctalus*	*Pipistrellus*	Nathusius' pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared	Total
Static H								
21/04/2024	0	0	0	0	0	0	0	**0**
22/04/2024	0	0	0	0	0	0	0	**0**
23/04/2024	0	0	0	0	0	0	0	**0**
24/04/2024	0	0	0	0	0	0	0	**0**
25/04/2024	0	0	0	0	0	0	0	**0**
26/04/2024	0	0	0	0	0	0	0	**0**
27/04/2024	0	0	0	0	0	0	0	**0**
28/04/2024	0	0	0	0	0	0	0	**0**
29/04/2024	0	0	0	0	0	0	0	**0**
30/04/2024	0	0	0	0	0	0	0	**0**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Mean	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Median	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Grand Total	**21**	**0**	**0**	**0**	**115**	**152**	**0**	**288**

Table C 2 Summer 2024 Static Data

Recording Night	*Myotis*	*Nyctalus*	*Pipistrellus*	Nathusius' pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared	Total
Static A								
25/07/2024	0	0	1	0	6	0	0	**7**
26/07/2024	0	0	0	0	69	122	0	**191**
27/07/2024	1	0	7	0	148	187	0	**343**
28/07/2024	1	0	7	0	204	344	1	**557**

29/07/2024	0	0	1	0	38	62	0	**101**
30/07/2024	0	2	7	0	148	340	0	**497**
31/07/2024	4	0	5	0	99	105	0	**213**
01/08/2024	1	0	13	0	152	243	3	**412**
02/08/2024	0	0	4	0	54	213	2	**273**
03/08/2024	0	1	6	0	73	353	0	**433**
Total	**7**	**3**	**51**	**0**	**991**	**1969**	**6**	**3027**
Mean	**0.7**	**0.3**	**5.1**	**0**	**99.1**	**196.9**	**0.6**	**302.7**
Median	**0**	**0**	**5.5**	**0**	**86**	**200**	**0**	**308**
Static B								
25/07/2024	0	0	0	0	0	0	0	**0**
26/07/2024	0	0	0	0	0	0	0	**0**
27/07/2024	0	0	0	0	0	0	0	**0**
28/07/2024	0	0	0	0	0	0	0	**0**
29/07/2024	0	0	0	0	0	0	0	**0**
30/07/2024	0	0	0	0	0	0	0	**0**
31/07/2024	0	0	0	0	0	0	0	**0**
01/08/2024	0	0	0	0	0	0	0	**0**
02/08/2024	0	0	0	0	0	0	0	**0**
03/08/2024	0	0	0	0	0	0	0	**0**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Mean	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Median	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Static C								
25/07/2024	0	0	0	0	0	0	0	**0**
26/07/2024	0	0	0	0	30	97	0	**127**
27/07/2024	1	1	1	0	64	86	0	**153**

28/07/2024	0	0	3	0	29	82	0	**114**
29/07/2024	0	1	2	0	21	65	0	**89**
30/07/2024	0	0	0	0	6	11	0	**17**
31/07/2024	1	0	1	0	26	59	0	**87**
01/08/2024	0	0	4	1	95	72	0	**172**
02/08/2024	0	0	0	0	6	22	0	**28**
03/08/2024	0	0	1	0	8	31	0	**40**
Total	**2**	**2**	**12**	**1**	**285**	**525**	**0**	**827**
Mean	**0.2**	**0.2**	**1.2**	**0.1**	**28.5**	**52.5**	**0**	**82.7**
Median	**0**	**0**	**1**	**0**	**23.5**	**62**	**0**	**88**
Static D								
25/07/2024	0	0	0	0	0	0	0	**0**
26/07/2024	0	0	1	0	4	26	0	**31**
27/07/2024	0	0	1	0	19	37	1	**58**
28/07/2024	2	0	2	0	17	51	0	**72**
29/07/2024	0	0	0	0	4	24	0	**28**
30/07/2024	0	0	2	0	18	45	0	**65**
31/07/2024	0	0	0	0	16	45	0	**61**
01/08/2024	0	2	3	0	19	113	0	**137**
02/08/2024	0	0	1	0	5	38	0	**44**
03/08/2024	0	0	0	0	4	38	0	**42**
Total	**2**	**2**	**10**	**0**	**106**	**417**	**1**	**538**
Mean	**0.2**	**0.2**	**1**	**0**	**10.6**	**41.7**	**0.1**	**53.8**
Median	**0**	**0**	**1**	**0**	**10.5**	**38**	**0**	**51**
Static E								
25/07/2024	0	0	0	0	1	0	0	**1**
26/07/2024	0	0	0	0	33	49	0	**82**



27/07/2024	1	0	1	0	59	117	0	**178**
28/07/2024	2	0	3	0	47	173	0	**225**
29/07/2024	1	0	3	0	72	311	0	**387**
30/07/2024	1	0	2	0	96	192	0	**291**
31/07/2024	0	0	3	0	72	212	0	**287**
01/08/2024	0	0	8	0	109	284	1	**402**
02/08/2024	0	0	3	0	35	76	0	**114**
03/08/2024	0	0	1	0	52	299	0	**352**
Total	**5**	**0**	**24**	**0**	**576**	**1713**	**1**	**2319**
Mean	**0.5**	**0**	**2.4**	**0**	**57.6**	**171.3**	**0.1**	**231.9**
Median	**0**	**0**	**2.5**	**0**	**55.5**	**182.5**	**0**	**256**
Static F								
25/07/2024	0	0	0	0	0	0	0	**0**
26/07/2024	0	0	0	0	0	2	0	**2**
27/07/2024	0	0	0	0	3	4	0	**7**
28/07/2024	0	0	0	0	2	17	0	**19**
29/07/2024	0	0	0	0	3	0	0	**3**
30/07/2024	0	0	0	0	0	2	0	**2**
31/07/2024	0	0	0	0	6	14	0	**20**
01/08/2024	0	1	0	0	7	29	0	**37**
02/08/2024	0	0	0	0	1	5	0	**6**
03/08/2024	0	0	0	0	1	3	0	**4**
Total	**0**	**1**	**0**	**0**	**23**	**76**	**0**	**100**
Mean	**0**	**0.1**	**0**	**0**	**2.3**	**7.6**	**0**	**10**
Median	**0**	**0**	**0**	**0**	**1.5**	**3.5**	**0**	**5**
Static G								
25/07/2024	0	0	0	0	0	1	0	**1**

26/07/2024	0	0	1	0	23	109	0	**133**
27/07/2024	1	0	2	0	38	83	0	**124**
28/07/2024	1	0	0	0	39	162	0	**202**
29/07/2024	7	0	2	0	30	156	0	**195**
30/07/2024	1	0	3	0	19	64	0	**87**
31/07/2024	2	0	1	0	19	50	0	**72**
01/08/2024	0	0	2	0	40	132	0	**174**
02/08/2024	0	0	2	0	13	116	0	**131**
03/08/2024	1	0	2	0	22	94	0	**119**
Total	**13**	**0**	**15**	**0**	**243**	**967**	**0**	**1238**
Mean	**1.3**	**0**	**1.5**	**0**	**24.3**	**96.7**	**0**	**123.8**
Median	**1**	**0**	**2**	**0**	**22.5**	**101.5**	**0**	**127.5**
Static H								
25/07/2024	0	0	0	0	0	1	0	**1**
26/07/2024	0	0	0	0	2	6	0	**8**
27/07/2024	0	0	0	0	3	11	0	**14**
28/07/2024	0	0	0	0	8	17	0	**25**
29/07/2024	0	0	0	0	1	6	0	**7**
30/07/2024	0	0	0	0	1	2	0	**3**
31/07/2024	0	0	0	0	15	34	0	**49**
01/08/2024	0	0	3	0	16	37	1	**57**
02/08/2024	0	0	0	0	2	4	2	**8**
03/08/2024	0	0	0	0	1	4	0	**5**
Total	**0**	**0**	**3**	**0**	**49**	**122**	**3**	**177**
Mean	**0**	**0**	**0.3**	**0**	**4.9**	**12.2**	**0.3**	**17.7**
Median	**0**	**0**	**0**	**0**	**2**	**6**	**0**	**8**
Grand Total	**29**	**8**	**115**	**1**	**2273**	**5789**	**11**	**8226**

Table C 3 Autumn 2024 Static Data

Recording Night	Myotis	*Nyctalus*	Pipistrellus	Nathusius' pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared	Total
Static A								
26/09/2024	0	0	0	0	0	1	0	**1**
27/09/2024	0	0	0	0	0	0	0	**0**
28/09/2024	0	0	0	0	12	13	0	**25**
29/09/2024	3	0	0	0	1	3	1	**7**
30/09/2024	0	0	1	0	2	16	0	**19**
01/10/2024	0	0	3	0	20	138	0	**161**
02/10/2024	0	0	0	0	0	31	0	**31**
03/10/2024	1	0	1	0	1	39	3	**42**
04/10/2024	0	0	0	0	0	3	2	**3**
05/10/2024	0	0	0	0	0	6	0	**6**
Total	**4**	**0**	**5**	**0**	**36**	**250**	**6**	**295**
Mean	**0.4**	**0**	**0.5**	**0**	**3.6**	**25**	**0.6**	**29.5**
Median	**0**	**0**	**0**	**0**	**0.5**	**9.5**	**0**	**13**
Static B								
26/09/2024	0	0	0	0	0	0	0	**0**
27/09/2024	8	0	0	0	0	0	0	**8**
28/09/2024	2	0	0	0	2	568	0	**572**
29/09/2024	2	0	0	0	0	556	0	**558**
30/09/2024	0	0	0	0	9	118	0	**127**
01/10/2024	1	0	4	0	0	120	0	**125**
02/10/2024	3	0	0	0	0	135	0	**138**
03/10/2024	2	0	0	0	4	114	0	**120**

04/10/2024	0	0	0	0	0	2	0	**2**
05/10/2024	2	0	0	0	0	20	0	**22**
Total	**20**	**0**	**4**	**0**	**15**	**1633**	**0**	**1672**
Mean	**2**	**0**	**0.4**	**0**	**1.5**	**163.3**	**0**	**167.2**
Median	**2**	**0**	**0**	**0**	**0**	**116**	**0**	**122.5**
Static C								
26/09/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
27/09/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
28/09/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
29/09/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
30/09/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
01/10/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
02/10/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
03/10/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
04/10/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
05/10/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Static D								
26/09/2024	0	0	0	0	0	0	0	**0**
27/09/2024	0	0	0	0	0	0	0	**0**
28/09/2024	0	0	0	0	0	0	0	**0**
29/09/2024	0	0	0	0	0	0	0	**0**
30/09/2024	0	0	0	0	0	0	0	**0**
01/10/2024	0	0	0	0	0	0	0	**0**
02/10/2024	0	0	0	0	0	0	0	**0**
03/10/2024	0	0	0	0	0	0	0	**0**
04/10/2024	0	0	0	0	0	0	0	**0**
05/10/2024	0	0	0	0	0	0	0	**0**

Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Mean	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Median	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Static E								
26/09/2024	0	0	0	0	0	0	0	**0**
27/09/2024	0	0	0	0	0	0	0	**0**
28/09/2024	0	0	0	0	0	0	0	**0**
29/09/2024	0	0	0	0	0	0	0	**0**
30/09/2024	0	0	0	0	0	0	0	**0**
01/10/2024	0	0	0	0	0	0	0	**0**
02/10/2024	0	0	0	0	0	0	0	**0**
03/10/2024	0	0	0	0	0	0	0	**0**
04/10/2024	0	0	0	0	0	0	0	**0**
05/10/2024	0	0	0	0	0	0	0	**0**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Mean	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Median	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Static F								
26/09/2024	0	0	0	0	0	0	0	**0**
27/09/2024	0	0	0	0	0	0	0	**0**
28/09/2024	0	0	0	0	0	0	0	**0**
29/09/2024	0	0	0	0	0	0	0	**0**
30/09/2024	1	0	0	0	0	0	0	**1**
01/10/2024	0	0	0	0	0	0	0	**0**
02/10/2024	0	0	0	0	0	0	0	**0**
03/10/2024	0	0	0	0	0	0	0	**0**
04/10/2024	0	0	0	0	0	0	0	**0**

05/10/2024	0	0	0	0	0	0	0	**0**
Total	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
Mean	**0.1**	**0**	**0**	**0**	**0**	**0**	**0**	**0.1**
Median	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Static G								
26/09/2024	0	0	0	0	0	0	0	**0**
27/09/2024	1	0	0	0	0	2	0	**3**
28/09/2024	0	0	1	0	0	1	0	**2**
29/09/2024	2	0	1	0	0	6	0	**9**
30/09/2024	0	0	0	0	1	0	0	**1**
01/10/2024	1	0	0	0	0	8	0	**9**
02/10/2024	1	0	0	0	1	3	0	**5**
03/10/2024	2	0	0	0	0	4	0	**6**
04/10/2024	0	0	0	0	0	3	0	**3**
05/10/2024	0	0	0	0	1	5	0	**6**
Total	**7**	**0**	**2**	**0**	**3**	**32**	**0**	**44**
Mean	**0.7**	**0**	**0.2**	**0**	**0.3**	**3.2**	**0**	**4.4**
Median	**0.5**	**0**	**0**	**0**	**0**	**3**	**0**	**4**
Static H								
26/09/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
27/09/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
28/09/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
29/09/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
30/09/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
01/10/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
02/10/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
03/10/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

04/10/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
05/10/2024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Grand Total	**32**	**0**	**11**	**0**	**54**	**1915**	**0**	**2012**

Table C 4 Summary Overview of Bat passes Recorded Per Static Detector and Across the Site as a Whole

Static ID	No. Survey Nights	*Myotis*	*Nyctalus*	*Pipistrellus*	Nathusius' pipistrelle	Common pipistrelle	Soprano pipistrelle	Brown long-eared	Total	Mean Passes per Night (*per detector*)
A	20	11	3	56	0	1027	2219	6	3322	166.10
B	30	38	0	4	0	123	1753	0	1918	63.93
C	20	4	2	12	1	286	527	0	832	41.60
D	30	2	2	10	0	106	417	1	538	17.93
E	30	6	0	24	0	582	1743	1	2356	78.53
F	30	1	1		0	23	76	0	101	3.37
G	30	20	0	17	0	246	999	0	1282	42.73
H	20	0	0	3	0	49	122	3	177	8.85
Total	240	82	8	126	1	2442	7856	11	10526	43.86
Proportion	-	0.78	0.08	1.20	0.01	23.20	74.63	0.10	-	-
Mean Passes per Night (*per species across all detectors*)	-	0.39	0.04	0.60	0.00	11.63	37.41	0.05	-	-

Appendix D Weather Data

Table C 1 Weather Data

Date	Sunset - Sunrise	Time	Temp (ºC)	Windspeed (mph)	Rainfall
21 - 22 April	20:36 - 05:51	20:20	8	3	No rainfall
		21:20	8	0	No rainfall
		22:20	9	0	No rainfall
		23:20	8	0	No rainfall
		00:20	7	5	No rainfall
		01:20	7	2	No rainfall
		02:20	7	2	No rainfall
		03:20	7	5	No rainfall
		04:20	8	2	No rainfall
		05:20	8	5	No rainfall
		06:20	8	2	No rainfall
22 - 23April	20:38 - 05:49	20:20	10	9	No rainfall
		21:20	8	6	No rainfall
		22:20	9	7	No rainfall
		23:20	8	7	No rainfall
		00:20	8	7	No rainfall
		01:20	7	9	No rainfall
		02:20	6	6	No rainfall
		03:20	4	2	No rainfall
		04:20	3	1	No rainfall
		05:20	3	1	No rainfall
		06:20	2	5	No rainfall
23 - 24 April	20:40 - 05:46	20:20	9	10	No rainfall
		21:20	7	7	No rainfall
		22:20	8	3	No rainfall
		23:20	7	1	No rainfall
		00:50	6	3	No rainfall
		01:20	6	2	No rainfall
		02:20	4	1	No rainfall
		03:20	2	1	No rainfall
		04:20	2	2	No rainfall
		05:20	2	1	No rainfall
		06:20	1	1	No rainfall
24 - 25 April	20:42 - 05:44	20:20	9	13	No rainfall
		21:20	7	12	No rainfall
		22:20	8	8	No rainfall
		23:20	7	5	No rainfall

Date	Sunset - Sunrise	Time	Temp (°C)	Windspeed (mph)	Rainfall
		00:20	7	3	No rainfall
		01:20	7	3	No rainfall
		02:20	7	3	No rainfall
		03:20	6	3	No rainfall
		04:20	6	5	No rainfall
		05:20	6	6	No rainfall
		06:20	6	3	No rainfall
25 - 26 April	20:44 - 05:41	20:20	5	7	No rainfall
		21:20	4	5	No rainfall
		22:20	4	3	No rainfall
		23:20	5	1	No rainfall
		00:20	4	1	No rainfall
		01:20	3	2	No rainfall
		02:20	3	5	No rainfall
		03:20	4	3	No rainfall
		04:20	4	1	No rainfall
		05:20	3	2	No rainfall
		06:20	1	2	No rainfall
26 - 27 April	20:46 - 05:39	20:20	6	3	No rainfall
		21:20	5	6	No rainfall
		22:20	6	3	No rainfall
		23:20	3	1	No rainfall
		00:20	1	1	No rainfall
		01:20	3	2	No rainfall
		02:20	1	2	No rainfall
		03:20	0	3	No rainfall
		04:20	0	0	No rainfall
		05:20	0	5	No rainfall
		06:20	2	1	No rainfall
27 - 28 April	20:48 - 05:37	20:20	8	12	No rainfall
		21:20	6	6	No rainfall
		22:20	4	7	No rainfall
		23:50	3	5	No rainfall
		00:20	2	5	No rainfall
		01:20	2	0	No rainfall
		02:50	0	0	No rainfall
		03:20	1	3	Light rainfall
		04:20	4	2	Light rainfall
		05:20	4	2	No rainfall

Date	Sunset - Sunrise	Time	Temp (°C)	Windspeed (mph)	Rainfall
		06:20	5	2	Light rainfall
28 - 29 April	20:50 - 05:34	20:20	10	8	No rainfall
		21:20	8	15	No rainfall
		22:20	7	12	No rainfall
		23:20	5	9	No rainfall
		00:20	5	6	No rainfall
		01:20	5	3	No rainfall
		02:20	5	2	No rainfall
		03:20	7	12	No rainfall
		04:20	7	9	No rainfall
		05:20	6	9	No rainfall
		05:50	5	7	No rainfall
29 - 30 April	20:52 - 05:32	20:20	12	20	No rainfall
		21:20	11	9	No rainfall
		22:20	10	10	Light rainfall
		23:20	11	9	No rainfall
		00:20	10	10	No rainfall
		01:20	9	7	No rainfall
		02:20	8	2	No rainfall
		03:20	9	7	No rainfall
		04:20	7	2	No rainfall
		05:20	9	6	No rainfall
		06:20	9	8	No rainfall
30 April - 1 May	20:54 - 05:30	20:20	12	8	No rainfall
		21:20	11	9	No rainfall
		22:20	11	6	No rainfall
		23:20	11	9	No rainfall
		00:50	10	8	No rainfall
		02:50	9	10	No rainfall
		03:50	8	3	No rainfall
		04:20	8	9	No rainfall
		05:20	8	12	No rainfall
		06:20	8	12	No rainfall
25 - 26 July	21:36 - 05:08	21:20	14	10	Light rainfall
		22:20	14	12	No rainfall
		23:20	12	6	No rainfall
		00:20	11	7	No rainfall
		01:20	12	8	No rainfall
		02:20	12	6	No rainfall

Date	Sunset - Sunrise	Time	Temp (°C)	Windspeed (mph)	Rainfall
		03:20	11	3	No rainfall
		04:20	12	9	No rainfall
		05:20	12	9	No rainfall
26 - 27 July	21:34 - 05:10	21:20	15	12	No rainfall
		22:20	14	2	No rainfall
		23:20	13	2	No rainfall
		00:20	12	2	No rainfall
		01:20	11	3	No rainfall
		02:20	12	0	No rainfall
		03:20	11	2	No rainfall
		04:20	11	2	Light rainfall
		05:20	11	0	No rainfall
27 - 28 July	21:32 - 05:12	21:20	16	5	No rainfall
		22:20	13	6	No rainfall
		23:20	13	7	No rainfall
		00:20	12	8	No rainfall
		01:50	12	6	No rainfall
		02:20	11	5	No rainfall
		03:20	12	7	No rainfall
		04:20	11	3	No rainfall
		05:20	11	8	No rainfall
28 - 29 July	21:30 - 05:14	21:20	18	8	No rainfall
		22:20	17	3	No rainfall
		23:20	16	3	No rainfall
		00:20	15	5	No rainfall
		01:50	14	3	No rainfall
		02:20	15	6	No rainfall
		03:20	14	3	No rainfall
		04:20	16	10	No rainfall
		05:20	16	12	No rainfall
29 - 30 July	21:28 - 05:16	21:20	15	7	No rainfall
		22:20	16	10	No rainfall
		23:20	14	5	No rainfall
		00:20	15	7	No rainfall
		01:20	15	6	No rainfall
		02:20	16	13	No rainfall
		03:20	15	10	No rainfall
		04:20	15	9	No rainfall
		05:20	14	13	No rainfall

Date	Sunset - Sunrise	Time	Temp (°C)	Windspeed (mph)	Rainfall
30 - 31 July	21:26 - 05:18	21:20	14	6	No rainfall
		22:20	12	3	No rainfall
		23:20	10	3	No rainfall
		00:20	8	6	No rainfall
		01:20	8	6	No rainfall
		02:20	7	5	No rainfall
		03:20	7	5	No rainfall
		04:20	7	3	No rainfall
		05:20	6	3	No rainfall
31 July - 1 August	21:24 - 05:19	21:20	14	6	No rainfall
		22:20	13	6	No rainfall
		23:20	13	1	No rainfall
		00:20	13	2	No rainfall
		01:20	13	2	No rainfall
		02:20	13	1	Light rainfall
		03:20	13	3	Light rainfall
		04:20	13	2	No rainfall
		05:20	12	2	No rainfall
1 - 2 August	21:22 - 05:21	21:20	17	3	No rainfall
		22:20	14	5	No rainfall
		23:20	12	2	No rainfall
		00:20	11	1	No rainfall
		01:20	12	5	No rainfall
		02:20	12	2	No rainfall
		03:20	11	1	No rainfall
		04:20	11	2	No rainfall
		05:20	12	1	No rainfall
2 - 3 August	21:20 - 05:23	21:20	16	13	Light rainfall
		22:20	16	10	Light rainfall
		23:20	14	10	No rainfall
		00:20	13	9	No rainfall
		01:20	12	8	No rainfall
		02:20	12	8	No rainfall
		03:20	10	5	No rainfall
		04:20	10	7	No rainfall
		05:20	9	7	No rainfall
3 - 4 August	21:18 - 05:25	21:50	15	7	Light rainfall
		22:20	14	8	No rainfall
		23:20	14	9	No rainfall

Date	Sunset - Sunrise	Time	Temp (°C)	Windspeed (mph)	Rainfall
		00:20	13	8	No rainfall
		01:20	12	5	No rainfall
		02:20	13	6	No rainfall
		03:20	13	7	No rainfall
		04:20	13	5	No rainfall
		05:20	13	5	No rainfall
26 - 27 September	19:02 - 07:11	18:20	10	15	No rainfall
		19:20	10	12	No rainfall
		20:20	9	8	No rainfall
		21:20	9	7	No rainfall
		22:20	9	7	No rainfall
		23:20	9	5	No rainfall
		00:20	9	6	No rainfall
		01:20	8	3	No rainfall
		02:20	8	6	No rainfall
		03:20	8	5	No rainfall
		04:20	8	6	No rainfall
		05:20	8	5	No rainfall
		06:20	7	5	No rainfall
		07:20	7	3	No rainfall
27 - 28 September	19:00 - 07:13	18:20	11	3	No rainfall
		19:20	9	2	No rainfall
		20:20	7	5	No rainfall
		21:20	8	2	No rainfall
		22:50	3	6	No rainfall
		23:20	4	5	No rainfall
		00:20	4	8	No rainfall
		01:20	5	3	No rainfall
		02:20	4	3	No rainfall
		03:20	4	6	No rainfall
		04:20	4	5	No rainfall
		05:20	4	8	No rainfall
		06:20	5	5	No rainfall
		07:20	5	8	No rainfall
28 - 29 September	18:57 - 07:15	18:20	11	9	No rainfall
		19:20	10	7	No rainfall
		20:20	7	6	No rainfall
		21:20	7	7	No rainfall
		22:20	7	5	No rainfall

Date	Sunset - Sunrise	Time	Temp (°C)	Windspeed (mph)	Rainfall
		23:20	7	2	No rainfall
		00:20	7	5	No rainfall
		01:20	6	1	No rainfall
		02:20	6	3	No rainfall
		03:20	5	2	No rainfall
		04:20	6	0	No rainfall
		05:20	6	1	No rainfall
		06:20	6	2	No rainfall
		07:20	6	2	No rainfall
29 - 30 September	18:55 - 07:17	18:20	13	12	No rainfall
		19:20	11	12	No rainfall
		20:20	11	12	No rainfall
		21:20	10	9	No rainfall
		22:20	9	9	No rainfall
		23:20	7	6	No rainfall
		00:20	9	7	No rainfall
		01:20	9	9	No rainfall
		02:20	9	13	No rainfall
		03:20	9	7	No rainfall
		04:20	10	6	No rainfall
		05:20	9	5	No rainfall
		06:20	10	6	No rainfall
		07:20	10	9	No rainfall
30 September - 1 October	18:52 - 07:19	18:20	12	10	No rainfall
		19:20	12	12	No rainfall
		20:20	12	10	No rainfall
		21:20	12	10	No rainfall
		22:20	11	8	No rainfall
		23:20	12	10	No rainfall
		00:20	11	8	No rainfall
		01:20	11	6	No rainfall
		02:20	11	8	No rainfall
		03:20	11	10	No rainfall
		04:50	11	8	No rainfall
		05:20	11	7	No rainfall
		06:20	11	9	Light rainfall
		07:20	11	9	No rainfall
1 - 2 October	18:49 - 07:21	18:20	12	15	No rainfall
		19:20	12	14	No rainfall

Date	Sunset - Sunrise	Time	Temp (°C)	Windspeed (mph)	Rainfall
		20:20	12	13	No rainfall
		21:20	12	13	No rainfall
		22:20	12	14	No rainfall
		23:20	11	13	No rainfall
		00:20	11	13	No rainfall
		01:20	12	13	No rainfall
		02:20	12	13	No rainfall
		03:20	11	7	No rainfall
		04:20	11	9	No rainfall
		05:20	11	10	No rainfall
		06:20	11	7	No rainfall
		07:20	11	7	No rainfall
2 - 3 October	18:47 - 07:23	18:20	11	9	No rainfall
		19:20	8	6	No rainfall
		20:20	8	3	No rainfall
		21:20	6	1	No rainfall
		22:20	5	1	No rainfall
		23:20	4	2	No rainfall
		00:20	3	1	No rainfall
		01:20	4	3	No rainfall
		02:20	5	0	No rainfall
		03:20	5	2	No rainfall
		04:20	6	2	No rainfall
		05:20	6	2	No rainfall
		06:20	7	1	No rainfall
		07:20	6	2	No rainfall
3 - 4October	18:44 - 07:25	18:20	11	2	No rainfall
		19:20	11	1	No rainfall
		20:20	9	2	No rainfall
		21:20	9	3	No rainfall
		22:20	9	6	No rainfall
		23:20	8	7	No rainfall
		00:20	9	7	No rainfall
		01:20	8	6	No rainfall
		02:20	8	3	No rainfall
		03:20	9	2	No rainfall
		04:20	9	5	No rainfall
		05:20	8	2	No rainfall
		06:20	7	3	No rainfall

Date	Sunset - Sunrise	Time	Temp (ºC)	Windspeed (mph)	Rainfall
		07:20	8	3	No rainfall
4 - 5 October	18:41 - 07:27	18:20	13	5	No rainfall
		19:20	13	6	No rainfall
		20:20	13	2	No rainfall
		21:20	14	7	No rainfall
		22:20	14	7	No rainfall
		23:50	14	8	No rainfall
		00:20	14	12	No rainfall
		01:50	14	3	No rainfall
		02:20	13	9	No rainfall
		03:20	14	16	No rainfall
		04:50	13	12	No rainfall
		05:20	13	13	No rainfall
		06:50	13	7	No rainfall
		07:20	13	5	No rainfall
5 - 6 October	18:39 - 07:29	18:20	12	2	No rainfall
		18:50	11	2	No rainfall
		20:20	10	5	No rainfall
		21:20	9	5	No rainfall
		01:20	14	7	No rainfall

Appendix E Collision Risk Assessment

Stage 1 – Initial Site Risk Assessment

		Project Size		
		Small	Medium	Large
Habitat Risk	Low	1	2	3
	Moderate	2	3	4
	High	3	4	5
Key *Site Risk Level (1 – 5), whereby 1-2 = Low site risk, 3 = Medium site risk, 4 – 5= High site risk*				

Criteria extracted from NatureScot *et al*., (2021).

Habitat and Project Size Descriptions for Assessing Initial Site Risk

Habitat Suitability	Habitat Description
Low	Small number of potential roost features, of low quality. Low quality foraging habitat that could be used by small numbers of foraging bats. Isolated site not connected to the wider landscape by prominent linear features.
Moderate	Buildings, trees or other structures with moderate-high potential as roost sites on or near the Site. Habitat could be used extensively by foraging bats. Site is connected to the wider landscape by linear features such as scrub, tree lines and streams.
High	Numerous suitable buildings, trees (particularly mature ancient woodland) or other structures with moderate-high potential as roost sites on or near the Site, and/or confirmed roosts present close to or on the Site. Extensive and diverse habitat mosaic of high quality for foraging bats. Site is connected to the wider landscape by a network of strong linear features such as rivers, blocks of woodland and mature hedgerows. At/near edge of range and/or on an important flyway. Close to key roost and/or swarming site.
Project Size	**Description**
Small	Small scale development (≤10 turbines). No other wind energy developments within 10km. Comprising turbines
Medium	Larger developments (between 10 and 40 turbines). May have some other wind developments within 5km. Comprising turbines 50-100m in height.
Large	Largest developments (>40 turbines) with other wind energy developments within 5km. Comprising turbines >100m in height.

Criteria extracted from NatureScot *et al*., (2021).

Stage 2 - Overall risk assessment

Ecobat activity category (or equivalent justified categorisation)						
Site risk level	Nil (0)	Low (1)	Low-moderate (2)	Moderate (3)	Moderate-high (4)	High (5)
Lowest (1)	0 Low	1 Low	2 Low	3 Low	4 Low	5 Medium
Low (2)	0 Low	2 Low	4 Low	6 Medium	8 Medium	10 Medium
Med (3)	0 Low	3 Low	6 Medium	9 Medium	12 Medium	15 High
High (4)	0 Low	4 Low	8 Medium	12 Medium	15 High	18 High
Highest (5)	0 Low	5 Medium	10 Medium	15 High	20 High	25 High

The scores in the table are a product of multiplying site risk level and the Ecobat activity category (or equivalent). Nil (0) means no bat activity was recorded across the whole site, but caution is needed here, because although the values given in this column are “0”, at sites where pre-construction surveys found no bat activity, there remains the possibility that new turbines could attract some bat species, thereby altering the level of risk that applies in reality.

Overall Assessment: Low = 0-4, Medium = 5-12, High = 15-25

Appendix F 2022 Collision Risk Assessment

Table D 1 2022 Common Pipistrelle Collision Risk Assessment

Static ID	Month	Median Percentile	Typical Activity Level (Median percentile)	Typical Activity Risk Assessment	Peak Activity Level (Maximum Percentile)	Peak Activity Risk Assessment	Nights Recorded
B	Apr	0	Low	Low (4)	Low	Low (4)	1
B	Jun	7	Low	Low (4)	Low	Low (4)	6
B	Aug	6	Low	Low (4)	Low	Low (4)	5
B	Sep	4	Low	Low (4)	Low	Low (4)	4
D	Apr	0	Low	Low (4)	Low	Low (4)	1
D	Jun	0	Low	Low (4)	Low	Low (4)	3
D	Aug	4	Low	Low (4)	Low	Low (4)	5
D	Sep	4	Low	Low (4)	Low	Low (4)	5
F	Jun	0	Low	Low (4)	Low	Low (4)	3
F	Aug	0	Low	Low (4)	Low	Low (4)	3
F	Sep	1	Low	Low (4)	Low	Low (4)	2

Table D 2 2022 Soprano Pipistrelle Collision Risk Assessment

Static ID	Month	Median Percentile	Typical Activity Level (Median percentile)	Typical Activity Risk Assessment	Peak Activity Level (Maximum Percentile)	Peak Activity Risk Assessment	Nights Recorded
B	Apr	0	Low	Low (4)	Low	Low (4)	1
B	Jun	3	Low	Low (4)	Low	Low (4)	8
B	Aug	26	Low	Low (4)	Low-Moderate	Medium (8)	5
B	Sep	8	Low	Low (4)	Low-Moderate	Medium (8)	6
D	Apr	0	Low	Low (4)	Low	Low (4)	3
D	Jun	2	Low	Low (4)	Low	Low (4)	6
D	Aug	44	Moderate	Medium (12)	High	High (18)	6
D	Sep	11	Low	Low (4)	Low-Moderate	Medium (8)	5
F	Jun	1	Low	Low (4)	Low	Low (4)	5
F	Aug	5	Low	Low (4)	Low	Low (4)	6
F	Sep	3	Low	Low (4)	Low	Low (4)	4

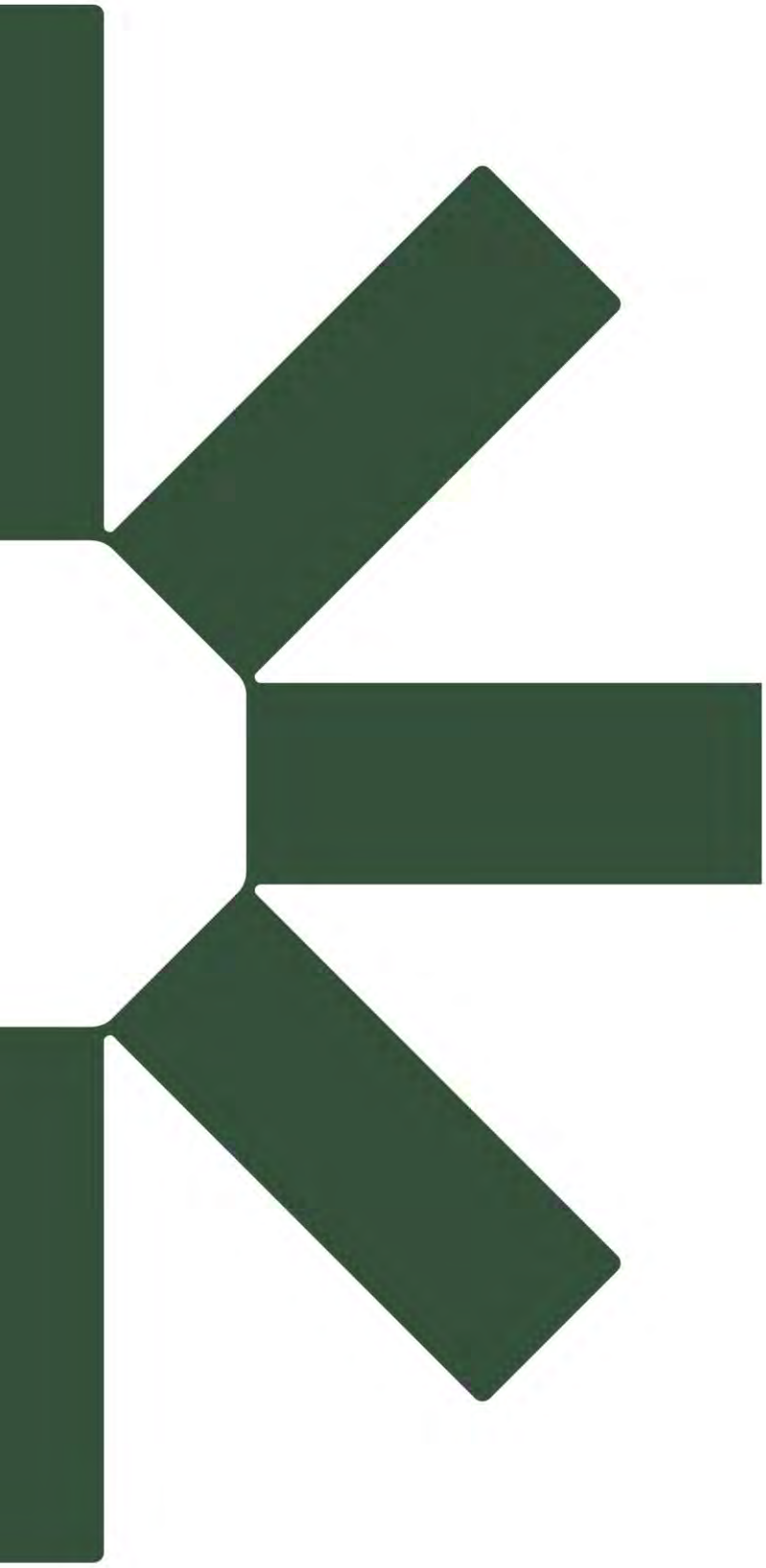


Table D 3 2022 Pipistrellus Collision Risk Assessment

Static ID	Month	Median Percentile	Typical Activity Level (Median percentile)	Typical Activity Risk Assessment	Peak Activity Level (Maximum Percentile)	Peak Activity Risk Assessment	Nights Recorded
D	Apr	1	Low	Low (4)	Low	Low (4)	1
D	Aug	1	Low	Low (4)	Low	Low (4)	2
D	Sep	4	Low	Low (4)	Low	Low (4)	1

Table D 4 2022 Nyctalus Collision Risk Assessment

Static ID	Month	Median Percentile	Typical Activity Level (Median percentile)	Typical Activity Risk Assessment	Peak Activity Level (Maximum Percentile)	Peak Activity Risk Assessment	Nights Recorded
B	June	50	Moderate	Medium (12)	Moderate	Medium (12)	1



Making Sustainability Happen

Technical Appendices 8.5: Fish Habitat and Population Assessment

Cairnoch Hill Wind Farm

Eurowind Energy Limited

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Prepared by:

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SLR Project No.: 428.V12085.00001

3 August 2026

Revision: 01

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
01	3 August 2026	A. Green	N. Tyrrell	N. Tyrrell

Basis of Report

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Acronyms and Abbreviations

CPUE	Catch per Unit Effort
EIA	Environmental Impact Assessment
EU	European Union
FFD	Freshwater Fish Directive
FHS	Fish Habitat Assessment
FLS	Forestry and Land Scotland
FUP	Fish Utilisation Potential
FWPM	Freshwater Pearl Mussel
NBN	National Biodiversity Network
OS	Ordnance Survey
RBMP	River Basin Management Plan
SEPA	Scottish Environment Protection Agency
SEW	Scotland's Environmental Web
SFCC	Scottish Fisheries Coordination Centre
SSP	Salmonid Spawning Potential
WFD	Water Framework Directive

1.0 Introduction

1.1 Background

SLR Consulting Ltd ('SLR') was appointed by Eurowind Energy Limited ("the Applicant") to undertake fish habitat assessments (including salmonid spawning potential) and fully quantitative electrofishing assessments, to determine the potential of watercourses supporting a variety of fish and evaluate fish presence / likely absence in relation to the proposed Cairnoch Hill Wind Farm (hereafter referred to as "the Proposed Development"). The surveys are focused on the Proposed Development location ("the Site"), specifically the area within the Site boundary.

The Proposed Development comprises up to four wind turbines with associated works and infrastructure including: forestry works; crane hardstandings; access tracks; cabling; a borrow pit; temporary construction compounds; a single substation including control building and a permanent anemometry mast (refer to **Chapter 3: Desription of the Development** for more detail). A Site layout is presented on **Figure 8.5.1a-h**.

1.2 Site Description

The Site is situated approximately 6km north of Kilsyth and 6km east of Fintry, within the Stirling Council administrative area, National Grid Reference NS 69768 85606. It is positioned to the north of Carron Valley Reservoir within land managed by Forestry and Land Scotland (FLS).

The topography of the Site ranges from approximately 227m Above Ordnance Datum (AOD) at the southern boundary next to Carron Valley Reservoir, to 413m AOD at the summit of Cairnoch Hill. The Site predominantly lies within the Forth River Trust catchment, with the western zone of the Carron Valley reservoir lying within the Loch Lomond Fisheries Trust catchment.

The Site lies within land managed for its conifer plantation by FLS. The majority habitat within the Site includes coniferous plantation woodland of juvenile and semi-mature trees connected by areas of acid grassland and scattered broadleaved shrub.

Several small watercourses run through the Site draining south into the Carron Valley reservoir on the southern side of the B818 road. Watercourses at the northwest and west side of the Site drain into Endrick Water and those at the northeast and east side of the Site drain into Earl's Burn.

1.3 Surrounding Area

The surrounding landscape consists of areas of grazing pasture and coniferous plantations with the Carron Valley reservoir situated south of the Site boundary. There are three operational wind farms (Craigengelt, Earlsburn and Earlsburn North), two consented wind farms (Shelloch, and Earlsburn Extension), and one 'in planning' wind farm (Drummarnock) within 10km of the Site. There are four residential properties/farms close to the Site (within 1km), the nearest of which are located immediately south of the Site on the northern side of the B818.

1.4 River Basin Management Plan

The European Union's Water Framework Directive (WFD) requires all inland and coastal waters within defined river basin districts to reach at least 'good' ecological status/potential by

a set deadline[1]. The Scottish Government committed to continued alignment with European Union (EU) standards and laws following EU exit[2]. SEPA is the lead authority to ensure compliance with WFD requirements. With input from responsible authorities and other stakeholders, SEPA has coordinated the production of the Scotland River Basin Management Plan (RBMP) to ensure the protection, improvement and sustainable use of the water environment for future generations. The overall aim is for 98% of Scotland's waters to be in a good condition by 2027, to be progressively implemented through three RBMP cycles (2009-2015; 2015-2021 and 2021-2027)[3].

The RBMP has identified the following key pressures on the water environment in Scotland:

- Morphological alterations (e.g., modifications to beds, banks and shores as the result of historical engineering and urban development);
- Diffuse source pollution (e.g., agriculture, urban development);
- Point source pollution (e.g., the discharge of sewage, manufacturing and quarrying);
- Abstraction and flow regulation (e.g., alterations to water flows and levels as the result of electricity generation and public water supplies); and
- Invasive non-native species RBMPs set out how organisations, stakeholders and communities will work together to improve the water environment.

1.5 Study Objectives

The objectives of this report were to:

- Undertake baseline fish habitat assessments within/ out with the Site area where there is potential for impact on the aquatic environment during construction and operation to identify potential important ecological features;
- To put watercourses into context to that of the wider riverine environment;
- Identify potential spawning areas for salmonids (Atlantic salmon (*Salmo salar*) / sea trout / brown trout (*Salmo trutta*) and lamprey (*Lampetra fluviatilis / Lampetra planeri*);
- Identify the potential habitat requirements of protected such as freshwater pearl mussels (*Margaritifera margaritifera*) (FWPM) and European eel (*Anguilla anguilla*) and the potential presence of notable / invasive species;
- To inform the impact assessment within the EIA; and
- Use the baseline information for future comparison studies, potentially required during the Development construction and post-construction phases.

2.0 Habitat Requirements

Habitat requirements of species covered within this report are presented below.

[1] Water framework directive (WFD) 2000/60/EC (2019) European Environment Agency. Available at: https://www.eea.europa.eu/policy-documents/water-framework-directive-wfd-2000 (Accessed: 19 January 2024).

[2] *UK withdrawal from the European Union (Continuity) (Scotland) act 2021* (2021) *Legislation.gov.uk*. Available at: https://www.legislation.gov.uk/asp/2021/4/contents/enacted (Accessed: 19 January 2024).

[3] Scottish Government (2015) Available at: https://www.sepa.org.uk/media/163445/the-river-basin-management-plan-for-the-scotland-river-basin-district-2015-2027.pdf (Accessed: 19 January 2024).

2.1 Salmonids

Habitat requirements differ across salmonid species life stages (Atlantic salmon and brown / sea trout), which has been subjected to considerable research[4,5,6,7]. Salmonids return to their natural rivers and spawn in late autumn and early winter, depositing eggs in redds which females excavate in gravel and pebble substrate.

Spawning depths range from 5–90cm[8], though the selected habitat is based on flow type and substrate composition as opposed to depth. Areas of riffle, run and glides where accelerated flow is present is where eggs are often deposited, where high amounts of oxygen is supplied, essential of egg development. Fine sediment such as silt and fine sand reduces water flow and oxygen supply, resulting in egg mortality. Egg survival is also affected by redd 'washouts' during winter spates – the direct, physical, scouring out of eggs from the gravel. Substrate stability, the dynamics of water flow and the weather all determine the extent of siltation and washouts. Over the course of three/four months (385–545 degree days) the eggs hatch into alevins, though, this time frame is highly dependent on environmental factors such as temperature.

Alevins emerge from the gravel redds (often in March to early May) to feed on macro-invertebrates, they are then referred to as 'fry', where they passively drift downstream or remain in the vicinity of the redd. Salmon fry prefer fast flowing waters i.e. riffles (>20cm/s) with surface turbulence, requiring pebble, cobble and gravel substrate. However, trout prefer low velocity water, near the stream bed with slower flow rates. Cover from stones, plants or debris is required and good cover is essential for maintaining high fry densities.

Usually by the second year in streams, fry develop into 'parr', becoming much larger over time after utilizing feeding opportunities in the stream. Environmental factors such as water temperature and food availability determine the temporal variability in which individuals remain in the parr phase. Parr are found to prefer deeper water (approximately 15-40cm) and coarser substrate, consisting of pebbles, cobbles, and boulders. Trout parr prefer low water velocity areas where cover is available, often being found alongside the banks, in undercut banks and amongst margin vegetation and exposed tree roots.

2.2 Lamprey

In April to May, adult lamprey migrate upstream, often during night hours to spawn, extruding their eggs into a redd (nest) in the riverbed, consisting of pebble and gravel substrate, though substrate densities and types have been found to vary between species.

Brook lamprey have been found to spawn in areas of coarse sand and gravel whilst river lamprey selects sites with larger substrate types (gravel, pebble and cobble). The eggs hatch into young larvae, known as ammocoetes and drift downstream from the redd, utilising the current to settle in nursey habitat which consists of fine, soft substrate (mud/sand) in well oxygenated, slow flowing waters. Ammocoetes feed on fine particulate matter such as diatoms, algae and bacteria, spending several years before metamorphosing from larval to adult form. At larvae stage, Brook and river lamprey are not distinguishable, though once

[4] Crisp, D.T. (1996) 'Environmental requirements of common riverine European salmonid fish species in fresh water with particular reference to physical and chemical aspects', Hydrobiologia, 323(3), pp. 201–221. doi:10.1007/bf00007847.

[5] Hendry K & Cragg-Hine D (2003) Ecology of the Atlantic Salmon. Conserving Natura 2000 Rivers Ecology Series No 7. English Nature, Peterborough.

[6] Klemetsen, A., Amundsen, P-A, Dempson, J.B., Jonsson, B., Jonsson, N., O'Connell, M.F. and Mortensen, E. (2003) 'Atlantic salmon *salmo salar* L., brown trout *salmo trutta* L. and arctic charr *salvelinus alpinus* (l.): A review of aspects of their life histories', Ecology of Freshwater Fish, 12(1), pp. 1–59. doi:10.1034/j.1600-0633.2003.00010.x.

[7] Youngson, A. F., & Hay, D. (1996). The lives of salmon: an illustrated account of the life-history of the Atlantic salmon. Voyageur Press (MN).

[8] Neary, J. P. (2006). Use of physical habitat structure to assess stream suitability for brown trout: a case study of three upland Scottish streams. Available at: https://dspace.stir.ac.uk/handle/1893/209.

transformed it becomes possible to distinguish between them on the basis of morphology and colouration[9].

Both species of lamprey are known to be poor swimmers, so when migrate upstream for spawning it can be easily disrupted by relatively low vertical barriers.

2.3 European Eel

European eels (hereafter referred to as 'eels') migrate from saltwater to freshwater environments (catadromous freshwater fish) though spawn in saltwater, taking place in the Sargasso Sea, but the exact location has never been found. The fertile eggs float with the oceanic currents before developing into leptocephali. The migration back to Europe utilising only oceanic currents can take up to two years allowing for morphological changes to occur to pre-adapt juvenile eels for freshwater environments, developing into the glass eel stage.

Glass eels use tides to carry themselves upstream once the coastline is reached. At around 8cm juvenile eels migrate upstream in-search for suitable residing habitat (coarse substrate and gravel, undercutting banks, tree roots). Once within the freshwater environment, glass eels transition into yellow eels, which is the longest life stage ranging from 5–20 years, though dependent of sex, recourses and temperature. Upon reach adequate size and fat storage, yellow eels transform into silver eels. The morphological changes (change colour, pectoral fins widen, digestive tract shut down, eyes grow up to 10 times their original size and muscle mass increase) pre-adapts the silver eel to return to the Sargasso Sea to start the cycle again.

2.4 Freshwater Pearl Mussel (FWPM)

FWPM are found in fast flowing river systems (optimal velocity of 0.25–0.75m.s^{-1}), with an optimal depth of 30–40cm[10]. FWPM prefer stable, though non compact substrate such as cobble and boulder with patches of fine substrates which allow for individuals to burrow[11].

Juvenile mussels require fine stable substrate, particularly clean gravel, living buried in clean, fast-flowing unpolluted riverine environments and survive by inhaling and filtering for the minute organic particles on which they feed9. Adult and juvenile FWPM tend to have similar habitat 'preferences', although adults are found over a wider range of physical conditions and juveniles appear to be more exacting in their requirements and sensitivity to environmental disturbance[12].

FWPM have a short parasitic larval phase on the gills of suitable host fish. The larvae (glochidia) of FWPM are host-specific and can only complete their development on Atlantic salmon or brown trout, with the preferred host being juvenile fish (fry and parr) of these species[13].

The presence of FWPM in any river therefore depends on salmonid host fish availability. It is usually considered necessary for migratory salmonids to be present within a catchment for freshwater pearl mussels to be present. This is typically the case, however occasionally, where historical river captures have occurred, FWPM populations are sometimes isolated from

[9] Gardiner, R. (2003). Identifying lamprey. A field key for sea, river and brook lamprey. Conserving Natura 2000 Rivers Conservation Techniques Series No. 4. *English Nature, Peterborough*. Available at: https://publications.naturalengland.org.uk/publication/72035.

[10] Hastie, L. C., Boon, P. J., & Young, M. R. (2000). Physical microhabitat requirements of freshwater pearl mussels, *Margaritifera margaritifera* (L.). *Hydrobiologia*, *429*, 59-71. Available at: https://doi.org/10.1023/A:1004068412666.

[11] Cosgrove, P., Hastie, L., & Young, M. (2000). Freshwater pearl mussels in peril. *British Wildlife*, *11*(5), 340-347. Available at: https://www.sciencedirect.com/science/article/pii/S0006320700001749?casa_token=3k1ifbwSglQAAAAA:HnbOv2nBAl9A6ztJe7zuD_IIDNjyt-pINYQFHFkOo01VhLJ3UlsLd_dnBX-OuNhGndqKiLfGCN0.

[12] Maitland, P. S. (2003). *Ecology of the river, brook and sea lamprey: Lampetra fluviatilis, Lampetra planeri and Petromyzon marinus*. Life in UK Rivers. Available at: https://link.springer.com/chapter/10.1007/978-94-017-9306-3_8.

[13] Young, M. (1984). The reproductive biology of the freshwater pearl mussel *Margaritifera margaritifera* (Linn.) in Scotland. I, Field studies. *Archiv fur Hydrobiologie*, *99*, 405-422. Available at: https://cir.nii.ac.jp/crid/1571417125313791488.

present day migratory salmonids (e.g., by impassable waterfalls and have survived this isolation by utilising host resident brown trout). Thus, all sites capable of containing native salmonids can potentially hold FWPM populations.

3.0 Methodology

3.1 Project Personnel

Table 3-1 details all personnel involved in aquatic assessments of the Proposed Development of Cairnoch HIll Wind Farm.

Table 3-1: Project Personnel.

Personnel	Role
Amy Green	Senior Aquatic Ecologist
Sophie McPeake	Project Ecologist
Euan Macrae	Project Ecologist

3.2 Desk Study

A desk study was carried out at the start of the commission and ahead of field surveys. Information sources used for this study are described below:

- Bing Maps[14] – to obtain aerial imagery and Ordnance Survey Mapping to inform field surveys, access suitability and inform gradient limitations with the Site boundary;
- Scotland's Environment Web (SEW)[15] – to obtain data on obstacles to fish migration on affected watercourses and to determine expected species within the surrounding location (~2km area buffer zone);
- Scottish Environment Protection Agency (SEPA)[16] – to review information on the SEPA Water Classification Hub regarding the classification status of watercourses under the Water Framework Directive (WFD) and Freshwater Fish Directive (FFD) with potential to be affected by the Proposed Development;
- National Biodiversity Network (NBN)[17]– publicly available information covering localised species records, and focused on legally protected and ecologically significant species; and
- NatureScot[18] – to perform a search to identify survey locations with relevant qualifying interests within 2km of the Proposed Development.

3.3 Aquatic Assessment Outline

The following Surveys were undertaken in 2024 as part of the Environmental Impact Assessment for the Proposed Development;

1) Fish habitat walkover assessment. This was undertaken in May 2024; and

[14] Bing (2023). Available at: https://www.bing.com/maps/?cp=55.867606~-4.251709&lvl=11.0 (Accessed: 19 February 2024).

[15] Scotland's Environment Web. (2022). Search Scotland's Environment Map. [Online] Available at: https://map.environment.gov.scot/sewebmap/ (Accessed: 19 February 2024).

[16] Scottish Environment Protection Agency. (2022). SEPA Water Classification Hub. [Online] Available at: https://www.sepa.org.uk/data-visualisation/water-classification-hub/ (Accessed: 19 February 2024).

[17] NBN Trust (2024). The National Biodiversity Network (NBN) Atlas. https://ror.org/00mcxye41. (Accessed: 19 February 2024).

[18] NatureScot. (2022). Map Search. [Online] Available at: https://sitelink.nature.scot/map. (Accessed: 19 February 2024).

2) Fully quantitative electrofishing assessments of suitable watercourses. This was undertaken in August 2024.

Please note survey locations were altered across the two survey stages in 2024 to account for access limitations.

3.4 Fish Habitat Assessment

3.4.1 Survey Locations

Table 3-2 provides a list of all survey locations for fish habitat assessments in 2024 conducted by SLR Project Ecologists and provide justification for selection.

Table 3-2 Survey Locations for 2024 Aquatic Assessments of Cairnoch Hill Wind Farm.

Waterbody	Survey Location	Upstream	Downstream	Justification for Surveying
Unnamed	CV01	NS 68547 86178	NS 68491 86177	Within the Site boundary; Assessing watercourses near proposed wind turbine placement; T1.
Unnamed	CV02	NS 68493 85701	NS 68421 85638	Within the Site boundary; Assessing watercourses near proposed wind turbine placement; T1.
Unnamed	CV03	NS 69437 86386	NS 69422 86448	Within the Site boundary; Control site.
Unnamed	CV05	NS 69153 84983	NS 69117 84952	Within the Site boundary; Assessing watercourses downstream of proposed wind turbine placement; T2.
Unnamed	CV06	NS 70595 84884	NS 70569 84869	Within the Site boundary; Assessing watercourses downstream of proposed wind turbine placement; T3 & T4.
Unnamed	CV07	NS 70256 84565	NS 70280 84533	Within the Site boundary; Assessing watercourses downstream of proposed wind turbine placement; T3.
Unnamed	CV09	NS 70694 85673	NS 70723 85654	Within the Site boundary; Control site.

3.4.2 Fish Habitat Assessments

Fieldwork for the 2024 survey locations was conducted over one day on 1st May 2024 by two experienced surveyors. Weather conditions on the day of sampling were damp and misty with an ambient temperature of 13°C. Survey locations were determined prior to visiting the Site during the desk study using the latest design details. All watercourses visible at the 1:25,000 scale (OS map) within the Site boundary and 50m buffer of associated infrastructure were considered for survey where there was a potential to be impacted by the Proposed Development. The methodology for habitat assessment employed for the fieldwork was conducted under a modified version of the Scottish Fisheries Coordination Centre (SFCC)[19],

[19] Scottish Fisheries Co-ordination Centre. (2010). *Habitat Surveys Training Course Manual*. pp. 1-64 Available at: https://fms.scot/wp-content/uploads/2019/03/SFCC-Training-Manual.pdf.

outlined in the Environment Agency document 'Restoration of Riverine Salmon Habitats: A guidance Manual'[5]. This focuses on the assessment of salmonid fish, lamprey and European eel habitat, and the suitability of these respective areas to facilitate various life stages and their spawning potential. Predominant habitat was recorded within specific stretches (100m^2), and the habitat classified employing the criteria in **Table 3-3**. The habitats outlined form definable sections of a wider spectrum of habitats commonly found in watercourses. Where spawning gravels were present and accessible, an assessment of their quality in terms of stability, compaction and siltation was made. In addition, the bankside structure and surrounding land use was also described where appropriate. Areas surveyed included 100m^2 sections and both upstream and downstream were scoped further and target notes were recorded if applicable. In survey locations where the watercourses ceased to have definable features and/or were determined unsuitable to support any fish species the survey was not continued upstream of this point.

Table 3-3: Fish Habitat Classifications

Habitat Type	Classification
Salmon spawning gravel	Stable gravel up to 30cm deep that is not compacted or contains excessive silt. Substrate size predominantly pebbles and smaller cobbles depending on fish size.
Trout spawning gravel	Stable gravel up to 30cm deep that is not compacted or contains excessive silt. Substrate size varies from gravels, pebbles and smaller cobbles depending on fish size.
Salmon fry habitat	Shallow (<0.2m) and fast flowing water indicative of riffles and runs with a substrate dominated by pebbles and smaller cobbles.
Salmon parr habitat	Riffle/run habitat that is generally faster and deeper than fry habitat (0.2 - 0.4m). Substrate size* from large pebbles/smaller cobbles to boulder.
Trout fry habitat	Slow to medium flowing shallow water with a substrate dominated by pebbles and smaller cobbles, often concentrated at stream margins.
Trout parr habitat	Variety of substrate sizes; undercut banks, tree roots, big rocks; deeper, slower water.
Lamprey spawning habitat	Stable gravel up to 30cm deep that is not compacted or contains excessive silt (but may contain some sand). Substrate size varies from gravels to pebbles.
Juvenile lamprey habitat	Optimal: Stable fine sediment or sand ≥15cm deep with low water velocity and the presence of organic detritus/plant material. Sub-optimal: Shallow sediment (<15cm deep), often patchy and interspersed among coarser substrates.
Eel habitat	Frequently burrow into mud and utilise cover from larger instream substrate and bankside crevices (e.g., gaps in bank modifications such as walls and log revetments).
Glides	Smooth laminar flow with little surface turbulence. Shallow glide ≤ 0.3m, deep glide > 0.3m.
Pools	No perceptible flow. Shallow pool ≤ 0.3m, deep pool > 0.3m.
Flow constriction	Where flows are accelerated between narrow banksides (usually combined with deep fast flows and bedrock substrates).
*Gravel (2-16mm), pebble (16-64mm), cobble (64-256mm), boulder (>256mm) ** If significant amounts of different habitat types were found to co-exist in the same section, these habitat classifications were adequately described. For example, in the case of salmonids, fry and parr habitat is classified as juvenile habitat. Where parr habitat is mentioned, this refers to habitat that has principally been identified as habitat more suited to parr than fry, however, habitually contains a lower quantity of fry habitat than habitat which is suited to both fry and parr. Substrate and flow definitions in **Table** are adapted from SFCC Habitat Manual[5,16,12].	

Within the 100m^2 survey section, predominant substrate and flow types were categorised according to SFCC[19] definitions outlined in **Table 3-4**.

Table 3-4: Substrate and Flow Type Categorisation[19]

Substrate	Definition	Flow Types	Definitions
SA	Sand: Fine, inorganic particles, <2mm diameter, individual particles visible	DP	Deep Pool: > =30cm deep, water flow slow, eddying, no waves form behind a 2-3cm wide rule placed in the current, smooth surface appearance, water flow is silent.
GR	Gravel: Inorganic particles 2-16mm diameter	SP	Shallow Pool: < 30cm deep, water flow slow, eddying, no waves form behind a 2-3cm wide rule placed in the current, smooth surface appearance, water flow is silent
PE	Pebble: Inorganic particles 16-64mm diameter	DG	Deep Glide: > =30cm deep, water flow moderate/fast; waves form behind a 2-3cm wide rule placed in the current, smooth surface appearance, water flow is silent.
CO	Cobble: Inorganic particles 64 - 256mm diameter	SG	Shallow Glide: < 30cm deep, water flow moderate/fast; waves form behind a 2-3cm wide rule is placed in the current, smooth surface appearance, water flow is silent.
BO	Boulder: Inorganic particles >256mm diameter	RU	Run: water flow fast, unbroken standing waves at surface; water flow is silent.
BE	Bedrock: Continuous Rock Surface	RI	Riffle: water flows fast, broken standing waves at surface; water flow is audible.
OB	Obstruction: Roots, wood, sheets of iron, barrels etc.	TO	Torrent: white water, chaotic and turbulent flow, water flow is noisy, difficult to distinguish substrate.

3.4.3 Analysis

During the fish habitat survey for numerous species, observations and target notes were recorded to identify optimal habitat for fish utilisation potential (FUP) and Salmonid spawning potential (SSP), including channel width; channel depth; flow type; substrate composition; instream and bankside cover; riparian canopy cover; fish spawning potential; riparian land uses; and associated limiting factors. From the data collected, further analysis was undertaken, and evaluations were made for FUP and SSP along each 100m^2 surveyed area. Each survey location was then given a rating for fish utilisation potential (**High**, **Good**, **Moderate**, **Low** or **Poor**) described in **Table 3-5**.

Table 3-5: Fish Utilisation Potential Grades

Grade	Conditions
High	All desirable habitat conditions are met.
Good	Most of desirable habitat requirements met with few adverse conditions present.
Moderate	Habitat displays a mixture of both desirable and adverse conditions.
Poor	Habitat primarily consists of adverse conditions with few desirable conditions present.
Low	Little/no desirable habitat conditions present.

SSP was assessed via the SFCC Walkover Habitat Survey Protocol and Habitat Surveys Training Course Manual[19]. Survey locations were graded as having **Optimal**, **Sub-Optimal** or **Not Suitable** SSP. SSP is considered 'Optimal' if an area greater than 10m^2 is present with clean and suitable substrate likely suitable to all salmonids. SSP is considered 'Sub-optimal' if spawning area is <10m^2 with a mix of suitable and unsuitable substrate types. 'Not suitable' spawning habitat contains no suitable spawning habitat. Additional assessment of SSP was taken to provide additional information on the categories assessed: substrate type, substrate

compaction, river depth, flow type, and siltation. SSP assessment criteria is shown in **Table 3-6.**

Table 3-6: Salmonid Spawning Potential Criterium[19,20].

Species	Substrate Requirements	Substrate Compaction	Depth (m)	Flow Type	Siltation
Atlantic Salmon	Gravel, Pebble, Cobble	Uncompacted	0.2 – 0.5	Fast velocities	No siltation
Sea/Brown Trout	Gravel, Pebble, Cobble	Uncompacted	0.15 – 0.45	Slow velocities	No siltation

3.5 Electrofishing Methodology

Table 3-7 provides a list of all survey locations for fully quantitative electrofishing assessments in August 2024. These locations are shown on **Figure 8.5.3**.

Table 3-7: Survey Locations for Baseline Electrofishing Surveys

Waterbody	Survey Location	Upstream	Downstream	Electrofishing Method
Unnamed	CV01	NS 68547 86178	NS 68491 86177	Fully quantitative
Unnamed	CV02	NS 68493 85701	NS 68421 85638	Fully quantitative
Unnamed	CV03	NS 69437 86386	NS 69422 86448	Fully quantitative
Unnamed	CV05	NS 69153 84983	NS 69117 84952	Fully quantitative
Unnamed	CV06	NS 70595 84884	NS 70569 84869	Fully quantitative
Unnamed	CV07	NS 70256 84565	NS 70280 84533	Fully quantitative
Unnamed	CV09	NS 70694 85673	NS 70723 85654	Fully quantitative

Electrofishing surveys were conducted across one day on 20th August 2024 by three experienced SFCC qualified holders (Amy Green, Sophie McPeake and Euan Macrae) using an EF-500B-SYS Electric Fishing Backpack System and single anode at 350 volts. Electrofishing surveys were led by Dr Amy Green and in full accordance with SFCC protocols. Weather conditions on the day of sampling were overcast with light shower and an ambient temperature of 13°C. Survey locations were determined during the fish habitat walkover assessment conducted in May 2024 where only survey locations deemed to be of 'Poor' to 'High' FUP were further explored (unless reasoning provided to suggest otherwise).

Fully quantitative surveys use a multiple run approach (3 runs), and estimates of fish abundance were based on fish depletion during successive runs. Fully quantitative surveys are area based and calculate the number of fish per 100m² as per SFCC guidelines19, the data collected can then be compared to other data collected year on year. For example; before, during and after construction. Both upstream and downstream stop nets were deployed to avoid fish emigration and/or migration from the survey location. All fish caught were anaesthetised for processing, identified (species) and measured (fork length). Other non-salmonid species were recorded but not measured.

3.5.1 Electrofishing Analysis

Densities of fish were calculated separately for fry (young of the year) and parr for both salmon and trout. Estimates of minimum density were calculated by dividing the number of fish caught by the area of habitat surveyed. Zippin corrections were applied where appropriate using the

[20] Louhi, P., Mäki-Petäys, A., & Erkinaro, J. (2008). Spawning habitat of Atlantic salmon and brown trout: general criteria and intragravel factors. River research and applications, 24(3), 330-339.

Removal Sampling II software (Pisces conservation)[21]. To provide a guide to the relative abundance of salmonid fish sampled during the survey, fish densities were classified per the SFCC classifications scheme Outer Hebrides region[22]. Godfrey's classification scheme is area based and calculated on a one-run approach, therefore classification for this survey is based only on the first pass of the multi-run approach. Grading from very poor through to excellent are given for abundance within each quintile range and absent for no fish caught.

3.5.2 Fish Habitat Assessment

At each electrofishing survey location, a repeated habitat assessment using the protocol outline in Section 3.4.2 were used to assess the instream habitat available for juvenile and adult fish. This was conducted to assess annual differences and potential bottleneck zones in areas which demonstrate fluctuating flow regimes.

3.6 Limitations to Survey

No limitations were recorded during the May 2024 Fish Habitat Assessment walkover.

During the August 2024 electrofishing surveys, water levels were high due to previous rainfall with a likely increase in torrent water. High rainfall preceding the survey may have resulted in fish being swept down watercourses, and thus underrepresented in the survey. Torrent water additionally reduced clarity through increases in suspended solids making identification of fish more difficult, however, given the shallow width and breadth of the channel and the size of net used it is unlikely fish would have been missed as a result.

Downstream access for survey location CV01 was partially blocked by collapsed coniferous trees, however, a large section of the watercourse was still able to be surveyed.

Access was limited outwith the clients landownership, as such, major watercourses such as the Endrick Water could not be surveyed. The Endrick Water has been extensively surveyed, and as such information on species present and populations are readily available and as such does not present a significant limitation.

4.0 Results

4.1 Desk Study

4.1.1 Watercourse Classification

Five classified watercourses and one waterbody were identified 2km from the Site within the SEPA Water Classification Hub[16]:

- Endrick Water (u/s Blane Water) (ID: 10153);
- Earl's Burn (ID: 4212);
- River Carron (Source to Carron Valley Reservoir) (ID: 4203);
- Carron Valley Reservoir (ID: 100283); and
- River Carron (Carron Valley Reservoir to Avon Burn Confluence) (ID: 4202).

SEPA[16] Water Classification Hub identified **Endrick Water** (u/s Blane Water) **(ID: 10153)** which runs through the Loch Lomond catchment of the Scotland river basin district and out with the Site application boundary. Endrick Water is considered to be of 'Good' overall status

[21] Seaby, R.M.H. & Henderson, P.A. (2008) Population Estimation by Removal Sampling. Version 2.2.2.22, *Pisces Conservation*, Hampshire.

[22] Godfrey (2005) *Site Condition Monitoring of Atlantic Salmon SACs*. SFCC to Scottish Natural Heritage, Contract F02AC608.

and ecological status since 2013, and fish ecology was found to be 'Good' since 2019, though previously high from 2013-2018. The main stem is approximately 34.2km in length.

Similarly, the **Earl's Burn (ID: 4212)** which runs east of the Site, and out with the application boundary is considered to be of 'Good' overall status since 2009, though 'Moderate' ecological status since 2013. The water body has been designated as a heavily modified water body on account of physical alterations that cannot be addressed without a significant impact on water storage for public drinking water. The main stem is approximately 9.2km in length.

The remaining two watercourses and single waterbody are located south of the Site boundary. **River Carron** (Source to Carron Valley Reservoir) **(ID: 4203)** and **Carron Valley Reservoir (ID: 100283)** are both deemed 'Good' overall status, though the reservoir was deemed to be of 'Poor' ecological status. **River Carron** (Carron Valley Reservoir to Avon Burn Confluence) **(ID: 4202)** was found to be of both 'Poor' overall and ecological status.

Table 4-1 shows summarises WFD classification results. It must be noted that not all tributaries located on OS maps within the Site boundary have classification.

Table 4-1: WFD Watercourse Classification[16].

2022 Parameters	Endrick Water (u/s Blane Water) (ID: 10153)	Earl's Burn (ID: 4212)	River Carron (Source to Carron Valley Reservoir) (ID: 4203)	Carron Valley Reservoir (ID: 100283)	River Carron (Carron Valley Reservoir to Avon Burn Confluence) (ID: 4202)
Overall Status	Good	Good	Good	Good	Poor
Fish	Good	High	High	High	Poor
Fish Barrier	High	High	High	High	Poor
Overall Ecology	Good	Moderate	Good	Poor	Poor
Overall Hydrology	Good	Moderate	High	Moderate	Moderate
Water Quality	Good	High	High	High	Good

4.1.2 Species Records

No fish species records from NBN Gateway are available in any of the watercourses within the Site or 2km of the Site centre. However, various records of Atlantic salmon brown / sea / rainbow trout, eel, brook lamprey, common carp (*Cyprinus carpio*), powan (*Coregonus lavaretus*), pike (*Esox lucius*), minnow (*Phoxinus phoxinus*), three-spined stickleback (*Gasterosteus aculeatus*) and stone loach (*Barbatula barbatula*) are available within 5km of the Site.

No records for FWPM were identified within 2km of the Site. NatureScot were consulted on the presence of FWPM within the Endrick water and the tributaries within the Site and indicated a lack of FWPM records for any of the waterbodies consulted and a lack of suitable habitat within forested areas within the application boundary. The Loch Lomond Fisheries Trust was consulted but no response was received.

4.1.3 Barriers to Migration

Two barriers to migration were identified using Scotland's Environment Web[15]. **Carron Valley reservoir dam (ID: 1418)** & **(ID: 2424)** located at both the eastern and western zones were deemed impassable in 2020 assessment due to no fish pass being present within any tributary within the Site boundary.

4.1.4 Protected Areas

Currently there are two conservation designations. The Endrick Water Site of Special Scientific Interest (SSSI) with relevance to brook and river lamprey, and the Endrick Water Special Area of Conservation (SAC) with specific interest in Atlantic salmon, within a 2km buffer of the Site[18].

The Site is found to be hydrologically connected to both Endrick Water designated sites and two further Sites of Special Scientific Interest; Carron Glen SSSI and Denny Muir SSSI, which all sit within 5km of the Site. All designated sites to which are hydrologically connected to the Site are detailed in **Table 4-2**.

Table 4-2: Statutory Designated Sites.

Name & Designation	Approximate Distance and Direction from Site (km)	Qualifying Feature(s) of Interest	Hydrological Connectivity
Endrick Water (SSSI)	2.3, W	Designated for its freshwater habitats, with water quality and water management in place. The lower reaches of the river provide an exceptional example of the fluvial geomorphology of Scotland. The river itself is the largest flowing into Loch Lomond and it is both nationally and internationally important for its population of river lamprey and brook lamprey and Atlantic salmon. The Site also supports the nationally rare Scottish dock (*Rumex aquaticus).*	Endrick Water SSSI and SAC are hydrologically connected to Site from tributaries within the Site flowing west off the Site. The Site is located upstream of the designated site. Water drains from the west of the Site into the Endrick Water (NS 67973 86725).
Endrick Water (SAC)		Designated for its freshwater habitats, with water quality and water management in place. The lower reaches of the river provide an exceptional example of the fluvial geomorphology of Scotland. The river itself is the largest flowing into Loch Lomond and it is both nationally and internationally important for its population of river lamprey, brook lamprey and Atlantic salmon.	
Carron Glen (SSSI)	5, E	The SSSI has been notified for the biological interest of its habitats – upland oak woodland, upland mixed ash woodland and neutral grassland.	Carron Glen SSSI is hydrologically connected to Site; the Site is situated upstream of the designated site. Water drains from the east of the Site into the Earl Burn. Forms confluence with River Carron (NS

Name & Designation	Approximate Distance and Direction from Site (km)	Qualifying Feature(s) of Interest	Hydrological Connectivity
		Qualifying features include; Lowland neutral grassland, upland mixed ash woodland, upland mixed ash woodland.	72971 83721). The designated site lies within the Carron River approximately 3km downstream from the confluence point.
Denny Muir (SSSI)	5, SE	The main interest of the SSSI is the range and extent of flushed grassland and fen vegetation types including locally uncommon plant communities and species. Heathland over peat, small peaty pools, and unimproved acidic grasslands also occur. Associated with this mosaic of habitats is a characteristic upland bird community including red grouse (*Lagopus lagopus scotica*), black grouse (*Lyrurus tetrix*), lapwing (V*anellinae*), snipe (*Gallinago gallinago*), curlew (*Numenius*), wheatear (*Oenanthe*), skylark (*Alauda arvensis*), and short-eared owl (*Asio flammeus*).	Denny Muir SSSI is hydrologically connected to Site; the Site is situated upstream of the designated site tributary confluence. Water drains from the east of the Site into the Earl Burn. Forms confluence with River Carron (NS 72971 83721). approximately 2km downstream from Earl Burn/ River Carron confluence, the water draining from the designated site confluences with the River Carron further downstream (NS 74796 83813).

4.2 Fish Habitat Assessment Results

4.2.1 Fish Utilisation Potential

Results of the FUP assessments conducted in 2024 are presented in **Table 4-3** and shown on **Figure 8.5.1**.

FUP ranged from: Moderate (CV03, CV04, CV05, CV06, CV07); to Poor (CV01, CV02). No habitat identified at the time were deemed to be High, Good or Bad. However limiting factors of all survey locations include flow and depths in summer month to be of concern.

No areas were deemed highly suitable to support eel or lamprey, however, further surveys may confirm presence.

4.2.2 Salmonid Spawning Potential

Results of the SSP assessments are presented in **Table 4-3** and shown on **Figure 8.5.2**.

SSP ranged from: Sub-Optimal (CV04, CV05, CV06); to Not Suitable (CV01, CV02, CV03, CV07). No survey locations were deemed Optimal for SSP due to limited flow, depths and suitable substrates. In addition, no redds were identified.

Table 4-3: Fish Habitat Assessment Results.

Survey Code	Fish Utilisation Potential	Salmonid Spawning Potential	Reach Description and Limiting Factors	Plate
CV01	Poor	Not Suitable	Survey Length: 62m Average wet width: 2.2m Surveys area: 136.4m^2 Wet width ranged from 0.5 -3m (Plate 2) with depth ranging from <10-20cm. In small areas there were multiple routes though depth remained uniform. Water flow throughout the survey location included SM (45%), RU (5%), SP (5%) SG (40%) and RI (5%). Water was found to be very peaty in colour. Substrates included SA (5%), GR (30%), PE (20%), CO (40%) and OB (5%). Substrate was stable and uncompacted at the time of surveying. Banks were found to be 100% bare, with erosion occurring throughout. No redds were identified. Due to the flows, substrates and limited instream fish cover this survey location is deemed 'Poor' fish utilisation potential (all life stages). Land use was predominantly conifer plantation and road. Limiting factors for the survey location would be limited flow in the summer months due to drought and the build-up of HO of time from leaf litter.	Plate 1.  Plate 2.  Plate 3. 

Survey Code	Fish Utilisation Potential	Salmonid Spawning Potential	Reach Description and Limiting Factors	Plate
CV02	Poor	Not Suitable	Survey Length: 100m Average wet width: 0.5m Surveys area: 50m^2 Wet width ranged from 0.3-0.6m, with watercourse passage becoming narrower at the downstream extent of the survey location. Water flow was predominantly between SG (80%) and RU (15%) with areas of RI (5%) and depths ranging from <10-20cm. Substrate included SA (20%), GR (40%), PE (35%), CO (5%), though no dense instream cover was noted. Banks were uncut on both sides (5-10%) which potentially provides marginal cover for juvenile fish. Due to the lack of flow velocity within the survey location, and limited cover and substrates the survey location is deemed Poor. No redds were identified. Land use is predominantly felled woodland and road. Limiting factors for the survey location would be limited flow in the summer months due to drought and poor conifer plantation drainage. It was found that no fish would be able to migrate past the upstream extent due to small pipe with limited accessibility and water flow. Due to limited access as a result of the deforestation and tree debris, the survey was stopped 100m downstream.	Plate 4.  Plate 5. 
CV03	Moderate	Not Suitable	Survey Length: 50m Average wet width: 2.4m Surveys area: 120m^2 Wet width ranged from 1.7–3.5m, though bed width extended ~4.9m wide. Water depth ranged from <10-15cm. Water flow throughout the survey location included RU (30%), SG (25%) and RI (45%). Substrates included GR (5%), PE (10%), CO (40%) and BO (45%). Substrate was stable but uncompacted at the time of surveying. Banks were found to be bare on both sides, which reduced the survey locations utilisation potential and erosion was noted to occur on the right bank due to surrounding tree collapse. No redds were identified. Due to the flows, substrates and potential fish cover this site is deemed moderate fish utilisation potential (primarily parr) and requires further scope. Though substrates were not suitable for spawning salmonids (Plate 6). Land use was predominantly conifer plantation and road. Limiting factors include water levels significantly reduced in summer months and banks were found to be unstable with signs of erosion recorded. In addition, the survey location is only accessible via road culvert.	Plate 6. 

Survey Code	Fish Utilisation Potential	Salmonid Spawning Potential	Reach Description and Limiting Factors	Plate
				Plate 7. 
CV04	Moderate	Sub-Optimal	Survey Length: 140m Average wet width: 1.3m Surveys area: 182m^2 Wet width ranged from 1–2.5m, with a water depth ranging from <10-15cm. Water flow throughout the survey location included SP (5%), RU (50%), SG (35%) and RI (10%). Substrates included SA (10%), GR (15%), PE (25%), CO (20%), BO (5%) and BE (20%) which was only found in the upper limits of the survey location. Substrate was stable but uncompacted at the time of surveying where bedrock was not present. Banks were found to be uncut both sides (Left: 5%/ Right: 15%), which increases the sites utilisation potential. No redds were identified. Due to the flows, substrates and potential fish cover this site is deemed Moderate fish utilisation potential (primarily parr and fry) and requires further scope. Though substrates were sub-optimal in the lower extent of the survey location for spawning salmonids. Land use was predominantly conifer plantation and road. Limiting factors include water levels significantly reduced in summer months. Unlikely migration beyond upper limits of survey location due to eroding culvert and small access hole (Plate 9).	Plate 8.  Plate 9.  Plate 10. 
CV05	Moderate	Sub-Optimal	Survey Length: 120m	Plate 11.

Survey Code	Fish Utilisation Potential	Salmonid Spawning Potential	Reach Description and Limiting Factors	Plate
			Average wet width: 0.85m Surveys area: 102m^2 Wet width ranged from 0.3–1.1m, with a water depth ranging from <10-20cm. Water flow throughout the survey location included SG (70%), RU (25%) and RI (5%). Substrates included GR (30%), PE (55%), CO (10%), BO (<5%) and BE (<5%). Substrate was stable but uncompacted at the time of surveying where bedrock was not present. Banks were found to be uncut both sides (Left: 15%/ Right: 5%), which increases the sites utilisation potential. No redds were identified. Due to the flows, substrates and potential fish cover this survey location is deemed Moderate fish utilisation potential (primarily parr and fry) and requires further scope. Though substrates were sub-optimal for spawning salmonids. Land use was predominantly conifer plantation and road. Limiting factors include water levels significantly reduced in summer months.	
CV06	Moderate	Sub-Optimal	Survey Length: 107m Average wet width: 1m Surveys area: 107m^2 Wet width ranged from 0.5–1.2m, with a water depth ranging from <10-22cm. Water flow throughout the survey location included SM (<5%), SG (40%), RU (55%) and RI (<5%). Substrates included SI (5%), SA (5%), GR (20%), PE (50%), CO (20%) with small areas of potential OB (<5%) caused by debris buildup. Substrate was stable but uncompacted at the time of surveying. Banks were found to be uncut both sides (Left: 60%/ Right: 25%), which increases the sites utilisation potential. No redds were identified. Due to the flows, substrates and potential fish cover this site is deemed Moderate fish utilisation potential (primarily parr and fry and resident adults) and requires further scope. Though substrates were sub-optimal for spawning salmonids, flow might be a limiting factor. Land use was predominantly conifer plantation and road.	Plate 12.  Plate 13. 

Survey Code	Fish Utilisation Potential	Salmonid Spawning Potential	Reach Description and Limiting Factors	Plate
CV07	Moderate	Not Suitable	Survey Length: 71m Average wet width: 0.6m Surveys area: 42.6m^2 Wet width ranged from 0.6–1m, with a water depth ranging from <10-20cm. Water flow throughout the survey location included SG (80%), RU (15%) and RI (5%). Substrates included SA (5%), GR (50%), PE (30%), CO (5%) with small areas of potential BE (5%). Substrate was stable but uncompacted at the time of surveying. Banks were found to be uncut both sides (Left: 10%/ Right: 5%), which increases the sites utilisation potential. No redds were identified. Due to the flows, substrates and potential fish cover this survey location is deemed Moderate fish utilisation potential (primarily parr and fry and resident adults) and requires further scope. Though substrates were sub-optimal for spawning salmonids, flow/depth might be a limiting factor. Land use was predominantly conifer plantation and road. Plate 16: signs of potential flood defence/ artificial stabilisation of the watercourse.	Plate 14.  Plate 15.  Plate 16. 

4.3 Electrofishing Results

4.3.1 Fish Fauna

No salmonids (0++/1++) or other fish species were captured during the August 2024 surveys. It is unlikely salmonids were present with the surveyed locations due to heavy rainfall a day prior to surveying and extreme flows present at the time of surveying. No calculations for minimum density were completed as a result.

Additionally, the landscape and current felled conifer plantation practices make it unlikely salmonids are utilising the upstream extent of the watercourses within the Site application

boundary, though will be within the downstream extents where watercourse confluence with predominant watercourses and the reservoir.

4.3.2 Fish Habitat Assessment

Table 4-4 provides summary data of habitat present post electrofishing assessments which was conducted in August 2024.

Water levels were higher when compared to the May 2024 fish habitat walkover assessment, though no watercourse, which was recommended for electrofishing, was too high for surveying.

Table 4-4: Fish habitat assessment results.

Survey Code	Reach Description and Limiting Factors
CV01	Survey Length: 35m Average wet width: 2.7m Surveys area: 94.5m^2 Access downstream was limited due to collapsed coniferous trees. Due to persistent rainfall a day prior wet width ranged between 0.75 to 3m and areas previously dry contained continuous water flow. Depth ranged between <10 to 25cm, clarity was poor due to peaty colouration, though substrate remained the similar to the May 2024 walkover. Substrates included; SA (5%), GR (25%), PE (20%), CO (40%) and OB (10%). Water flow was predominantly RU and RI. Substrates included were stable and uncompacted at the time of surveying. Banks were found to be 100% bare, with erosion occurring throughout. No redds were identified. Land use was predominantly conifer plantation and road. Limiting factors for the survey location would be limited flow in the summer months due to drought and the build-up of HO of time from leaf litter. No salmonids or fish species were captured during the August 2024 surveys.
CV02	Survey Length: 100m Average wet width: 0.6m Surveys area: 60m^2 Access downstream was limited due to felled conifer plantation practices, though the watercourse corridor width remained uniform when compared to May 2024 walkover assessment. Depth remained shallow between <10-15cm, though wet width was 0.6 throughout, likely due to persistent rainfall a day prior. Water flow was predominantly between SG (60%) and RU (35%) with areas of RI (5%). Substrate included SA (20%), GR (40%), PE (35%), CO (5%), though no dense instream cover was noted. Banks were uncut on both sides (5-10%) which potentially provides marginal cover for juvenile fish. Due to the lack of flow velocity within the survey location, and limited cover and substrates the survey location is deemed Poor. No redds were identified. Land use is predominantly felled woodland and road.

Survey Code	Reach Description and Limiting Factors
	Limiting factors for the survey location would be limited flow in the summer months due to drought and poor conifer plantation drainage. It was found that no fish would be able to migrate past the upstream extent due to small pipe with limited accessibility and water flow. No salmonids or fish species were captured during the August 2024 surveys.
CV03	Survey Length: 39m Average wet width: 2.7m Surveys area: 105.3m^2 Due to persistent rainfall a day prior to surveying, water flow was classed between RU, RI and torrent (TO). depth was between 10 to 25cm and water clarity was moderate though peaty in colouration. Substrates included GR (5%), PE (15%), CO (55%) and BO (25%). Substrate was stable but uncompacted at the time of surveying. Banks were found to be bare on both sides and erosion was noted to occur on the right bank due to surrounding tree collapse. Canopy cover equalled 90%. No redds were identified. Land use was predominantly conifer plantation and road. Limiting factors include water levels significantly reduced in summer months and banks were found to be unstable with signs of erosion recorded. In addition, the survey location is only accessible via road culvert. No salmonids or fish species were captured during the August 2024 surveys.
CV04	Survey Length: 80m Average wet width: 2.1m Surveys area: 168m^2 Dense vegetation overgrowth limited survey location access, thus surveys were conducted downstream from initial May 2024 assessment. Wet with ranged from 1.6–2.8m, with a water depth ranging from <15-40cm. Water flow throughout the survey location included DP (5%), RU (70%), SG (5%) and RI (20%). Substrates included SA (5%), GR (25%), PE (45%), CO (20%) and BO (5%). Substrate was stable but uncompacted at the time of surveying. Banks were found to be uncut both sides (Left: 10%/ Right: 15%) and canopy cover equalled 60%. No redds were identified. Land use was predominantly conifer plantation and road. Limiting factors include water levels significantly reduced in summer months and stagnant confluence with reservoir (unmaintained) where high algae content was noted during the protected mammal walkover in September 2024. No salmonids or fish species were captured during the August 2024 surveys.
CV05	Survey Length: 120m Average wet width: 0.85m Surveys area: 102m^2 Wet width ranged from 0.52–1.25m, with a water depth ranging from 15 to 30cm.

Survey Code	Reach Description and Limiting Factors
	Water flow throughout the survey location included RU (85%) and RI (15%). Substrates included GR (25%), PE (50%), CO (20%), BO (<5%) and BE (<5%). Substrate was stable but uncompacted at the time of surveying where bedrock was not present. Banks were found to be uncut both sides (Left: 15%/ Right: 5%). Canopy cover equalled 11% No redds were identified. Land use was predominantly conifer plantation and road. Limiting factors include water levels significantly reduced in summer months. No salmonids or fish species were captured during the August 2024 surveys.
CV06	Survey Length: 107m Average wet width: 1m Surveys area: 107m^2 Due to persistent rain a day prior to surveying water depth was significantly higher and water clarity was extremely poor and peaty. The watercourse corridor was uniform throughout though wet width extended to 1m average. Water depth was between 11 to 30cm and flow regimes were predominantly RU and RI with areas of SG. Substrates included SI (5%), SA (5%), GR (20%), PE (50%), CO (20%) with small areas of potential OB (<5%) caused by debris buildup. Substrate was stable but uncompacted at the time of surveying. Banks were found to be uncut both sides (Left: 60%/ Right: 25%), though no canopy cover was present. No redds were identified. Land use was predominantly conifer plantation and road. No salmonids or fish species were captured during the August 2024 surveys.
CV07	Survey Length: 75m Average wet width: 0.85m Surveys area: 63.75m^2 Due to overgrown vegetation, access was limited. Though due to persistent rain a day prior to surveying water depth was significantly higher and water clarity was extremely poor and peaty. The watercourse corridor was uniform throughout, though wet width extended to 0.85m average. Water depth was between 11 to 24cm and flow regimes were predominantly RU and RI with areas of SG. Substrates included SA (5%), GR (50%), PE (30%), CO (5%) with small areas of potential BE (5%). Substrate was stable but uncompacted at the time of surveying. Banks were found to be uncut both sides (Left: 10%/ Right: 5%), with 5% canopy cover. No redds were identified. Land use was predominantly conifer plantation and road. Limiting factors include impassable culvert structure under certain flow regimes located downstream, conifer plantation felling silt runoff into the watercourse.

5.0 Discussion

5.1 Salmonid Fish

The FHQ and SSP of the sampling locations ranged between Moderate to Poor and Sub-Optimal to Not Suitable, respectively when assessed in May 2024. However, the connectivity between the watercourses throughout the Site is significantly affected by landscape vegetation; dense conifer plantations, felled woodland and peat.

It is considered highly unlikely migratory fish species will be present within the upper reaches of the Site within all watercourses surveyed, where further assessment using fully quantitative electrofishing fish methods did not show fish present within the Site boundary. It was noted road culverts are present across the majority of watercourses within the Site boundary. Erosion within these was noted (CV04). Nonetheless, it is possible that salmon and trout could ascend the barriers during optimal flow conditions, providing additional substrates and riparian cover are present to facilitate the fish upstream.

Habitat connectivity is integral to survival of migratory salmonids; successful migration upstream and downstream is required to support populations of migratory fish species[16,23]. It is unlikely, due to the fluctuating water flow regimes and depths, that salmonids would spawn with the Site boundary or migrate throughout the watercourse present on the Site.

Survey locations outside the Site application boundary could not be assessed due to access restrictions.

No important ecological features (IEF) were identified during the survey within the Site boundary; however the Site is hydrologically connected to four SAC's, SSSI's and watercourses given WFD classifications and must be considered during development mitigation measures, particularly given that lamprey (brook and river) and Atlantic salmon are addressed in the Qualifying Features of Interest (QFI).

5.2 Lamprey and Eel Suitability

Within the survey locations, there were few areas (CV05, CV06, CV07) suitable for juvenile lamprey (i.e., fine, soft substrate in well oxygenated, slow flowing water). No significantly deep undercut section or large boulders/ tree debris were present throughout the Site; thus its unlikely eels are present.

Fully quantitative electrofishing assessments did not provide an indication of lamprey and/or eels to be present.

5.3 Freshwater Pearl Mussel Suitability

Limited / no suitable habitat for FWPM was identified during the habitat survey of sampled watercourses.

5.4 Recommended Surveys

No further fish habitat or populations are recommended within the Site boundary.

[23] Buddendorf, W. B., Jackson, F. L., Malcolm, I. A., Millidine, K. J., Geris, J., Wilkinson, M. E., & Soulsby, C. (2019). Integration of juvenile habitat quality and river connectivity models to understand and prioritise the management of barriers for Atlantic salmon populations across spatial scales. *Science of the Total Environment*, *655*, 557-566.

Figures

Figure 8.5.1 Fish Utilisation Potential

Figure 8.5.2 Salmon Spawning Potential

Figure 8.5.3 Electrofishing Survey Locations

Cairnoch Hill Wind Farm

Eurowind Energy Limited

SLR Project No.: 428.V12085.00001

3 August 2026

268000 269000 270000 271000 272000

687000 686000 685000

T1 T2 T3 T4

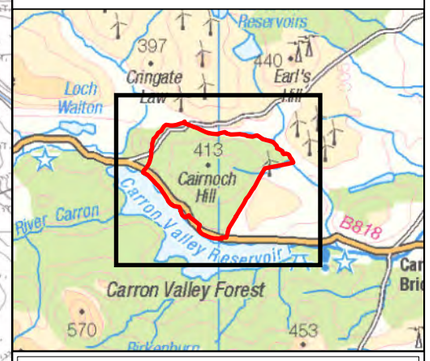
8.5.1b 8.5.1c 8.5.1d 8.5.1e 8.5.1f 8.5.1g 8.5.1h

Cringate Sheepfold Waterfall Easter Cringate Earl's Burn Cairnoch Hill Craigannet Hill Craigannet Craigannet Craig Carron Valley Reservoir Smaitburn Haugh Hill Priest's Croft Quarry (Stone) Quarry (disused) Sir John de Graham's Castle Motte & Bailey Sluice Weir Ford Cairn Fendrick Water Wind Fa Duncarron Fort Easterton

N

LEGEND

- Site Boundary
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Crane Pad / Hardstanding
- Proposed Substation Compound
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Blade Laydown Area
- Watercourse (OS OpenMap Local)
- Waterbody (OS OpenMap Local)



0 0.25 0.5 1 Kilometres

Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.5 - FISH

FISH UTILISATION POTENTIAL

FIGURE 8.5.1a

Scale 1:15,000 @ A3

Date JUNE 2026

428.V12085.00001.0146.0 Fish Utilisation Potential

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268400 268500 268600

686300

686200

CV01

N

0 25 50 100

Metres

LEGEND

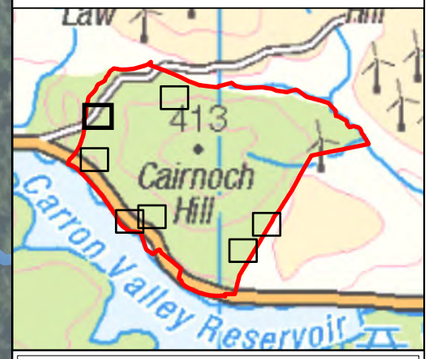
- Site Boundary
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Watercourse (OS OpenMap Local)
- Waterbody (OS OpenMap Local)

Survey Extent Indicator

- Upstream
- Downstream

Fish Utilisation Potential

- Moderate - Habitat Displays A Mixture Of Both Desirable And Adverse Conditions
- Poor - Little/No Desirable Habitat Conditions Present



Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.5 - FISH

FISH UTILISATION POTENTIAL

FIGURE 8.5.1b

Scale 1:1,000 @ A3

Date JUNE 2026

428.V12085.00001.0146.0 Fish Utilisation Potential

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268300 268400 268500 268600

685800

685700

CV02

N

LEGEND

Site Boundary

Proposed Turbine Location

Proposed Existing Track to be Upgraded

Watercourse (OS OpenMap Local)

Waterbody (OS OpenMap Local)

Survey Extent Indicator

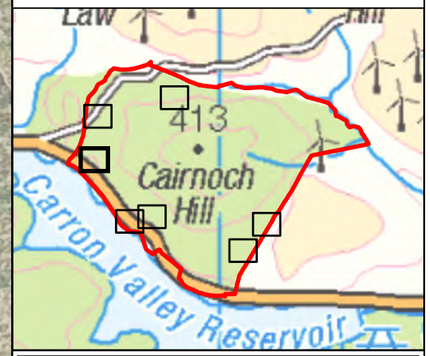
Upstream

Downstream

Fish Utilisation Potential

Moderate - Habitat Displays A Mixture Of Both Desirable And Adverse Conditions

Poor - Little/No Desirable Habitat Conditions Present



0 25 50 100

Metres

Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.5 - FISH

FISH UTILISATION POTENTIAL

FIGURE 8.5.1c

Scale 1:1,000 @ A3

Date JUNE 2026

428.V12085.00001.0146.0 Fish Utilisation Potential

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269300 269400 269500 269600

686500

686400

CV03

N

0 25 50 100

Metres

LEGEND

Site Boundary

Proposed Turbine Location

Watercourse (OS OpenMap Local)

Waterbody (OS OpenMap Local)

Survey Extent Indicator

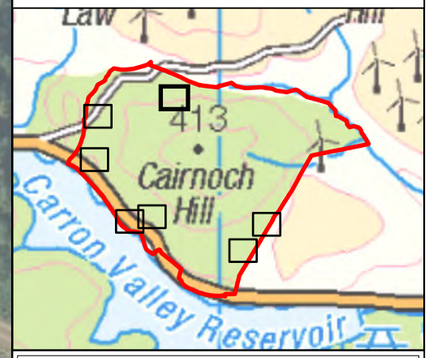
Upstream

Downstream

Fish Utilisation Potential

Moderate - Habitat Displays A Mixture Of Both Desirable And Adverse Conditions

Poor - Little/No Desirable Habitat Conditions Present



Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.5 - FISH

FISH UTILISATION POTENTIAL

FIGURE 8.5.1d

Scale 1:1,000 @ A3

Date JUNE 2026

428.V12085.00001.0146.0 Fish Utilisation Potential

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268800
268900
269000
685000
684900
CV04
N
0
25
50
100
Metres
LEGEND
Site Boundary
Proposed Turbine Location
Watercourse (OS OpenMap Local)
Waterbody (OS OpenMap Local)
Survey Extent Indicator
Upstream
Downstream
Fish Utilisation Potential
Moderate - Habitat Displays A Mixture Of Both Desirable And Adverse Conditions
Poor - Little/No Desirable Habitat Conditions Present
Law
413
Cairnoch Hill
Carron Valley Reservoir
Eurowind Energy
SLR
CAIRNOCH HILL WIND FARM
EIAR - TA 8.5 - FISH
FISH UTILISATION POTENTIAL
FIGURE 8.5.1e
Scale 1:1,000 @ A3
Date JUNE 2026
428.V12085.00001.0146.0 Fish Utilisation Potential
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269000 269100 269200 269300

685100

685000

N

CV05

0 25 50 100

Metres

LEGEND

Site Boundary

Proposed Turbine Location

Proposed Existing Track to be Upgraded

Watercourse (OS OpenMap Local)

Waterbody (OS OpenMap Local)

Survey Extent Indicator

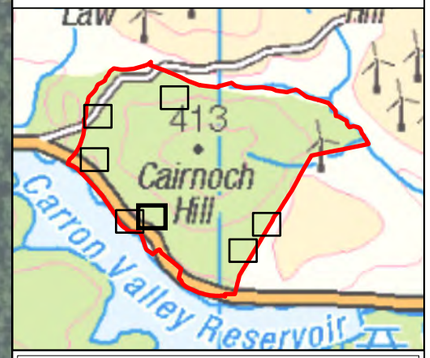
Upstream

Downstream

Fish Utilisation Potential

Moderate - Habitat Displays A Mixture Of Both Desirable And Adverse Conditions

Poor - Little/No Desirable Habitat Conditions Present



Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.5 - FISH

FISH UTILISATION POTENTIAL

FIGURE 8.5.1f

Scale 1:1,000 @ A3

Date JUNE 2026

428.V12085.00001.0146.0 Fish Utilisation Potential

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270400 270500 270600 270700

685000

684900

CV06

N

0 25 50 100

Metres

LEGEND

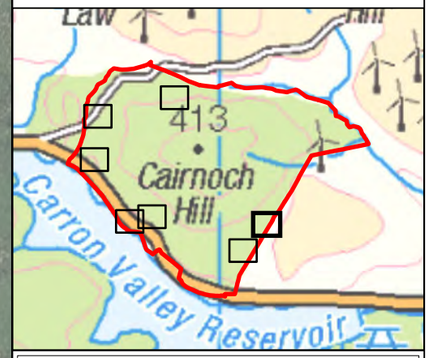
- Site Boundary
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Substation Compound
- Watercourse (OS OpenMap Local)
- Waterbody (OS OpenMap Local)

Survey Extent Indicator

- Upstream
- Downstream

Fish Utilisation Potential

- Moderate - Habitat Displays A Mixture Of Both Desirable And Adverse Conditions
- Poor - Little/No Desirable Habitat Conditions Present



Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.5 - FISH

FISH UTILISATION POTENTIAL

FIGURE 8.5.1g

Scale 1:1,000 @ A3

Date JUNE 2026

428.V12085.00001.0146.0 Fish Utilisation Potential

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270200
270300
270400
684600
CV07
N
0
25
50
100
Metres
LEGEND
Site Boundary
Proposed Turbine Location
Proposed Existing Track to be Upgraded
Watercourse (OS OpenMap Local)
Waterbody (OS OpenMap Local)
Survey Extent Indicator
Upstream
Downstream
Fish Utilisation Potential
Moderate - Habitat Displays A Mixture Of Both Desirable And Adverse Conditions
Poor - Little/No Desirable Habitat Conditions Present
Law
413
Cairnoch Hill
Carron Valley Reservoir
Eurowind Energy
SLR
CAIRNOCH HILL WIND FARM
EIAR - TA 8.5 - FISH
FISH UTILISATION POTENTIAL
FIGURE 8.5.1h
Scale 1:1,000 @ A3
Date JUNE 2026
428.V12085.00001.0146.0 Fish Utilisation Potential
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268000 269000 270000 271000 272000

687000 686000 685000

LEGEND

- Site Boundary
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Crane Pad / Hardstanding
- Proposed Substation Compound
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Blade Laydown Area
- Watercourse (OS OpenMap Local)
- Waterbody (OS OpenMap Local)

T1 T2 T3 T4

8.5.2b 8.5.2c 8.5.2d 8.5.2e 8.5.2f 8.5.2g 8.5.2h

Cairnoch Hill 413

Craigannet Hill 354

Carron Valley Reservoir

Carron Valley Forest

Loch Walton

Cringate Law 397

Earl's Burn

Sheepfold

Easter Cringate

Craigannet

Craigannet Craig

Easterton

Quarry (disused)

Haugh Hill

Priest's Croft

Burial Gd

Sir John de Graham's Castle

Smaltburn

Duncarron Fort

Reservoirs

Wind Fa

0 0.25 0.5 1 Kilometres

N

Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.5 - FISH

SALMONID SPAWNING POTENTIAL

FIGURE 8.5.2a

Scale 1:15,000 @ A3

Date JUNE 2026

428.V12085.00001.0156.0 Salmonid Spawning Potential

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268400 268500 268600

686300

686200

CV01

N

0 25 50 100

Metres

LEGEND

Site Boundary

Proposed New Track

Proposed Existing Track to be Upgraded

Survey Extent Indicator

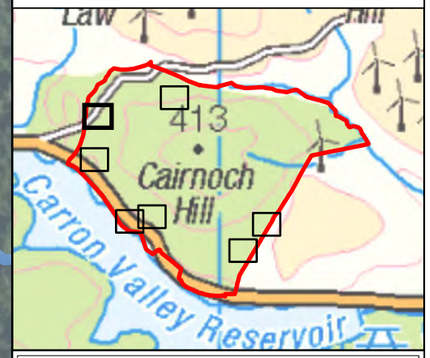
Upstream

Downstream

Salmonid Spawning Potential

Sub-Optimal

Not Suitable



Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.5 - FISH

SALMONID SPAWNING POTENTIAL

FIGURE 8.5.2b

Scale 1:1,000 @ A3

Date JUNE 2026

428.V12085.00001.0156.0 Salmonid Spawning Potential

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268300 268400 268500 268600

685800

685700

CV02

N

LEGEND

Site Boundary

Proposed Existing Track to be Upgraded

Survey Extent Indicator

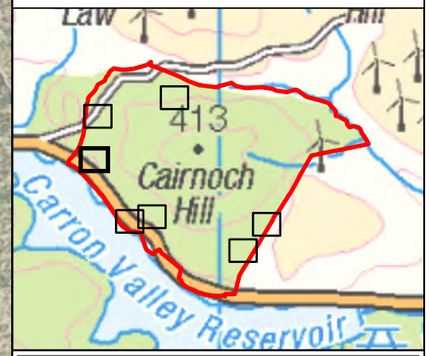
Upstream

Downstream

Salmonid Spawning Potential

Sub-Optimal

Not Suitable



0 25 50 100

Metres

Eurowind Energy™

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.5 - FISH

SALMONID SPAWNING POTENTIAL

FIGURE 8.5.2c

Scale 1:1,000 @ A3

Date JUNE 2026

428.V12085.00001.0156.0 Salmonid Spawning Potential

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269300 269400 269500 269600

686500

686400

CV03

N

0 25 50 100

Metres

LEGEND

Site Boundary

Survey Extent Indicator

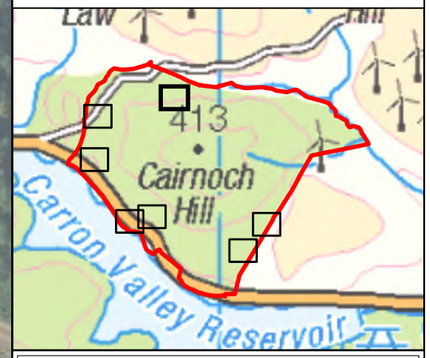
Upstream

Downstream

Salmonid Spawning Potential

Sub-Optimal

Not Suitable



Eurowind Energy

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.5 - FISH

SALMONID SPAWNING POTENTIAL

FIGURE 8.5.2d

Scale 1:1,000 @ A3

Date JUNE 2026

428.V12085.00001.0156.0 Salmonid Spawning Potential

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268800
268900
269000
685000
684900
428.V12085.00001.0156.0 Salmonid Spawning Potential

N

CV04

0 25 50 100
Metres

LEGEND

Site Boundary

Survey Extent Indicator

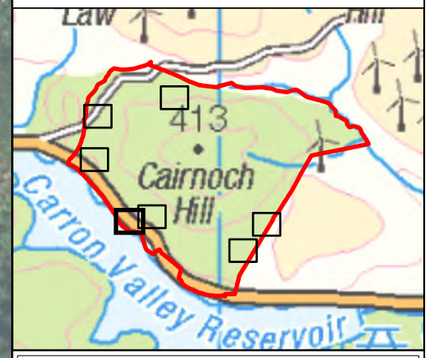
Upstream

Downstream

Salmonid Spawning Potential

Sub-Optimal

Not Suitable



Eurowind Energy™

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.5 - FISH

SALMONID SPAWNING POTENTIAL

FIGURE 8.5.2e

Scale 1:1,000 @ A3

Date JUNE 2026

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269000 269100 269200 269300

685100

685000

CV05

N

0 25 50 100

Metres

LEGEND

Site Boundary

Proposed Existing Track to be Upgraded

Survey Extent Indicator

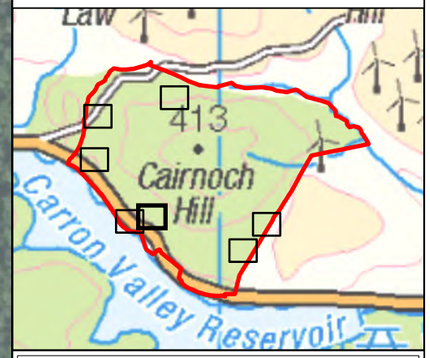
Upstream

Downstream

Salmonid Spawning Potential

Sub-Optimal

Not Suitable



Eurowind Energy™

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.5 - FISH

SALMONID SPAWNING POTENTIAL

FIGURE 8.5.2f

Scale 1:1,000 @ A3

Date JUNE 2026

428.V12085.00001.0156.0 Salmonid Spawning Potential

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270400 270500 270600 270700

685000

684900

CV06

N

0 25 50 100

Metres

LEGEND

Site Boundary

Proposed New Track

Proposed Existing Track to be Upgraded

Proposed Substation Compound

Survey Extent Indicator

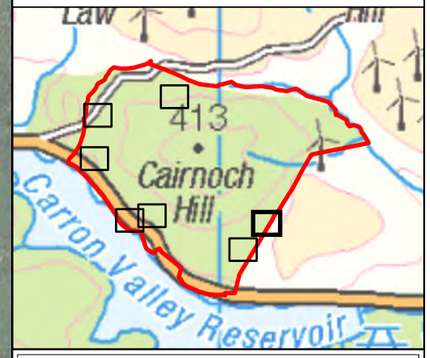
Upstream

Downstream

Salmonid Spawning Potential

Sub-Optimal

Not Suitable



Eurowind Energy™

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.5 - FISH

SALMONID SPAWNING POTENTIAL

FIGURE 8.5.2g

Scale 1:1,000 @ A3

Date JUNE 2026

428.V12085.00001.0156.0 Salmonid Spawning Potential

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270200
270300
270400
684600
CV07
N
0
25
50
100
Metres
LEGEND
Site Boundary
Proposed Existing Track to be Upgraded
Survey Extent Indicator
Upstream
Downstream
Salmonid Spawning Potential
Sub-Optimal
Not Suitable
Law
Cairnoch Hill
413
Carron Valley Reservoir
Eurowind Energy
SLR
CAIRNOCH HILL WIND FARM
EIAR - TA 8.5 - FISH
SALMONID SPAWNING POTENTIAL
FIGURE 8.5.2h
Scale 1:1,000 @ A3
Date JUNE 2026
428.V12085.00001.0156.0 Salmonid Spawning Potential
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268000 269000 270000 271000 272000

687000 686000 685000

LEGEND

- Site Boundary
- Proposed Turbine Location
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Crane Pad / Hardstanding
- Proposed Substation Compound
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Blade Laydown Area
- Watercourse (OS OpenMap Local)
- Waterbody (OS OpenMap Local)
- Electrofishing Survey Location

N

T1 T2 T3 T4

CV01 CV02 CV03 CV04 CV05 CV06 CV07

Cairnoch Hill 413

Craigannet Hill

Carron Valley Reservoir

Carron Valley Forest

Haugh Hill

Sir John de Graham's Castle Motte & Bailey

Quarry (Stone)

Quarry (disused)

Priest's Croft

Burial Gd

Craigannet Craig

Craigannet

Easterton

Sheepfold

Easter Cringate

Cringate

Earl's Burn

Waterfall

Smallburn

Sluice

Weir

Ford

Cairn

Kindrick Water

Loch Walton

Cringate Law

Earl's Hill

River Carron

Carron Valley Reservoir

Reservoirs

Duncarron Fort

0 0.25 0.5 1

Kilometres

Eurowind Energy™

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.5 - FISH

ELECTROFISHING SURVEY LOCATIONS

FIGURE 8.5.3

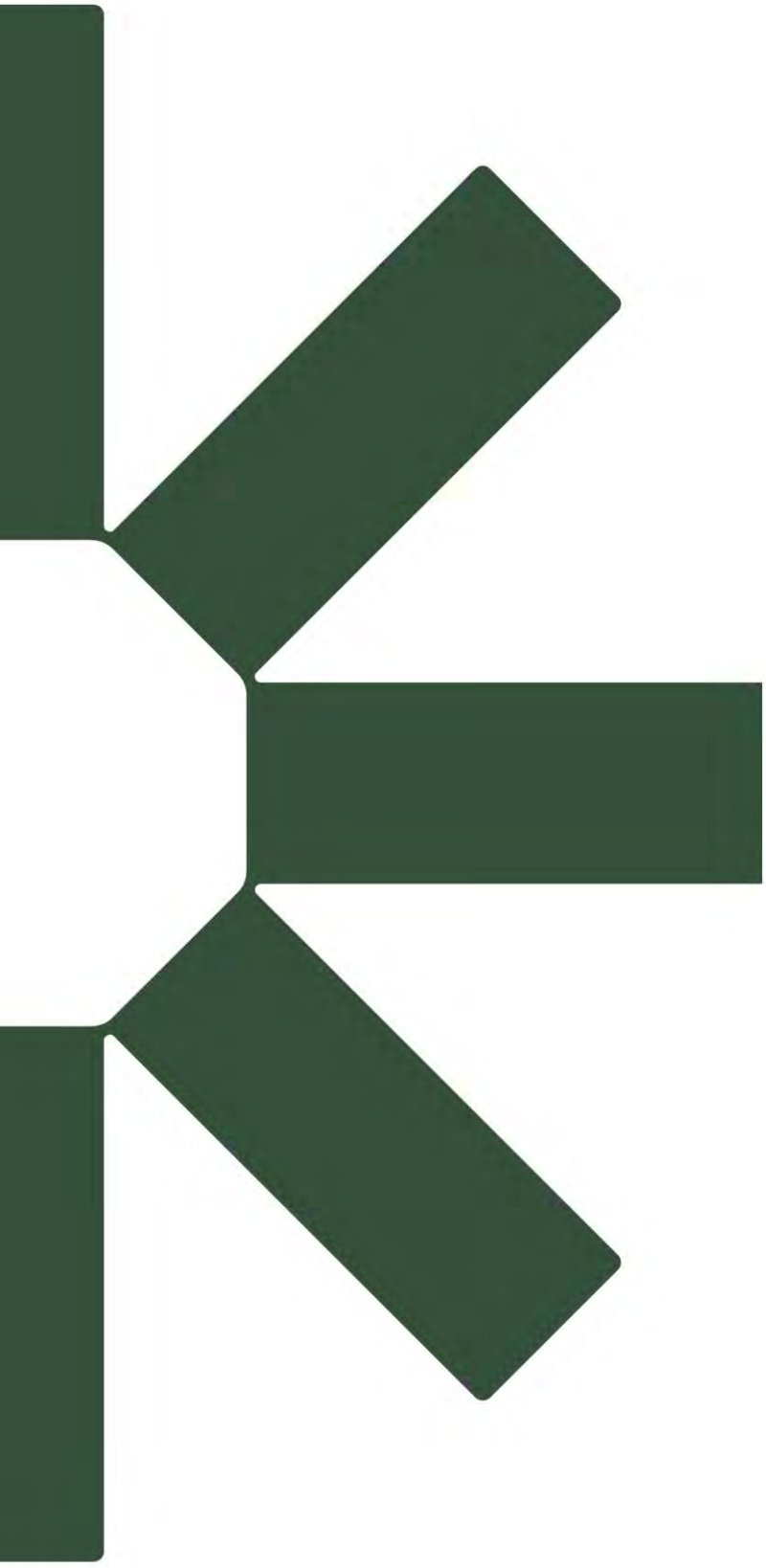
Scale 1:15,000 @ A3

Date JUNE 2026

428.V12085.00001.0157.0 Electrofishing Survey Locations

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Making Sustainability Happen

Technical Appendix 8.6: Outline Habitat Management Plan

Cairnoch Hill Wind Farm

Eurowind Energy Limited

Prepared by:

SLR Consulting Limited

The Tun, 4 Jackson's Entry, Edinburgh, EH8 8PJ

SLR Project No.: 428.V12085.00001

3 August 2026

Revision: 01

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
01	3 August 2026	K. Hazelwood	R. King	R. King

Basis of Report

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Acronyms and Abbreviations

CEMP	Construction and Environmental Management Plan
CRSG	Central Raptor Study Group
CSM	Common Standards Monitoring
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
FLS	Forestry and Land Scotland
GB	Great Britain
GPS	Global Positioning System
ha	Hectare
HMP	Habitat Management Plan
INNS	Invasive Non-Native Species
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
km	Kilometre
m	Metre
NNR	National Nature Reserve
NPF4	National Planning Framework 4
NVC	National Vegetation Classification
OS	Ordnance Survey
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SBL	Scottish Biodiversity List
SEPA	Scottish Environment Protection Agency
SNH	Scottish Natural Heritage
SPA	Special Protection Area
SPMP	Soils and Peat Management Plan
SSSI	Site of Special Scientific Interest
UKHab	UK Habitat Classification

1.0 Introduction

The purpose of this Technical Appendix is to provide an Outline Habitat Management Plan (HMP) in support of a planning application for the proposed Cairnoch Hill Wind Farm ("the Proposed Development").

It is anticipated that the Proposed Development will comprise of up to four wind turbines with associated infrastructure. The wind turbine layout is presented on **Figure 8.6.1** and a full description of the Proposed Development is set out in EIA Report **Chapter 3: Description of the Development**.

The Outline HMP describes the broad principles for avoiding, mitigating, and compensating for the predicted impacts of the Proposed Development, as well as supporting an overall enhancement of the biodiversity value of the Site which is in keeping with the National Planning Framework 4[1] (NPF4) policy.

The Outline HMP has been informed by a desk study and a targeted suite of botanical and protected/notable species surveys, including bat surveys, fish surveys and terrestrial vertebrate surveys. The measures described herein complement the avoidance, mitigation and enhancement strategies described within **Chapter 8: Ecology** of the EIA Report.

The anticipated mechanism for taking forward this Outline HMP to a detailed HMP version would be via a suitably worded planning condition which would request that the programme for and detail of the detailed HMP is finalised and approved prior to the commencement of the Proposed Development.

1.1 Site Description

The location of the Proposed Development ("the Site") is centred on grid reference NS 69459 85738 located at Cairnoch Hill, to the north of Carron Valley Reservoir, 6km north of Kilsyth and 6km east of Fintry, Stirlingshire. The Site predominately lies within the Forth River Trust catchment, with the western zone of the Carron Valley reservoir lying within the Loch Lomond Fisheries Trust catchment. The Site is within the Stirling Council administrative boundary.

The land within the Site boundary is managed as plantation woodland. Several small watercourses run through the Site draining south into the Carron Valley reservoir on the southern side of the B818 road. Watercourses at the northwest and west side of the Site drain into Endrick Water and those at the northeast and east side of the Site drain into Earl's Burn.

The surrounding landscape consists of areas of grazing pasture and commercial coniferous plantation. There are also several wind farm developments in the vicinity, including Earlsburn, Earlsburn North, Craigengelt, and a single turbine at Craigannet. There are a number of residential properties close to the Site, the nearest of which is located along the southern Site boundary.

1.2 Planning Policy

Planning policies of primary relevance to this Outline HMP are listed below.

- National Planning Framework 4 (NPF4)[1];

[1] National Planning Framework 4 (2023). The Scottish Government. Available online at https://www.gov.scot/publications/national-planning-framework-4/

- Scotland's Environment Strategy[2];
- Scottish Biodiversity Strategy[3];
- Onshore wind: policy statement 2022[4]; and
- The Stirling Local Development Plan[5].

Methodology

1.3 Approach

This Outline HMP is to be implemented to complement an Ecological Impact Assessment that together will serve to address the predicted impacts of the Proposed Development. The aim of the Outline HMP is to set out measures that will compensate for the loss of biodiversity as a result of the Proposed Development and that will enhance existing biodiversity while aiding the recovery of natural habitats and populations in a wider biodiversity and nature networks context. The overarching aim is to achieve significant biodiversity gains such that they are in a demonstrably better state than without intervention.

This Outline HMP will require to be taken forward by a suitably qualified and experienced biodiversity specialist in the event of planning approval. At that juncture, this Outline HMP will be updated with more detail and will be subject to consultation with relevant stakeholders.

1.4 Baseline Data Collection

The Outline HMP has been informed by baseline data collected to inform the Ecological Impact Assessment carried out by SLR for the Proposed Development. Tasks included:

- Desk study (**Technical Appendix 8.1**);
- Terrestrial Ecology Field Surveys;
  - Habitat Surveys including UKHab and NVC assessment (**Technical Appendix 8.2**);
  - Protected mammal surveys (**Technical Appendix 8.3**);
  - Bat surveys (**Technical Appendix 8.4**);
  - Fish habitat surveys (**Technical Appendix 8.5**); and
- Ornithology surveys (EIA Report **Chapter 9: Ornithology**).

[2] Scottish Government (2020). The Environment Strategy for Scotland. Available at: https://www.gov.scot/publications/scottish-biodiversity-strategy-2045-tackling-nature-emergency-scotland/documents/ [Accessed April 2025]

[3] Scottish Government (2020). Scottish Biodiversity Strategy to 2045. Available at: https://www.gov.scot/publications/scottish-biodiversity-strategy-2045-tackling-nature-emergency-scotland/documents/ [Accessed April 2025]

[4] Scottish Government (2022). Onshore wind: policy statement 2022. Available at: Onshore wind: policy statement 2022 - gov.scot

[5] Stirling Council. (2018). Stirling Local Development Plan. Available online at https://www.stirling.gov.uk/planning-and-building/planning-and-building-standards-documents-a-z/stirling-council-local-development-plan-2018/ [Accessed April 2025]

2.0 Baseline Conditions

This section summarises the baseline conditions within the Site of particular relevance to the design of the Outline HMP. The goals and objectives of this Outline HMP have been set relative to the baseline conditions as noted during field surveys and set out in **Chapter 8: Ecology** of the EIA Report and associated technical appendices.

This Outline HMP is based on habitat suitability, protected/notable species and professional judgement to guide the broad principles for biodiversity enhancement and restoration.

2.1 Designated Sites

There are 15 statutory designated sites within 10km of the Site designated primarily for their non-avian ecological features, including 12 Sites of Special Scientific Interest (SSSIs), two Special Areas of Conservation (SACs), and one National Nature Reserve (NNR). Qualifying features include protected fish species, habitats of interest, protected mammals and protected plants. Three of these have hydrological connectivity with the Site.

No statutory sites designated for ornithological features were identified within 10km of the Site boundary. However, two statutory sites with multiple designations for wintering species of goose were identified within 20km: Slamannan Plateau Special Protection Area (SPA) and SSSI; and Firth of Forth SPA, Ramsar site, and SSSI.

Please refer to **Technical Appendix 8.1: Desk Study** for further details.

2.2 Habitats

The main habitats recorded on Site were non-native conifer plantation, with mostly tall herb or rush dominated habitats in the forest rides. There is an area of degraded blanket bog on top of Cairnoch hill with peaty habitats in some forest rides. Damp areas include neutral swamp habitats, Annex I transition mire habitat and some small patches of wet woodland. There are two quarries within the Site boundary, the quarry to the east of the Site has three notable plant species present. There is a graveyard adjacent to the south eastern border of the Site with one notable plant species and a giant hogweed *Heracleum mantegazzianum* plant which is an invasive non-native species (INNS).

Direct permanent habitat loss was calculated as all habitat lost to proposed infrastructure. Temporary habitat loss includes areas within the working corridor that will be disturbed / damaged during construction, and reinstated following construction where feasible. A 5m temporary loss buffer has been applied from infrastructure. The 5m buffer is in line with similar assessments for other projects, and, although arbitrary, is considered precautionary based on experience at other sites. Some small areas classed as degraded blanket bog are due to be impacted, these are areas within forest rides that have degraded too far to fit an NVC category and lie on shallow peat. Considering the above, and the existence of drains within 5m of the blanket bog, the indirect loss for this habitat is still considered to be 5m.

Habitat loss has been calculated for all proposed infrastructure, **Table 2-1**.

Table 2-1 Summary of Habitat Loss for Proposed Infrastructure

UKHab	NVC Community	NVC mosaics	Direct Loss (ha)	Indirect Loss (ha)	Total Loss (ha)
f2f	M23b	OV27b, U4b, M6c, M9b, MG9a	0.40	0.35	0.75
g1b6	U4a/b	M23b	0.04	0.07	0.11
g3c	OV27a/b/c	U4b, M23b, MG9a	0.30	0.25	0.55
g3c	NA	NA	0.01	0.01	0.02

UKHab	NVC Community	NVC mosaics	Direct Loss (ha)	Indirect Loss (ha)	Total Loss (ha)
s1d	NA	NA	0.22	0.06	0.28
w1d	W4c	W7c	0.02	0.00	0.02
w1d	W6a	NA	0.05	0.01	0.06
w1d	W7c	NA	0.10	0.02	0.12
w1h	NA	NA	0.01	0.00	0.01
w1h6	NA	NA	3.56	0.26	3.82
w2c	NA	NA	33.44	2.12	35.56
Total Loss			38.15	3.15	41.30

2.3 Notable Plants

The following notable species were recorded on Site:

- Annual Knawel *Scleranthus annuus* (270414 684615) - GB redlist: Endangered, SBL and locally rare;
- Shepherd's cress *Teesdalia nudicaulis* (270302 684528) - GB redlist: Near threatened, SBL and locally rare;
- Small cudweed *Filago minima* (270440 684681) – locally scarce; and
- Masterwort *Imperatoria ostruthium* (270054 683994) – GB redlist: Near threatened and locally rare archaeophyte.

Annual Knawel and small cudweed were recorded in the disused quarry to the west of the Site, shepherd's cress was recorded on the track leading up to the disused quarry. Masterwort was recorded adjacent to the public footpath beside the graveyard to the south east of the Site.

2.4 Invasive Non-Native Species (INNS)

Invasive non-native species (INNS) are species that have been introduced to the UK and have the ability to spread causing damage to the environment, the economy, our health or the way we live. The law on non-native species is covered by the Wildlife and Countryside Act 1981 (as amended), Nature Conservation (Scotland) Act 2004 (as amended) and Wildlife and Natural Environment (Scotland) Act 2012 (as amended). It is an offence to plant, or otherwise cause to grow or spread, a plant in the wild at a location outside its native range.

A single plant of giant hogweed was recorded within the survey buffer[6] of the Site, close to the Site boundary to the south east, adjacent to the graveyard (270105 684008 see **Figure 8.6.1**). Giant hogweed primarily grows on waste ground and waterways and is toxic when in contact with skin.

[6] Buffer extends 250m beyond Site boundary, as detailed in Technical Appendix 8.2: UKHab and NVC Habitat Report

2.5 Protected and Notable Species

Otter *Lutra lutra* spraints were recorded on the watercourses on the edge of the Site or in the Site buffer[7], with one potential holt 240m outside the Site boundary.

Badger *Meles meles* setts, pathways and foraging signs were recorded within the north of the Site, with further signs of badger activity recorded throughout the Site.

Pine marten *Martes martes* territory markings were recorded throughout the Site along forest rides within the conifer plantation.

Red squirrel *Sciurus vulgaris* field signs were not recorded on Site, however there is suitable habitat for this species and the likelihood that red squirrel are present on Site is high.

Suitable habitat for common amphibian and reptile species (including common frog *Rana temproria*, common toad *Bufo bufo* and common lizard *Zootoca vivipara*) exists within the Site. There were incidental records of common lizard and common toad outside of the protected mammal surveys so it assumed that these species remain present within the Site.

Bat activity surveys confirmed at least seven bat species utilise the Site for commuting and foraging purposes: common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *P. pygmaeus*, Nathusius' pipistrelle *P. nathusii*, brown long-eared bat *Plecotus auritus*, as well as unidentified *P.* species, *Nyctalus* species, and *Myotis* species. Soprano pipistrelle was the most commonly recorded species.

2.6 Fish

It is considered highly unlikely migratory fish species will be present within the upper reaches of the Site due to the fluctuating water flow regimes and depths.

There were few areas suitable for juvenile lamprey. Fully quantitative electrofishing assessments did not find lamprey and/or eels to be present.

Although no important aquatic ecological features were identified during the survey within the Site boundary, the Site is hydrologically connected to four SAC's, SSSI's and watercourses.

2.7 Ornithology

There were four species of raptor breeding on Site that are listed under Schedule 1 of the Wildlife and Countryside Act (1981 as amended) and/or Annex 1 of the Birds Directive (2009/147/EC). These are listed in **Confidential Technical Appendix 9.2**, associated with **Chapter 9: Ornithology**. In relation to this Outline HMP, these include three woodland nesting species that will be impacted by the loss of suitable nesting habitat within conifer plantation woodland, one ledge nesting species recorded in the buffer that will be unlikely to be impacted by the proposed development, and one platform nesting species, that will be impacted by the proposed development through the loss of breeding site.

A total of 28 breeding territories of six wader species were recorded within the site buffer to the north and east of the Site across two years of surveys. No wader species were recorded breeding within the Site Boundary. There may be some displacement and risk of collision to these species.

[7] Buffer extends 250m beyond Site boundary for Otter, and 50m for all other species, as detailed in Technical Appendix 8.3: Protected Species Report

3.0 Outline Biodiversity, Enhancement and Restoration Plan

3.1 Vision and Scope

The vision of this plan is to enhance, restore, and create 68.27ha of habitat onsite for protected woodland mammals and birds, while also connecting and maintaining resources for vulnerable and rare flora and fauna within the site.

Measures will be implemented to best achieve positive outcomes for the goals and objectives of the HMP. The objectives focus primarily on creation and improvement of native broadleaf woodlands (including riparian zones), improvement of peatland habitat, creation and improvement of ponds, provision of wildlife boxes and removal of invasive species. These factors will improve the ecological and functional diversity[8] of the habitats on and surrounding the site.

The scope of the habitat restoration and enhancement works proposed in this Outline HMP are depicted on **Figure 8.6.1**.

3.2 HMP Working Group and Review

As part of the preparation of the detailed HMP post-consent, a group of key stakeholders will be invited to form a HMP working group. Their role would be to provide input to and comment on the detailed HMP and subsequent monitoring reports that lead to any necessary revisions to the HMP during the lifetime of the Proposed Development.

It is envisaged that the following stakeholders would be invited to join the HMP Working Group:

- Eurowind Energy Limited (“The Applicant”) and their ecological advisor(s);
- The landowner (Scottish Ministers managed by Forestry and Land Scotland);
- Stirling Council Biodiversity Officer;
- NatureScot;
- SEPA; and
- RSPB Scotland.

Further details, including terms of reference for the HMP working group, will be provided in the detailed HMP post-consent.

The HMP will be reviewed and updated on a regular basis, based on monitoring of progress toward achieving its goals and objectives and to inform any necessary active changes to management or measures. Proposed review timescales are set out in Section 5.0, **Table 5-1**.

The Applicant is ultimately responsible for meeting the commitments made in the detailed HMP. The implementation of the detailed HMP would be undertaken by suitably experienced contractors and all monitoring would be undertaken by suitably qualified and experienced environmental professionals.

3.3 Targets

This section details the habitat features that will be the targets of the Outline HMP. The features which form the targets of this Outline HMP have been determined through

[8] Functional diversity refers to those components of biodiversity that influence how an ecosystem operates or functions.

consideration of the relative importance of ecological features present at the site, the extent to which they may be impacted by the Proposed Development (as set out in the EIA Report), their potential to benefit from restoration or management and national or local biodiversity priorities.

Enhancement and restoration measures are primarily targeted at addressing losses of Priority habitats, focussing on target floral species and those measures that will support a diverse faunal community from invertebrates through to the higher trophic species groups. Targets of habitat management include:

- Native woodland;
- Riparian zones;
- Peatland;
- Pond;
- Invasive species;
- Badger;
- Pine marten;
- Red squirrel;
- Bat assemblage;
- Reptiles;
- Amphibians;
- Osprey;
- Barn owl;
- Upland bird assemblage; and
- Woodland bird assemblage.

3.4 Goals and Objectives

Goals and objectives, and associated targets are outlined in **Table 3-1**. This section details how objectives meet the goals, to restore the natural spaces onsite while providing resources for wildlife.

As a general rule, native species of local provenance (where practicable) will be planted onsite and no invasive and non-native species (INNS) will be planted or allowed to spread on the Site. This applies to all of the below Objectives. Biohazard measures will be followed where appropriate for all works undertaken on Site, see the Construction and Environmental Management Plan (CEMP) for details.

Consultation will be required with relevant stakeholders, including NatureScot and landowners, on the proposed biodiversity restoration and enhancement objectives.

Table 3-1 HMP Goals and Objectives

Goal	Objective	Area	Associated Targets
1. Native woodland	1.1 Fell conifer plantation	Broadleaf woodland creation areas (15.46 ha) Wet woodland management area (8.81 ha)	Native woodland Wet woodland Badger Pine Marten Red Squirrel Bat Assemblage Barn Owl Woodland Bird Assemblage
	1.2 Plant Broadleaf woodland		
	1.3 Clear conifer trees from existing broadleaf woodland		
	1.4 Maintain broadleaf woodland free of conifer regeneration		
2. Riparian zones	2.1 Fell conifer plantation	Riparian improvement zones (11.83 ha)	Native woodland Riparian zones Badger Pine Marten Red Squirrel Bat Assemblage Barn Owl Woodland Bird Assemblage
	2.2 Plant Broadleaf woodland		
	2.4 Maintain broadleaf woodland free of conifer regeneration		
3. Restoration of peatland	3.1 Increase water table in peatland restoration area through ditch blocking	Peatland restoration area (13.71 ha) Broadleaf woodland creation area – peatland buffer (13.92 ha)	Peatland Reptiles Upland bird assemblage
	3.2 Maintain peatland restoration area free of conifer regeneration		
	3.3 Create a broadleaf tree buffer		
4. Creation and improvement of pond	4.1 Pond creation	Existing ponds (0.03 ha) New pond locations (0.02 ha) Pond buffers (1.36 ha) Pond connection corridors (0.18 ha)	Pond Bat Assemblage Amphibians Woodland bird assemblage
	4.2 Conifer removal to 20m from pond		
	4.3 Scrub planting		
	4.4 Maintain broadleaf woodland free of conifer regeneration		



Goal	Objective	Area	Associated Targets
5. Provision and maintenance of wildlife boxes/nests	5.1 Provision and maintenance of brash piles	Broadleaf woodland creation areas Wet woodland management area Riparian zones Cairnoch Hill buffer Pond buffers	Pine marten Reptiles Amphibians
	5.2 Provision and maintenance of bat roost and hibernation boxes		Bat Assemblage
	5.3 Provision and maintenance of barn owl boxes		Barn Owl
	5.4 Provision and maintenance of small bird boxes		Woodland bird assemblage
	5.5 Provision and maintenance of osprey nesting platform(s)	Off-site	Osprey
6. Invasive species removal	6.1 Removal of giant hogweed	Giant hogweed site	Invasive species

3.4.1 Goal 1: Native woodland

The Site primarily comprises non-native conifer plantation. This habitat provides foraging, commuting and some breeding sites for a number of bat, mammal and bird species, including crossbill, which specialise in conifer woodlands. However, botanical and invertebrate biodiversity is often low and overall species richness tends to be lower than native woodland habitats in the UK[9,10]. The low biodiversity of conifer plantations is a result of closely planted trees forming a dense closed canopy and preventing light reaching into the woodland[11]. Conversion of closed-canopy conifer plantation to a more open canopy mixed woodland is likely to result in a higher species richness, as well as raising the soil pH, increasing access to nutrients for plants and increasing soil moisture[12]. An open canopy will increase the scrub and ground layer vegetation, providing more foraging and breeding habitats for birds, bats and invertebrates[13,14]. There would be some loss of habitat specialist species such as crossbill, however there is abundant habitat for this species remaining on the Site and in the wider area so the impact on this species is likely to be low.

Wet woodland was recorded in small areas on Site. Wet woodland is considered a rare habitat and is listed on the SBL, providing a unique habitat for bird and invertebrate communities.

3.4.1.1 Area and Extent

The proposed infrastructure will result in the total direct and indirect loss of 39.59ha of woodland, including 35.56ha of non-native conifer plantation, and 4.03ha loss of mixed and broadleaf woodland. To compensate for this habitat loss and provide biodiversity enhancements, 15.46ha of broadleaf woodland creation is proposed, in addition to tree planting associated with objectives 2-4. Woodland restocking and compensatory planting associated with the Control of Woodland Removal Policy[15] are addressed within the Forestry Report, **Technical Appendix 3.2**.

The total area of native broadleaf woodland creation across Objectives 1-4 is 42.76ha. While there is little impact proposed on wet woodland, 8.81ha of existing wet woodland onsite has been designated for long-term retention and management for enhancement.

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[9] Augusto, L., Dupouey, J. L., Picard, J. F., & Ranger, J. (2001). Potential contribution of the seed bank in coniferous plantations to the restoration of native deciduous forest vegetation. *Acta Oecologica*, *22*(2), 87-98.

[10] J. Barlow, T.A. Gardner, I.S. Araujo, T.C. Ávila-Pires, A.B. Bonaldo, J.E. Costa, M.C. Esposito, L.V. Ferreira, J. Hawes, M.I.M. Hernandez, M.S. Hoogmoed, R.N. Leite, N.F. Lo-Man-Hung, J.R. Malcolm, M.B. Martins, L.A.M. Mestre, R. Miranda-Santos, A.L. Nunes-Gutjahr, W.L. Overal, L. Parry, S.L. Peters, M.A. Ribeiro-Junior, M.N.F. da Silva, C. da Silva Motta, & C.A. Peres, Quantifying the biodiversity value of tropical primary, secondary, and plantation forests, Proc. Natl. Acad. Sci. U.S.A. 104 (47) 18555-18560, https://doi.org/10.1073/pnas.0703333104 (2007).

[11] Wallace, H.L., Good, J.E.G. and Williams, T.G. (1992). The effects of afforestation on upland plant communities: an application of the British National Vegetation Classification. Journal of Applied Ecology 29, 180–94.

[12] Gartner, S. and Reif, A. (2005). The response of ground vegetation to structural change during forest conversion in the southern Black Forest. European Journal of Forest Research 124, 221–31.

[13] Sweeney, O.F., Wilson, M.W., Irwin, S., Kelly, T.C. and O'Halloran, J. (2010). The influence of a native tree species mix component on bird communities in non-native coniferous plantations in Ireland. Bird Study 57, 483–94.

[14] Jung, K., Kaiser, S., Bohm, S., Nieschulze, J. and Kalko, E.K.V. (2012). Moving in three dimensions: effects of structural complexity on occurrence and activity of insectivorous bats in managed forest stands. Journal of Applied Ecology 49, 523–31.

[15] Forestry Commission Scotland. (2025). The Scottish Government's Policy on Control of Woodland Removal. Available on line at: https://www.forestry.gov.scot/publications/control-woodland-removal-policy [Accessed July 2026]

3.4.1.2 Methods

Clear-felling of conifers will take place in the 'broadleaf woodland creation area' where conifers are heavily dominant and few or no broadleaved trees are present. Sensitive conifer removal, where conifers are removed and broadleaf trees are left in the area, will take place within the above areas where there is a higher broadleaf tree cover and in the 'wet woodland management area' (**Figure 8.6.1**).

Tree felling and conifer removal would be undertaken in accordance with Forestry Commission good practice guidelines[16]. Felling and broadleaf woodland planting will be undertaken in stages, in line with the phased felling plan for Site, set out in **Technical Appendix 3.2: Forestery**. This would be set out in full detail in the detailed HMP. All HMP related felling and planting is anticipated to take place within 10 years of construction of the Proposed Development. The final method of felling would be agreed prior to construction and confirmed within a detailed felling plan. Tree felling would be subject to nesting bird checks for any works required within the nesting season, as detailed within **Chapter 9: Ornithology** of the EIA Report.

The 'broadleaf woodland creation area' would then be planted with a mix of native broadleaf trees, with varied species mixes depending on the ground conditions. Dry areas should comprise a native oak woodland mix such as sessile oak *Quercus petraea*, silver birch *Betula pendula* and rowan *Sorbus aucuparia*, these are likely to be the areas on slightly higher ground and can be used as a barrier between the conifer plantation and the more sensitive wet woodland. Wet areas should be planted sparsely, with open areas left in the wettest patches, using species such as alder *Alnus glutinosa*, downy birch *Betula pubescens* and willow species *Salix sp*.[17].

The 'wet woodland management area' should receive light intervention, with removal of invasive conifers only. Heavy impact to the ground from machinery should be avoided and manual methods of removal should be used, existing native trees should be retained.

3.4.2 Goal 2: Riparian zones

Native tree planting in riparian zones has been shown to improve water quality, reduce river temperatures, help with flood management and enhance biodiversity[18]. Biodiversity enhancements associated with riparian planting include: improved habitat for fish, aquatic and terrestrial invertebrates, otters, and bat and bird species[19], including habitat and connectivity for breeding passerines.

3.4.2.1 Area and Extent

The proposed infrastructure will result in the total direct and indirect loss of 39.59ha of woodland, including 35.56ha of non-native conifer plantation, and 4.03ha loss of mixed and broadleaf woodland. To compensate for this habitat loss and provide biodiversity enhancements, 11.83ha of broadleaf woodland creation is proposed along riparian zones, in addition tree planting associated with objectives 1, 3 and 4. The total area of broadleaf woodland creation across Objectives 1-4 is 42.76 ha. Woodland restocking and

[16] Forestry Commission (2024) UK Woodland Assurance Standard Fifth Edition. UKWAS.

[17] Rodwell, J., Patterson, G. (1995). Bulletin 112. Creating New Native Woodlands. Forestry Commission.

[18] Scottish Forestry (2023). *Boosting tree planting around rivers and streams.* [Online] Available at: https://forestry.gov.scot/news-releases/boosting-tree-planting-around-rivers-and-streams [Accessed in March 2024]

[19] SEPA (2009). *Riparian Vegetation Management. Engineering in the Water Environment Good Practice Guide.* [Online] Available at: https://www.sepa.org.uk/media/151010/wat_sg_44.pdf [Accessed in March 2024]

compensatory planting associated with the Control of Woodland Removal Policy[15] are addressed within the Forestry Report, **Technical Appendix 3.2**.

3.4.2.2 Methods

Clear-felling of conifers will take place in the 'riparian improvement zones' where conifers are heavily dominant and few or no broadleaved trees are present. Sensitive conifer removal, where conifers are removed and broadleaf trees are left in the area, will take place within the above areas where there is a higher broadleaf tree cover.

Tree felling and conifer removal would be undertaken in accordance with Forestry Commission good practice guidelines[16]. Felling and broadleaf woodland planting will be undertaken in stages, in line with the phased felling plan for Site, set out in Technical Appendix 3.2: Forestery. This would be set out in full detail in the detailed HMP. All HMP related felling and planting is anticipated to take place within 10 years of construction of the Proposed Development. The final method of felling would be agreed prior to construction and confirmed within a detailed felling plan. Tree felling would be subject to nesting bird checks for any works required within the nesting season, as detailed within **Chapter 9** of the EIA Report.

The 'riparian improvement zones' would then be planted with a mix of native broadleaf trees, with varied species mixes depending on the ground conditions. Dry areas should comprise a native oak woodland mix such as sessile oak, silver birch, and rowan. These are likely to be located in areas on slightly higher ground and can be used as a barrier between the conifer plantation and the more sensitive wet woodland. Wet areas should be planted sparsely, with open areas left in the wettest patches, using species such as alder, downy birch and willow species[17].

The habitat should comprise a patchwork of tree planting and open glade habitats. Consistency of shade along the watercourse influences the botanical, aquatic invertebrate and fish communities, and it is generally recommended that partial shade is achieved by leaving gaps in the shade along the watercourse in the planting plan[19].

3.4.3 Goal 3: Restoration of peatland

Peatland is a general term for a wide range of peat soils and habitats that occupy more than 20% of Scotland's land area[20] and Scotland holds around 60% of the UK's peatlands soils[21]. Peatland has been identified as a national conservation priority within Scotland's National Peatland Plan (SNPP)[20] for its importance for biodiversity, water quality, and as a carbon store. Peatlands support a variety of flora and fauna, including a number of protected and priority open ground passerines, reptiles (protected under the Wildlife and Countryside Act 1981 (as amended) and priority SBL species) and a unique invertebrate assemblage. Restoration of peatlands is identified as a priority under NPF4, Policy 5, peatland is therefore considered to be a priority habitat for conservation, both nationally and locally.

There is a small area of open upland on the top of Cairnoch Hill with shallow peat, dominated by peatland vegetation. The area represents a mix of degraded blanket bog on shallow peat and drier acid grassland, relating to NVC communities M19 and M20 blanket mire mixed with patches of U4 acid grassland (see **Technical Appendix 8.2: UKHab and NVC Habitat Report** for details). The peatland is degraded in nature, with hare's-tail cottongrass dominant indicating reliance of peat, but small and scattered patches of *Sphagnum* where there was likely once a constant carpet.

[20] SNH (2015). *Scotland's National Peatland Plan: Working for our future*. Available online at https://www.nature.scot/doc/scotlands-national-peatland-plan-working-our-future [Accessed Sep 2025]

[21] IUCN (2019) *What's so special about peatlands? The truth behind the bog*. Available online at *https://www.iucn-uk-peatlandprogramme.org/about-peatlands* [Accessed Sep 2025]

Restoration works focussed on degraded blanket bog and potential wet heath areas will protect and enhance important peatland habitats and may benefit local priority bird species, including black grouse, which benefit from soft forest edges and open moorland. Restoration of bog, wet heath and upland grassland habitats are aligned under the same methods and are therefore considered together here.

As the peat is shallow in this area, it may not be possible to restore an active blanket bog, however blocking ditches and removing young, regenerating commercial conifers to slow the water flow and maintain a high water table will preserve the open peatland habitat and encourage peat and wet heath species.

3.4.3.1 Area and Extent

There is no loss of peatland habitats caused by infrastructure, the 13.71ha of restored peatland habitat will provide enhancement on site as compensation for loss of habitats with lower ecological value, such as conifer plantation.

The proposed infrastructure will result in the total direct and indirect loss of 39.59ha of woodland, including 35.56ha of non-native conifer plantation, and 4.03ha loss of mixed and broadleaf woodland. To compensate for this habitat loss and provide biodiversity enhancements, 13.92ha of broadleaf woodland creation is proposed within the buffer around Cairnoch Hill. The total area of broadleaf woodland creation across Objectives 1-4 is 42.76ha. Woodland restocking and compensatory planting associated with the Control of Woodland Removal Policy[15] are addressed within the Forestry Report, **Technical Appendix 3.2**.

3.4.3.2 Methods

For the ‘peatland restoration area’, the following preparation work is proposed:

1 A botanical monitoring survey would be undertaken to establish an up-to-date baseline for the vegetation types present. The botanical survey paired with drone monitoring or other aerial photography, would then be used as a baseline for ongoing monitoring (see Section 6.1 for further details). Baseline botanical monitoring would be undertaken at an appropriate time of year, prior to restoration works commencing.

2 A drain slope survey and mapping exercise would be undertaken across all bog restoration areas prior to restoration works, including ditches. Taking levels of the drain water surface would allow for the creation of drain slope profiles across the restoration areas. Analysis and mapping from drone orthomapping would also be undertaken to derive the lengths of ditch restoration.

3 A Peatland Restoration Plan for peatland restoration works would be produced prior to the commencement of works, but is anticipated to focus on the following three measures: ditch blocking, conifer regen removal, and replacement of adjacent commercial woodland fringes with a broadleaf woodland buffer, as detailed below.

Proposed Peatland Enhancement/Restoration Measures

It is recommended that restoration works are informed by a detailed peatland survey and assessment to ascertain the most appropriate methods of restoration and enhancement. The Carbon and Peatland 2016 mapping[22] indicates that this area consists of Class 3 peatland and so while not considered priority peatland habitat it is associated with wet and acidic type mire. The proposed restoration methods should be based on published literature and

[22] SNH (2016). Peatland and Carbon 2016 v2. Available online at: https://opendata.nature.scot/datasets/snh::carbon-and-peatland-2016-map/explore

established restoration methods[23]. The methods set out below are a high-level overview of the approach to be taken. This will be discussed with key stakeholders, including NatureScot and the chosen contractor, and the agreed approach and finalised locations will be set out in detail in the detailed HMP post consent. The restoration areas may require a range of tailored approaches, which would be developed at the detailed HMP / implementation stage (post consent). Methods may be informed by further detailed survey work and consideration of restoration techniques available at the time of implementation.

Ditch Blocking

It is possible that ditch blocking will be required within any ditches that bisect the area and along ditches at the edge of the area at the boundary of the afforested area. Open ditches can be blocked with the insertion of a series of nearly impermeable barriers. These barriers cease the loss of water via the drain channels, raise the water levels within the ditch that then allows the water table within the wider peat macrotope to gain height and move closer to the surface, acrotelmic peat layer. In general terms, the aim would be to insert a dam for each 10cm drop in level of each drain, this is intended to ensure that the water level across each restoration area is maintained within 10cm of the bog surface to allow for the growth of peat-forming plants. Once the water level is back close to the surface, the resulting open water should be revegetated to fill in the ditch. The intention should be that the ditch infills with vegetation during the lifetime of the dam[24] and so becomes self-supporting.

A peat depth survey and peat slide risk assessment have been undertaken and the results are outlined in the **Outline Soils and Peat Management Plan (SPMP)** (EIA Report **Technical Appendix 10.2**). Although, as the peat depth survey focussed on other areas of the Site so probe points within the Cairnoch Hill area are somewhat sparse. As such, some additional, targeted peat probing is likely required to have a better understand of the peaty soil depth horizon.

Conifer Removal on Open Habitat

Conifers are present throughout the area assigned for peatland restoration. Conifer trees on peat is known to degrade the peatland habitat, causing release of greenhouse gases when tree growth is poor and peat soils are heavily drained and disturbed[25]. Conifers should be removed from the area at the outset of the restoration and will be done by hand wherever possible. There will likely be some conifer regeneration that will invade the recovering peatland due to the presence of conifer plantation within adjacent areas. Therefore, conifer regeneration would be monitored, and the removal of regenerating conifers carried out when required, to maintain open vegetation and avoid the area reverting back to forest. The frequency at which regenerating conifers would need to be removed would be subject to the speed of regeneration and would be determined following monitoring.

Conifer Removal and Broadleaf Tree Planting

It is recommended that the hard edge between non-native conifer plantation and open peatland is feathered with broadleaf tree planting. A barrier of broadleaved trees would help prevent conifer regeneration from the adjacent conifer plantation into the peatland, provide a

[23] NatureScot Peatland Action (2022). *Peatland ACTION - Technical Compendium*. Available online at https://www.nature.scot/doc/peatland-action-technical-compendium [Accessed Sep 2025]

[24] Thom, Tim; Hanlon, Astrid; Lindsay, Richard; Richards, Joanna; Stoneman, Rob; Brooks, Stuart (2019) *Consverving Bogs; The Management Handbook*. IUCN UK Peatland Programme

[25] Forestry Commission Scotland (2015) *Deciding future management options for afforested deep peatland*. Forestry Commission, Edinburgh.

soft edge to the conifer plantation helping improve the visual effect of the plantation edge, and provide a wildlife friendly corridor along the forest edge.

Clear-felling of conifers will take place where conifers are heavily dominant and few or no broadleaved trees are present. Sensitive conifer removal, where conifers are removed and broadleaf trees are left in the area, will take place within the above areas where there is a higher broadleaf tree cover.

Tree felling and conifer removal would be undertaken in accordance with Forestry Commission good practice guidelines[16]. The final method and timing of felling would be agreed prior to construction and confirmed within a detailed felling plan. Tree felling would be subject to nesting bird checks for any works required within the nesting season, as detailed within **Chapter 9** of the EIA Report.

Tree and scrub planting in the buffer around Cairnoch Hill should comprise native broadleaved trees appropriate to the ground conditions. It is likely that the area will require species suitable for damp or peaty conditions, such as those found in bog woodlands; downy birch, willow species, and alder. More dry tolerant species such as silver birch, sessile oak and rowan can be planted in thinner, drier soil where appropriate.

Any encroachment of regen broadleaved trees over time on the open peatland area will form part of the monitoring regime to ensure there is no expansion within the peatland enhancement area.

3.4.4 Goal 4: Creation and improvement of ponds

Ponds are an important freshwater habitat that support high biodiversity, sustain many aquatic taxa, and act as important refuges in modified landscapes[26,27]. Additionally, many terrestrial species, including insect pollinators, birds, bats, and other mammals rely on ponds for water, food, and habitat[28,29]. Ponds also play a significant role in the provision of ecosystem services to society including water purification, flood alleviation, support for pollinators, and climate change mitigation[30,31].

There are two existing ponds on Site in close proximity to each other (see **Figure 8.6.1**), that have been identified for improvements, and two additional locations have been assigned for pond creation. The existing ponds are currently close to conifer plantation, with tall herbaceous vegetation surrounding the ponds and some ruins nearby. The existing ponds and new pond locations are connected by corridors of forest edge/ride that provide commuting corridors for wildlife between ponds. Removal of conifers to within 20m of the existing ponds and scattered broadleaf scrub planting in the open area around the existing and new ponds (avoiding planting on or within 10m of the archaeological ruins), and along

[26] Hill, M.J., Greaves, H.M., Sayer, C.D., Hassall, C., Milin, M., Milner, V.S., Marazzi, L., Hall, R., Harper, L.R., Thornhill, I. and Walton, R., 2021. Pond ecology and conservation: research priorities and knowledge gaps. Ecosphere, 12(12), p.e03853.

[27] Davies, B., Biggs, J., Williams, P., Whitfield, M., Nicolet, P., Sear, D., Bray, S. and Maund, S., 2008. Comparative biodiversity of aquatic habitats in the European agricultural landscape. Agriculture, Ecosystems & Environment, 125(1-4), pp.1-8.

[28] Nummi, P., Kattainen, S., Ulander, P. and Hahtola, A., 2011. Bats benefit from beavers: a facilitative link between aquatic and terrestrial food webs. Biodiversity and Conservation, 20(4), pp.851-859.

[29] Lewis-Phillips, J., Brooks, S.J., Sayer, C.D., Patmore, I.R., Hilton, G.M., Harrison, A., Robson, H. and Axmacher, J.C., 2020. Ponds as insect chimneys: Restoring overgrown farmland ponds benefits birds through elevated productivity of emerging aquatic insects. Biological Conservation, 241, p.108253.

[30] Lundy, L. and Wade, R., 2011. Integrating sciences to sustain urban ecosystem services. Progress in Physical Geography, 35(5), pp.653-669.

[31] Stewart, R.I., Andersson, G.K., Brönmark, C., Klatt, B.K., Hansson, L.A., Zülsdorff, V. and Smith, H.G., 2017. Ecosystem services across the aquatic–terrestrial boundary: Linking ponds to pollination. Basic and applied ecology, 18, pp.13-20.

the connecting corridors will provide shade, shelter and improved water quality within the ponds.

3.4.4.1 Area and Extent

There is no loss of pond habitats caused by infrastructure, the 0.05ha of restored pond habitat will provide enhancement on Site as compensation for loss of habitats with lower ecological value, such as conifer plantation.

The proposed infrastructure will result in the total direct and indirect loss of 39.59ha of woodland, including 35.56ha of non-native conifer plantation, and 4.03ha loss of mixed and broadleaf woodland To compensate for this habitat loss and provide biodiversity enhancements, 1.55ha of broadleaf scrub creation is proposed within the buffer around the existing and new ponds, and along a corridor connecting the new ponds along a forest ride, in addition to tree planting associated with objectives 1-3. The total area of broadleaf woodland creation across Objectives 1-4 is 42.76ha. Woodland restocking and compensatory planting associated with the Control of Woodland Removal Policy[15] are addressed within the Forestry Report, **Technical Appendix 3.2**.

3.4.4.2 Methods

Conifer Removal and Scrub planting

It is recommended that conifer trees are removed out to 20m from the existing ponds, this will involve a small amount of conifer removal in this pond area. Tree felling and conifer removal would be undertaken in accordance with Forestry Commission good practice guidelines[16]. The final method of felling would be agreed prior to construction and confirmed within a detailed felling plan. Tree felling would be subject to nesting bird checks for any works required within the nesting season, as detailed within **Chapter 9** of the EIA Report.

Tree and scrub planting around the new and existing ponds, and along commuting corridors should comprise native broadleaved trees appropriate to the ground conditions. It is likely that the area will require a mix of some species suitable for damp or peaty conditions, such as; downy birch, willow species, and alder and more dry tolerant scrub species such as hawthorn and blackthorn. Planting should be low density, scattered and leave plenty of open habitat to allow light to access the ponds and surrounding area.

There will likely be some conifer regeneration that will invade the open areas due to the presence of conifer plantation within adjacent areas. Therefore, conifer regeneration will be monitored, and the removal of regenerating conifers carried out when required, to maintain open vegetation and avoid the area reverting back to forest. The frequency at which regenerating conifers would need to be removed would be subject to the speed of regeneration and would be determined following monitoring.

Pond creation

New ponds will form approximately 0.02ha. Creation of new ponds should follow recommended guidance for wildlife ponds, for example published guidance from SEPA[32] or from Freshwater Habitats Trust[33]. Broadly, the ponds will be of varying depth, with one area exceeding 1 m in depth. The ponds must contain shallower areas and a very shallow, sloping shelf to enable easier access by amphibians. New ponds should be created separate

[32] SEPA (2000) *Ponds, pools and lochans. Guidance on good practice in the management and creation of small waterbodies in Scotland*.

[33] P Williams, P. and Williams, P., (2020). *The pond book: A guide to the management and creation of ponds. Third Edition.* Freshwater Habitats Trust.

to ditches or streams to avoid pollution to the ponds. It may be necessary to carry out further works on new ponds 1-2 years after initial creation.

3.4.5 Goal 5: Provision and maintenance of wildlife boxes/nests

Provision of breeding and rest sites for birds and bats and provision of brash piles for pine marten, reptiles and amphibians enhances opportunities for these species to use the surrounding habitat for foraging and commuting. This is particularly relevant where tree felling, tree planting, habitat restoration and habitat creation is taking place, as this will provide temporary nest and roost sites for species that will likely use the new habitat in the long term. These additional nest and roost sites also provide supplementary shelter for wildlife that is permanently impacted by felling for the purpose of infrastructure.

To compensate for potentially significant collision risk and disturbance to a historic osprey nest site, it is recommended that the current nest site is felled and at least one new osprey nest platform is constructed away from the wind turbine area. This approach has been agreed in consultation with NatureScot. It is anticipated that the construction and management of any such new osprey nest platform would proceed in advance of a detailed HMP plan being agreed (post any consent) which would allow any breeding pairs to familiarise themselves with the location of the platform. However, the detailed HMP, to be agreed pre-construction, would likely include reference to, and management of, any such new osprey nest platform.

3.4.5.1 Area and Methods

Wildlife boxes and brash piles will be located in areas that are designated for habitat management within this document. Locations for brash piles for pine marten, bat boxes, bird boxes will be within broadleaf woodland creation and management areas, while brash piles for supporting reptiles will be located in the open upland area on Cairnoch Hill. Brash piles for supporting amphibians will be located in the scrub areas surrounding the new and existing ponds.

Boxes should be placed along woodland edges and face onto open clearings or rides. Boxes should be positioned at a variety of aspects, with clear flight lines to the boxes. The installation of bat boxes will not be within 100m of the turbine locations. Barn owl boxes should be sited near suitable foraging habitat, such as rough grassland areas, where possible. Barn owl boxes should include protection measures from pine marten predation.

It is important to ascertain exact locations for boxes through micrositing with on-site assessments of the habitat, following relevant guidance[34,35,36,37]. Final decisions on placement should be assessed in the detailed HMP, following a site visit by a qualified ecologist and confirmed through consultation with FLS.

The number of boxes will be detailed in the detailed HMP, but this outline plan indicates that the following will be suitable for this site as a minimum:

- 3 brash piles within woodland;
- 2 brash piles on Cairnoch Hill;
- 2 brash piles near ponds;

[34] https://www.barnowltrust.org.uk/barn-owl-nestbox/owl-boxes-for-trees/

[35] Cromack, D. and Baker, N. (2018). Nestboxes. Your Complete Guide. British Trust for Ornithology

[36] Bat Conservation Trust. Bat Box Information Pack. Available at https://www.bats.org.uk/our-work/buildings-planning-and-development/bat-boxes/putting-up-your-box. [Accessed November 2024

[37] Croose, E., Birsk, J.D.S. and Martin, J. (2016). Den boxes as a tool for pine marten *Martes martes* conservation and population monitoring in a commercial forest in Scotland. Conservation Evidence. 13, 57-61

- 5 bat roost boxes;
- 3 bat hibernacula boxes;
- 1 barn owl boxes; and
- 10 small bird boxes.

Osprey nest platform(s)

Correspondence with FLS and Central Raptor Study Group (CRSG) indicated that the at-risk nest site was occupied in 2022. Ornithology surveys indicated that osprey were regularly recorded around historic nest sites and a pair was heard calling, but no breeding territory was identified. There is no evidence that any target raptor species have bred within the Breeding Raptor Survey Area (EIA Report **Chapter 9: Ornithology**). Due to the potential impacts on breeding osprey (particularly collision risk) additional mitigation and monitoring will be undertaken for osprey. The existing osprey nest site would be felled to reduce collision risk impacts, while at least one artificial nest platform would be erected to compensate for the loss of the existing nest site. Felling the nest site will be conducted in the non-breeding season to comply with legislation.

Artificial nest platforms are a common method to facilitate breeding osprey and have been used across the globe. Constructing artificial nest platforms as compensation for the removal of occupied osprey nest sites has been successfully used in Scotland[38], Wales[39], and the United States[40], with osprey rapidly relocating to the newly constructed nest sites. Furthermore, osprey breeding on artificial nest platforms have been shown to have less variance in breeding success than those breeding on natural substrate[41] and in some instances osprey breeding on artificial nest structures have been demonstrated to have a higher productivity rate[42]. This is of particular relevance given the recent failures at the current nest site. This provides confidence that platforms are likely to be used by displaced birds, or any new prospecting pairs while also reducing potential for potential barrier effects, disturbance, or displacement of osprey.

FLS identified four suitable land parcels where siting artificial nest platforms would be possible based on their current felling plans. Three of these parcels are south of the reservoir and would likely eliminate displacement/disturbance and greatly reduce collision risk. The land parcels and location of the osprey nest are presented in **Technical Appendix 9.2: Confidential Annex**. The exact locations of the osprey platforms will consider osprey territory requirements, proximity to other breeding raptor species (pending further data provided by (CRSG), local terrain, and consultation with FLS.

Construction will follow standard practice guidelines, with several methodologies on constructing nest platforms available online[43,44,45,46]. A desk study and consultation with key

[38] https://www.roydennis.org/animals/raptors/osprey/nest-building/

[39] https://www.northwaleswildlifetrust.org.uk/days-out/ospreys-llyn-brenig

[40] https://alyeska-pipe.com/for-the-birds-osprey-nest-relocation-at-remote-gate-valves-98-and-100/

[41] Canal, D., Morandini, V., Martín, B., Langgemach, T., Muriel, R., de Lucas, M. and Ferrer, M. (2018). Productivity is related to nest site protection and nesting substrate in a German Osprey population**.** Journal of Ornithology, 159, pp 265 – 273.

[42] Forys, E.A., Clift A.N. and Salsky, A.A. (2016). Productivity of Ospreys (*Pandion haliaetus*) nesting in highly urbanized Pinellas County, Florida. Florida Field Naturalist, 44(1), pp 14-18.

[43] https://roydennis.org/wp-content/uploads/2026/01/How-to-build-an-osprey-nest-RDWF.pdf

[44] https://www.osprey-watch.org/learn/nest-platform-designs/

[45] https://www.lansingrec.com/sites/default/files/fileattachments/parks_amp_recreation/page/2895/guidelines_for_bdg_os_nests_may_25.9.pdf

[46] https://www.ospreys.com/nest-building-maintenance

stakeholders such as FLS and potential construction companies will be undertaken to determine the most suitable location for construction at Cairnoch Hill or the wider area. Constructing one platform will compensate the loss of the original nest site, but constructing additional nest sites increase the likelihood the pair will breed away from the proposed turbine location and may facilitate osprey population growth in the area. It is recommended that further consultation is undertaken with FLS, NatureScot and the RSPB to determine the most suitable location and methodology for the osprey platform.

3.4.6 Goal 6: Invasive species removal

Giant hogweed was recorded to the immediate south east of the Site (outside of the Site boundary). This plant is considered a problem species of plant in the UK and listed as an INNS. The law on INNS in Scotland is covered by the Wildlife and Countryside Act 1981 (as amended by the Wildlife and Natural Environment (Scotland) Act 2012). It is an offence to plant, or otherwise cause to grow, a plant in the wild at a location outside its native range. Giant hogweed can spread rapidly and form dominant stands that exclude most other plant species, causing large scale ecological damage. The plant is also phototoxic and harmful to people and animals when touched.

While there were no giant hogweed plants on Site at the time of habitat surveys, it is likely that the plant will spread into the Site (or has done so already since the time of survey) if it is not managed. We therefore recommend that this plant and any additional plants within the Site that have established since habitat surveys were undertaken should be removed to prevent further spread that would harm the ecosystem and the people that use the area.

3.4.6.1 Methods

Removal should be undertaken following recommended guidance[47,48,49,50]. Due to the small size of the stand, mechanical, non-chemical methods may be sufficient, however if there are more plants by the time removal works are undertaken chemical methods may be necessary. Clearance should be carried out in spring before the plants flower. A 7m exclusion zone is required during treatment and all hazardous waste should be disposed of appropriately. It is recommended that a specialist giant hogweed removal is utilised for this process.

4.0 Management and Monitoring

Detailed monitoring and management prescriptions will be included in the detailed HMP. All monitoring would be undertaken by suitably qualified and experienced ecologists. Short and long-term monitoring and management efforts are outlined in

[47] SEPA (2020) *Water Use Supporting Guidance (WAT-SG-18) Control of Plants in or Near to Water*.

[48] Invasive non-native species | Scottish Environment Protection Agency (SEPA) (accessed Sep 2025)

[49] Scottish Invasive Species Initiative. *Giant Hogweed*. Available online at https://invasivespecies.scot/invasive-plants/giant-hogweed/ (accessed Sep 2025)

[50] RAPID (2018) *Good Practice Management. Giant Hogweed (*Heracleum mantegazzianum*)*.

Table 4-1. An outline of monitoring methods are described in Section 4.0 below.

Table 4-1 Management and Monitoring Prescriptions

Monitoring Prescription	Area(s)	Monitoring Time/Extent	Indicators	Management	Management Time/Extent
Conifer regeneration	• Broadleaf woodland creation area • Wet woodland management area • Riparian Zones • Cairnoch Hill Peatland restoration area • Cairnoch Hill buffer • Pond buffer	Year 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. Ongoing requirement to be assessed thereafter	Cover of conifer seedlings and saplings	Removal of regenerating conifers where necessary	As required
Tree health and survival	• Broadleaf woodland creation area • Wet woodland management area • Riparian Zones • Cairnoch Hill buffer • Pond buffer	Year 1, 2, 3, 4, 5 following restructuring in each area. Requirement to be assessed thereafter	Tree health and survival rates	Beating up of dead trees	As required
				Replacing/removing tree tubes and stakes	As required
Ditch block checks	• Cairnoch Hill Peatland restoration area	Year 1 and 2 after ditch block installation, then every 5 years thereafter	Water table raised	Ditch block repair	As required
Habitat condition and botanical monitoring	• Cairnoch Hill Peatland restoration area	Year 1,3 and 5, then every 5 years thereafter	Plant community	Assessment of current management interventions	As required
Pond Survey	• New and existing Ponds	Year 1, 2, 3, 4, 5, then every 5 years thereafter	Pond health	Pond management as necessary	As required
Wildlife box monitoring	• Broadleaf woodland creation area		Use of wildlife box Wildlife box condition	Repairs to damaged boxes	As required

Monitoring Prescription	Area(s)	Monitoring Time/Extent	Indicators	Management	Management Time/Extent
	• Wet woodland management area • Riparian Zones • Cairnoch Hill Peatland restoration area • Cairnoch Hill buffer • Pond buffer	Year 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, then as required thereafter		Cleaning of boxes where necessary	As required
				Moving boxes	As required
Giant hogweed monitoring	• Giant hogweed area	Year 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, then as required thereafter	Presence of giant hogweed	Further giant hogweed removal	As required
Ornithology monitoring	• Whole Site (within redline boundary • Wind farm buffer (500 m from redline boundary) • Osprey platforms (see Section 3.4.5)	Year 1, 2, 3, 4, 5, then every 5 years thereafter	Breeding success and displacement	Assessment of current management interventions	As required

4.1 Monitoring Methods

4.1.1 Conifer Regeneration

Monitoring of conifer regeneration will assess the extent of regeneration conifer seedlings and saplings within the all habitat management areas outlined in objectives 1-4.

Monitoring will take place yearly for the first five years following the final felling and restoration phase, with the need for further monitoring determined after five years, depending on monitoring results. Monitoring should be timed to inform conifer removal management.

Remedial Action

Should conifer regeneration be recorded in any HMP areas, the area should be target for additional conifer removal works. This should be carried out within one year of survey results with the aim to remove regeneration through hand pulling, avoiding the need for heavy machinery.

4.1.2 Tree Health and Survival

All tree planting areas should be checked for tree health and survival rates, particularly during the first few years following planting. Surveyors will assess all tree areas for mortality and indicate areas of poor growth and disease so that these areas can be beaten up. Weeding of tree tubes will be advised where necessary. Tree tubes and stakes will also be checked within this timescale, broken stakes or tubes should be replaced, as appropriate, and stakes and tubes will be removed once the trees are established and maturing beyond requiring protection.

Remedial Action

Beating up of dead trees and weeding of tree tubes will be carried out where advised by monitoring. Tree tubes and stakes will be repaired where necessary, and tubes and stakes will be removed and recycled when no longer required to avoid littering the woodland areas and to avoid damage to mature trees. This will be carried out within one year of survey results with the aim to keep young trees healthy.

4.1.3 Ditch Block Checks

For the peatland restoration to be successful, any ditch blocking on Cairnoch Hill needs to remain effective. During ditch blocking, all dam locations will be recorded by 12-figure grid reference using GPS. Fixed point photography will be used across a minimum of 70% of dams to compare change across monitoring years.

In the first two monitoring years all the ditch blocking locations will be checked for signs of effectiveness, damage and requirements for maintenance. In subsequent monitoring years (alongside the botanical monitoring), especially if ditch block performance has been good with little maintenance requirement, then it may be appropriate to spot check only a proportion of dam locations.

Remedial Action

Where damage to ditch blocks is recorded, repairs will be carried out within one year of damage being recorded.

4.1.4 Habitat Condition and Botanical Monitoring

A peat condition assessment will be undertaken in tandem with botanical monitoring. Peatland condition aspects to be assessed should be outlined in the detailed HMP following an initial assessment of the peatland restoration area.

Ground-based botanical and condition monitoring is likely to be based on the Common Standards Monitoring (CSM) protocol for upland habitats[51], or successor if this is updated prior to monitoring commencing, which assesses habitat condition. CSM provides a detailed insight into changes in vegetation and some abiotic factors that pick-up trends in vegetation condition that are valuable to understanding the progress of habitat restoration and enhancement works and informing further management. CSM is designed to assess whether features (e.g., habitats) are in favourable or unfavourable condition and whether condition is being maintained, recovering, or declining over time. The assessment is based on habitat-specific criteria involving key indicator species and vegetation structure.

The thresholds in CSM that delineate habitats in favourable condition from those in unfavourable condition were designed to equate to the minimum standard for SSSI site selection. The objective of this HMP is to improve habitat condition compared to baseline condition, not to meet the minimum standard for SSSI site selection. The threshold conditions would therefore be adjusted accordingly following the first round of CSM data collection. CSM targets would then be updated in each subsequent HMP revision.

CSM transect lines would be set up to sample across the open area on Cairnoch Hill. Grid references would be recorded to allow re-location on return monitoring visits. Quadrat sampling along the transect lines would use 2m x 2m quadrats.

Botanical monitoring would be undertaken during the optimal survey period for plant species (May – August inclusive). The first year of botanical monitoring would be undertaken during the summer after each tree felling phase, to provide a baseline. Surveys should be undertaken each year following each phased felling, and every five years thereafter.

In addition to botanical monitoring, fixed point photography at approximately 20 locations will also be used at designated locations across the restoration area to document habitat change over time.

Remedial Action

Should surveys indicate no improvement or decline in the quality of the habitat, a further assessment of the efficacy of management interventions should be undertaken as part of the HMP review process, and updated management methods should be applied.

4.1.5 Pond Survey

A pond survey will be undertaken on new and existing ponds to assess the health of the ponds and address the requirements for additional works that could improve the quality of the ponds for wildlife. Pond surveys will include a site visit following methods outlined in the National Pond Survey Methodology[52], or successor if this is updated prior to monitoring commencing. This includes species lists of plants and invertebrates recorded in the ponds and an assessment of the site value using species richness, uncommon, national rare or red data book species.

[51] JNCC. (2005). Common Standards Monitoring Guidance for Upland Habitats. Joint Nature Conservation Committee. Peterborough

[52] Pond Action (1994) The Oxfordshire Pond Survey. Pond Action, Oxford.

Remedial Action

Should surveys indicate that ponds are in poor health, additional management applications might be necessary, such as additional planting in ponds and pond marginal areas or maintenance of scrub in areas around ponds.

4.1.6 Wildlife Box Monitoring

All wildlife box surveys will be conducted by suitably qualified and licenced (where necessary) ecologists. Wildlife boxes will be checked for occupancy once in autumn, at the end of the bird and bat breeding season. If any bat hibernation boxes are installed these will be checked once during January-February. The condition of the wildlife boxes will also be assessed, and faulty or missing boxes will be fixed/replaced before as soon as possible.

Remedial Action

Should boxes be reported faulty or missing, boxes will be fixed/replaced before as soon as possible. Should occupancy be reported as low for consecutive years at any box, it may be recommended that the box is moved to a more suitable location.

4.1.7 Giant Hogweed Monitoring

The giant hogweed area, and any additional sites where the plant is detected, should be monitored yearly. The site should be visited early in the season (April) to allow time for eradication to take place prior to the plants flowering. A suitably qualified ecologist should assess the site for giant hogweed seedlings and outline areas for eradication.

Remedial Action

Repeated treatments are likely to be necessary for the eradication of giant hogweed. Each year that giant hogweed is reported present on Site or in the adjacent graveyard area, all plants should be eradicated.

4.1.8 Ornithology Monitoring

As set out in the EIA Report **Chapter 9: Ornithology** a programme of post consent monitoring is proposed. The exact scope of works is to be confirmed following the planning decision notice being awarded and then included within the detailed HMP, following consultation. It is considered likely to include breeding raptor and wader surveys, osprey surveys on artificial nests, nightjar surveys and black grouse surveys. It is important that any monitoring is designed to assess the actual versus predicted impacts on birds and to allow for a flexible monitoring plan to be undertaken during the post consent period.

It is proposed that ornithological monitoring should take place during and post-construction, in line with NatureScot guidance (SNH, 2009[53]) as outlined below:

- Targeted raptor surveys will be undertaken to monitor the status of nesting raptor species within 1km of the Proposed Development, in order to determine the success of habitat management actions undertaken as part of the HMP. Surveys would be undertaken following the species-specific methods as outlined by Hardey et al (2013) in line with best practice;
- Breeding bird surveys focusing on breeding waders on Cairnoch Hill and within a 500m buffer of the Site boundary will be undertaken to monitor the status of nesting wader and grouse species within the vicinity of the Proposed Development, in order

[53] Scottish Natural Heritage (SNH) (2009). Monitoring the impact of onshore wind farms on birds. Scottish Natural Heritage, Inverness.

to further determine the displacement effect and to determine the success of habitat management actions undertaken as part of the HMP. Surveys would be undertaken following the adapted Brown and Shepherd methodology (Gilbert et al, 1998)[54] as outlined by NatureScot (2025)[55];

- Monitoring of artificial osprey nest platforms will be undertaken to determine the success of the alternative nest sites provided (this may commence in advance of the detailed HMP being agreed as detailed in Section 3.4.5). Surveys would be undertaken following the species-specific methods as outlined by Hardey et al (2013)[50] in line with best practice;
- Although there are no predicted impacts on this species other than minor habitat loss, nightjar surveys will be undertaken to monitor the population of breeding nightjar present and understand the range expansion of this species. Surveys should be undertaken in line with the methods outlined by Gilbert et al. (1998)[54], however there is the potential for bioacoustic methods to be used which may be preferential from a health and safety perspective. Any bioacoustic methods would be agreed in consultation with NatureScot; and
- Black grouse surveys on Cairnoch Hill and within a 500m buffer of the Site boundary will be undertaken to monitor to monitor any changes in local population dynamics. Surveys would be undertaken following the species-specific methods as outlined by Gilbert et al (1998) in line with best practice.

Given the broad range of existing data, a flexible monitoring programme is recommended and should be undertaken at reasonable intervals throughout the lifespan of the proposed development as outlined in SNH guidance (2009)[56]. For example, the above monitoring can take place annually during construction, and operational years 1-5, 7, 10 and 15, with the requirement for further surveys to be determined based on previous survey results.

Remedial Action

Should surveys indicate a decline in the ornithology community, a further assessment of the efficacy of management interventions should be undertaken as part of the HMP review process, and updated management methods should be applied.

4.2 Remedial Action

Should the monitoring find that target conditions, and therefore the goals and objectives of the HMP are not being met, then remedial action would be employed, and the HMP updated accordingly, in consultation with the HMP Working Group. Remedial actions would be dependent on the habitat and nature of the goal / objective not being met.

4.3 Reporting and Review

Monitoring results will be reported annually in years when monitoring takes place. The report shall include any recommended changes to management prescriptions considered necessary if objectives are not being met.

As such, the detailed HMP would be a live document, such that it can be altered following monitoring results, unexpected events or evolving guidance.

[54] Gilbert, G., Gibbons, D.W., Evans, J. (1998). Bird Monitoring Methods. RSPB, Sandy.

[55] NatureScot (2025a). Recommended bird survey methods to inform impact assessment of onshore windfarms – March 2025.

[56] Scottish Natural Heritage (2009) Guidance note: Guidance on Methods for Monitoring Bird Populations at Onshore Wind Farms. January 2009.

Any amendments to the HMP because of the outcome of monitoring will be agreed with stakeholders of the HMP Working Group in advance of any such revised prescriptions being implemented.

The HMP would be reviewed every five years and, alongside amendments to existing measures, will include for the removal of prescriptions and monitoring at the point of objectives being met and conditions indicating they are self-sustaining.

5.0 Timescales

An indicative programme for the implementation of the management and monitoring works set out in this Outline HMP is provided in **Table 5-1**. A more detailed programme would be provided in the detailed HMP, post consent.

Table 5-1 Outline Schedule of Works

Task	Pre-construction	Construction	Post-construction Year											
			1	2	3	4	5	6-9	10	11-14	15	16-19	20	21+
Enabling Tasks														
Form HMP working group	X													
Detailed HMP preparation and finalisation	X													
Detailed felling and conifer removal plan	X													
Detailed planting plan	X													
Detailed peat restoration plan	X													
Detailed pond creation plan	X													
Detailed invasive species management plan	X													

Task	Pre-construction	Construction	Post-construction Year											
			1	2	3	4	5	6-9	10	11-14	15	16-19	20	21+
Capital Works														
Felling of conifer plantation all HMP areas[57]	X	X	X	X	X	X	X	X	X					
Sensitive conifer removal all HMP areas	X	X	X	X	X	X	X	X	X					
Tree/scrub planting all HMP areas	X	X	X	X	X	X	X	X	X					
Ditch blocking Cairnoch Hill	X	X												
Pond creation	X	X	X	X	X	X	X							
Creation of brash piles	X	X												
Placement of Wildlife boxes	X	X												
Construction of osprey platforms	X													
Giant Hogweed removal	X	X	X	X	X	X	X	X	X	Additional works as required				
Monitoring														
Conifer regeneration monitoring			X	X	X	X	X		X	Additional works as required				
Tree health and survival monitoring			X	X	X	X	X	Additional works as required						

[57] Felling of trees outwith areas of infrastructure and associated advance felling (see **Technical Appendix 3.2: Forestry**), and the subsequent HMP related planting, would be done in line with the FLS forestry felling plan for the Site. The specific timings of when HMP identified areas can be felled and replanted would be agreed as part of the detailed HM, however it is anticipated that this would be phased, starting during construction, with all areas felled and replanted by 2040.

Task	Pre-construction	Construction	Post-construction Year											
			1	2	3	4	5	6-9	10	11-14	15	16-19	20	21+
Ditch block checks			X	X			X		X		X		X	Additional works as required
Habitat condition and botanical monitoring			X		X		X		X		X		X	
Pond Survey			X	X	X	X	X		X		X		X	
Wildlife box monitoring			X	X	X	X	X	X	X	Additional works as required				
Giant hogweed monitoring			X	X	X	X	X	X	X	Additional works as required				
Ornithology Monitoring			X	X	X	X	X		X		X		X	
Ongoing Management/Remedial Actions														
HMP reviews and updates							X		X		X		X	
Conifer regeneration removal all HMP areas			As Required											
Beating up of dead trees			As Required											
Replacing/removing tree tubes and stakes			As Required											
Ditch block repair			As Required											
Pond management as necessary			As Required											
Repairs to damaged boxes			As Required											
Cleaning of boxes where necessary			As Required											
Moving boxes			As Required											

Task	Pre-construction	Construction	Post-construction Year											
			1	2	3	4	5	6-9	10	11-14	15	16-19	20	21+
Further giant hogweed removal			As Required											
Ongoing adaptive management			As Required											

Appendix A Figures

Technical Appendix 8.6: Outline Habitat Management Plan

Cairnoch Hill Wind Farm

Eurowind Energy Limited

SLR Project No.: 428.V12085.00001

3 August 2026

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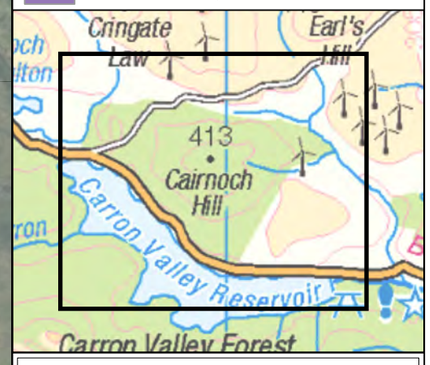
T1 T2 T3 T4

LEGEND

- Site Boundary
- Proposed Turbine Location
- Proposed Permanent Met Mast Location
- Proposed Permanent Met Mast 60 m Buffer
- Proposed New Track
- Proposed Existing Track to be Upgraded
- Proposed Crane Pad / Hardstanding
- Proposed Substation Compound
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Blade Laydown Area

Outline Habitat Management Plan (OHMP)

- Broadleaf Woodland Creation Area (Peatland Buffer)
- Broadleaf Woodland Creation Area
- Giant Hogweed Area
- Peatland Restoration Area
- Existing Ponds
- New Ponds
- Pond Buffer
- Pond Connection Corridors
- Riparian Improvement Area
- Wet Woodland Management Area



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Eurowind Energy™

SLR

CAIRNOCH HILL WIND FARM

EIAR - TA 8.6 - OHMP

OUTLINE HABITAT MANAGEMENT PLAN (OHMP)

FIGURE 8.6.1

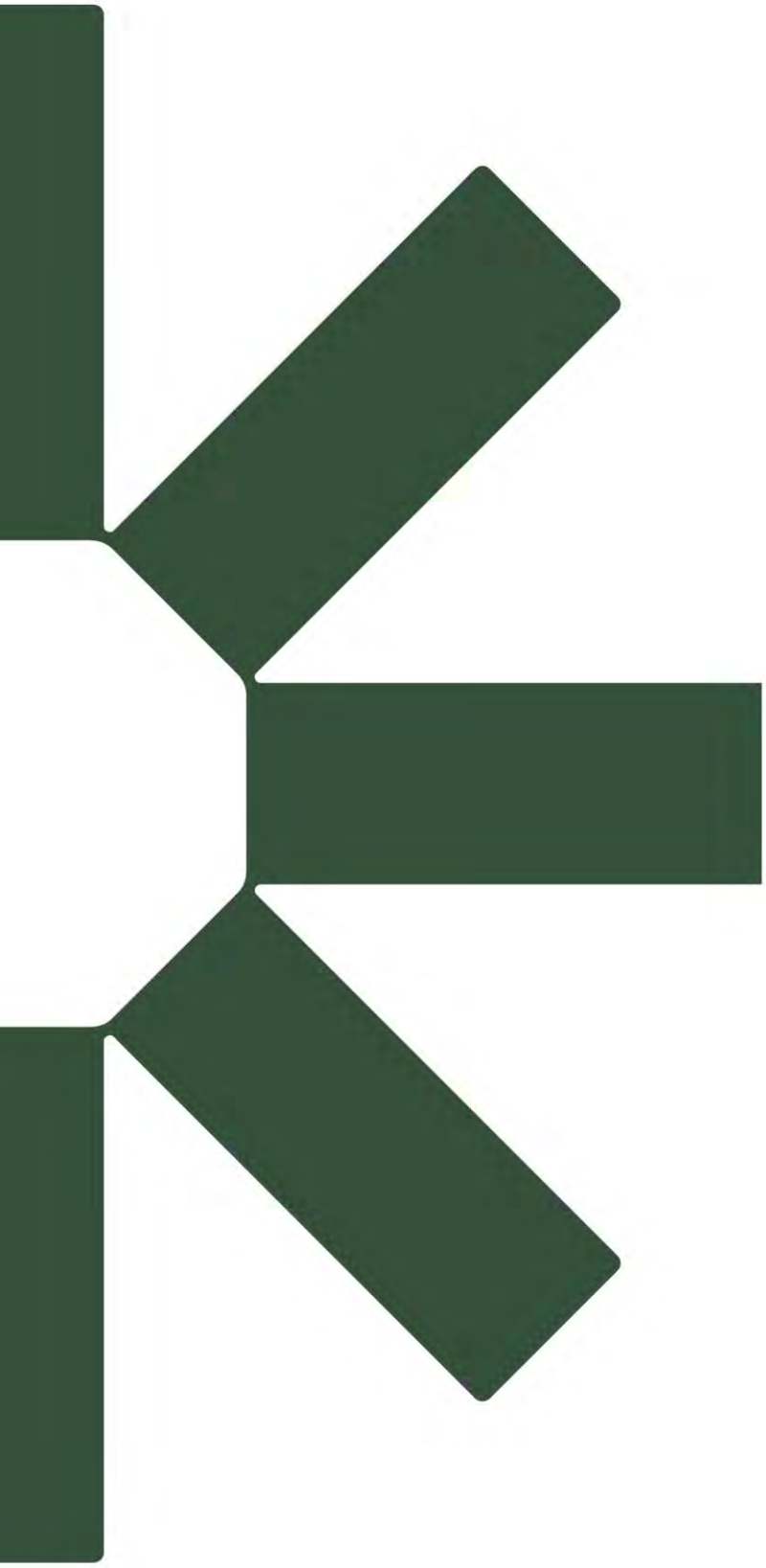
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Date JUNE 2026

428.V12085.00001.0171.0 OHMP

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Making Sustainability Happen

Eurowind Energy Limited

Cairnoch Hill Wind Farm:

Baseline Reports – Year 1 and 2

Technical Appendix 9.1

Billy Gardener, Evie Underwood, Matt Rea



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Revision and Amendment Register

Version Number	Date	Section(s)	Page(s)	Summary of Changes	Approved by
0.1	26/06/2026	All	All	First Draft	MD

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2. Year 1 Baseline report 1

3. Year 2 Baseline report 1

1. Introduction

This document is intended to serve as a cover sheet for the Year 1 and Year 2 Baseline Reports that comprise Technical Appendix 9.1 of the Cairnoch Hill Wind Farm EIA. The Year 1 Baseline Report was produced by Arcus, and the Year 2 Baseline Report was produced by ERM following their acquisition of Arcus. Both reports were written when the Proposed Development was known as Carron Valley Wind Farm.

2. Year 1 Baseline report

Included under a separate cover.

3. Year 2 Baseline report

Included under a separate cover.

ARCUS

CARRON VALLEY WIND FARM
YEAR 1 BASELINE ORNITHOLOGY REPORT

DECEMBER 2022



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ABBREVIATIONS

BoCC: Birds of Conservation Concern

BOU: British Ornithologists' Union

BTO: British Trust for Ornithology

EPS: European Protected Species

FAS: Flight Activity Surveys

MBBS: Moorland Breeding Bird Survey

OSNGR: Ordnance Survey National Grid Reference (OSNGR

RSG: Raptor Study Group

SBL: Scottish Biodiversity List

SPA: Special Protection Area

SSSI: Site of Special Scientific Interest

VP: Vantage Point

1 INTRODUCTION

1.1 Background

Arcus Consultancy Services Ltd ('Arcus') was commissioned by Eurowind Energy Limited ('Eurowind Energy') to evaluate the ornithological interest at the proposed Carron Valley Wind Farm ('the Development'), located on the north shore of Carron Valley Reservoir ('the Site') in Stirlingshire, approximately 6 km north of Kilsyth and 10 km west of Denny.

The Site Boundary is shown in Figure 1, Appendix 1.

Baseline Ornithology Surveys of the Site and surrounding area commenced in September 2021 and are ongoing until August 2023. This report details the survey methods and results of the first year of Baseline Ornithology Surveys (September 2021 to August 2022 inclusive). This document is supported by a Confidential Annex, which includes details of sensitive species.

Species names used in this report follow the British List[1], which is maintained by the British Ornithologists' Union (BOU), with all species referred to by their British (English) vernacular name. A list of scientific names, as well as details of relevant legislation and conservation status, of all bird species referred to in this report is provided in Table A2.1, Appendix 2.

1.2 Site Description

The habitat within the Site is comprised primarily of plantation forestry with topography rising steeply to a peak of 413 m at Cairnoch Hill, situated just east of the centre of the Site. Several small tributaries run across the Site, with Carron Valley Reservoir located to the south and southwest of the Site, the northern banks adjacent to the Site Boundary. There are several gravel roads and paths present throughout the Site and a single public road cuts across the northwest corner of the Site from southwest to northeast.

The wider area comprises undulating open habitats, with woodland blocks, farms, scattered dwellings, and numerous waterbodies and watercourses. Existing wind farms are present to the north and northeast of the Site, including Craigengelt, Earlsburn, and Kingsburn Wind Farms. Carron Valley Forest, used for recreation by mountain bikers and walkers, is located to the south of Carron Valley Reservoir. The town of Kilsyth, approximately 6 km south of the Site, is the largest settlement in the vicinity of the Site.

1.3 Desk Study

1.3.1 Statutory Sites Designated for Ornithological Features

The NatureScot (NS) SiteLink online tool[2] was used to search for statutory sites designated for ornithological features within the following search areas from the Site Boundary:

- 20 km for statutory sites designated for wintering geese; and
- 10 km for statutory sites designated for other ornithological features.

No statutory sites designated for ornithological features were identified within 10 km of the Site Boundary. However, two statutory sites with multiple designations for wintering geese

[1] British Ornithologists' Union. (2017). The British List: A Checklist of Birds of Britain (9th edition). *Ibis* 160: 190-240.

[2] NatureScot SiteLink. Available at: <https://sitelink.nature.scot/home> (accessed November 2022).

were identified within 20 km: Slamannan Plateau Special Protection Area (SPA)[3] and Site of Special Scientific Interest (SSSI)[4]; and Firth of Forth Ramsar site[5], SPA[6] and SSSI[7].

Slamannan Plateau SPA and SSSI are located approximately 12.74 km to the southeast of the Site (at the closest point), and both designations are for wintering taiga bean goose.

The Firth of Forth Ramsar site, SPA and SSSI are located approximately 14.6 km to the northeast of the Site (at the closest point), and the designations are for wintering pink-footed goose in addition to an assemblage of other wintering waterfowl.

These statutory sites are shown in Figure 2, Appendix 1.

1.3.2 Raptor Study Group Records

The Central Scotland Raptor Study Group (RSG), was contacted in March 2022 to obtain 'historic records' (defined as records within the last ten years) of breeding or roosting raptor species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)[8] and/or Annex I of the Birds Directive[9] within 2 km of the Site. The Central Scotland RSG provided details of a single breeding protected raptor species confirmed to be breeding within the search area, as well as records of two additional protected raptor species that were possibly breeding within the search area; details for all three species are provided in the Confidential Annex.

The Central Scotland RSG also provided a record of a single female hen harrier circling over woodland on the 23/04/2009. The RSG had no further records of hen harrier within 2 km of the Site, and there was no evidence that hen harrier has bred or roosted within 2 km of the Site within the last ten years.

2 METHODS

Based on the habitats present at the Site, the ornithological sensitivities known to occur in the area and professional experience, the 2021-22 Baseline Ornithology Survey programme comprised the following:

- Flight Activity Surveys (FAS; September 2021 to August 2022);
- Black Grouse Survey (March to May 2022);
- Breeding Raptor Survey (March to July 2022); and
- Moorland Breeding Bird Survey (MBBS; May to July 2022).

Full details of the methods followed for each of these surveys are provided below. Survey methods were based on current NS guidance[10], with any deviations noted.

2.1 Flight Activity Surveys

FAS were carried out between September 2021 and August 2022 using a series of watches from Vantage Points (VPs) overlooking the Site and a surrounding 500 m buffer, to record flight activity of target bird species. Target species included the following:

- All wild swan, goose and duck species (except Canada goose and mallard);

[3] Slamannan Plateau SPA. Available at: <https://sitelink.nature.scot/site/9184> (accessed November 2022).

[4] Slamannan Plateau SSSI. Available at: <https://sitelink.nature.scot/site/9171> (accessed November 2022).

[5] Firth of Forth Ramsar site. Available at: <https://sitelink.nature.scot/site/8424> (accessed November 2022).

[6] Firth of Forth SPA. Available at: <https://sitelink.nature.scot/site/8499> (accessed November 2022).

[7] Firth of Forth SSSI. Available at: <https://sitelink.nature.scot/site/8163> (accessed November 2022).

[8] Wildlife and Countryside Act (1981) as amended. Available at: <http://www.legislation.gov.uk/ukpga/1981/69> (accessed November 2022).

[9] The Birds Directive (2009/147/EC). Available at: <https://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm> (accessed November 2022).

[10] NatureScot (2017) *Recommended bird survey methods to inform impact assessment of onshore wind farms,* (version 2, March 2017). NatureScot.

- All Schedule 1-listed[8] and Annex I-listed[9] raptor and owl species;
- All wader species;
- Black grouse; and
- Nightjar.

The flight lines of all target species observed during the FAS were recorded on large scale maps in the field. Each recorded flight line was numbered and cross-referenced to the following flight data:

- Time (when first seen);
- Species, age and sex (when identification of age/sex was possible);
- Number of birds;
- Duration of flight within the VP viewshed; and
- Flight height in one of four height bands, that correspond to key dimensions of the potential turbine models being considered:
  1. < 10 m;
  2. 10-20 m;
  3. 21-150 m; and
  4. > 150 m.

In addition to recording target species, the number and activity of 'secondary' species was summarised for every 5-minute period during each of the FAS. Secondary species included the following: Canada goose, mallard, cormorant, grey heron, all other raptor species (i.e. those not listed on Schedule 1[8] or Annex I[9]), all gull species and raven. Recording of target species took priority over that of secondary species.

2.1.1 Vantage Point Locations

Three VP locations were used during Year 1 of Baseline Surveys: VP1 (Ordnance Survey National Grid Reference (OSNGR) NS 68234 84459), VP2 (OSNGR NS 70451 84613) and VP3 (OSNGR NS 69148 86860).

The VP locations and viewsheds are shown in Figure 3, Appendix 1.

2.1.2 Survey Effort

A total of 72 hours of survey per VP was completed during the FAS, with 36 hours of survey per VP completed during the non-breeding season (September to February), and 36 hours per VP during the breeding season (March to August), in line with NS guidance[10].

Six hours of survey per VP per month was completed, with the exception of VP3. No FAS was completed from VP3 during September 2021; however, to account for this shortfall, an additional six hours were completed during October 2021. Similarly, only three hours of survey were completed from VP3 during November 2021, with an additional three hours completed in December 2021.

Survey times were varied to cover all times of day, including the hours around dawn and dusk. Each watch lasted no more than three hours of continuous duration, with a minimum 30-minute break in between consecutive watches to minimise observer fatigue.

Full details of survey dates, times and hourly weather conditions are presented in Tables A3.1 to A3.3, Appendix 3.

2.2 Black Grouse Survey

A Black Grouse Survey was completed, based on the method detailed in Gilbert *et al.* (1998)[11]. The survey covered all potentially suitable lekking habitat within the Site and a

[11] Gilbert, G., Gibbons, D.W., Evans, J. (1998). *Bird Monitoring Methods*. RSPB, Sandy.

surrounding 1.5 km buffer (access permitting). The Black Grouse Survey Area is shown in Figure 4, Appendix 1.

Two survey visits were completed to all areas of suitable habitat between mid-March and late April 2022, to detect and count any lekking males and attendant females. Surveys were carried out around the hours of dawn, commencing from up to one hour before sunrise and continuing for up to three hours after sunrise.

Full details of survey dates, times and hourly weather conditions are presented in Table A3.4, Appendix 3.

2.3 Breeding Raptor Surveys

Monthly Breeding Raptor Surveys were completed between mid-March and late July 2022. In line with NS guidance[10], the Breeding Raptor Survey Area included suitable habitat within the Site and the following buffer areas (access permitting):

- 1 km for breeding barn owl and goshawk; and
- 2 km for all other breeding raptor species listed on Schedule 1[8] and/or Annex I[9] potentially present in the area.

The Breeding Raptor Survey Area is shown in Figure 4, Appendix 1.

All Breeding Raptor Surveys were completed with reference to the methods detailed in Hardey *et al*. (2013)[12]. This involved a combination of watches from VPs overlooking areas of suitable breeding habitat to identify any evidence of breeding (such as birds performing breeding displays or carrying prey), and walkovers of suitable habitat to search for nests and other signs of raptor presence (such as prey remains, pellets or feathers).

Although the surveys focussed on recording 'target' raptor species, i.e. those listed on Schedule 1[8] and/or Annex I[9], observations of 'secondary' raptor species (buzzard, sparrowhawk, tawny owl and kestrel) were also recorded. In addition, observations of other notable species (such as waders) were also recorded, and where relevant, were used to inform the results of other breeding season surveys. Observations were recorded on large-scale maps, with notes on behaviour taken where appropriate.

Full details of survey dates, times and hourly weather conditions are presented in Table A3.5, Appendix 3.

2.4 Moorland Breeding Bird Survey

A MBBS was undertaken between early May and late July 2022 (inclusive). In line with NS guidance[10], the survey followed an adapted Brown and Shepherd (1993)[13] method (designed to census upland breeding waders), with four survey visits completed at least seven days apart.

Although the survey focussed on identifying breeding waders, the method was modified such that all species seen or heard were recorded, with observations of other species of conservation concern mapped and green-listed species of low conservation concern recorded as present (but generally not mapped). Species of conservation concern, are defined as birds listed on one or more of the following:

- Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)[8];
- Annex I of the Birds Directive[9];

[12] Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. & Thompson, D. (2013). *Raptors: a field guide to survey and monitoring*, 3rd edition. The Stationery Office, Edinburgh.

[13] Brown, A.F. and Shepherd, K.B. (1993) A method for censusing upland breeding waders. *Bird Study* 40: 189-195.

- The UK Birds of Conservation Concern (BoCC) Red or Amber list[14]; and
- The Scottish Biodiversity List (SBL)[15].

Observations were recorded on large scale maps using standard British Trust for Ornithology (BTO) species and behaviour codes, as listed in Gilbert *et al*. (1998)[11].

The MBBS Area, which is shown in Figure 4, Appendix 1, included areas of open habitat within the Site and a surrounding 500 m buffer.

Full details of survey dates, times and hourly weather conditions are presented in Table A3.6, Appendix 3.

2.4.1.1 Breeding Territory Analysis

Upon completion of all four MBBS visits, all registrations of waders were transferred from the field maps to produce 'species summary maps' from which the number and distribution of likely territories for each species could be determined. The method was based on that described by Brown and Shepherd (1993)[13], with an element of professional judgement. Where there was any uncertainty regarding breeding status, a precautionary approach was followed, with a bird deemed to be holding a breeding territory if that was considered a possibility, e.g. if a pair of waders was observed in suitable habitat during just one of the four MBBS visits.

2.5 Survey Limitations

2.5.1 Weather Conditions

The majority of surveys were carried out in suitable weather conditions, with good visibility during diurnal surveys. However, it was not always possible to avoid periods of poor weather during the FAS, including rain, strong winds, moderate visibility and occasional frost and snow, especially when conditions varied from those forecast. It is considered that undertaking surveys in a range of conditions is more likely to capture bird activity that is representative of the Site and surrounding area. As such, weather conditions are not considered to represent a significant constraint to the robustness of the baseline data obtained.

2.5.2 Access

There was limited access to parts of the Ornithology Survey Areas where landowners had not given the surveyors permission to access their land. These areas were to the northeast and northwest of the Site and are shown on Figure 4, Appendix 1. Therefore, activity by target species within these areas may have been missed during. Where possible, these areas were surveyed using binoculars and telescope from distance to capture as much activity or evidence of target species as possible. This limitation did not affect the FAS as the VP locations were positioned out with the restricted areas.

2.5.3 Disturbance Events

Occasional disturbance events were recorded during the FAS, including forestry-related activities, noise from road traffic and helicopters, and the presence of farmers, cyclists and dog walkers within the Site and surrounding 500 m buffer. However, the disturbance events reported are representative of the area within and surrounding the Site, and are therefore not considered to affect the robustness of the baseline data obtained.

[14] Stanbury, A.J., Eaton, M.A., Aebischer, N.J., Balmer, D., Brown, A.F., Douse, A., Lindley, P., McCulloch, N., Noble, D.G. & Win, I. (2021). The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. *British Birds* 114, 723-747.

[15] Scottish Biodiversity List (2020). Available at: <https://www.nature.scot/doc/scottish-biodiversity-list> (accessed November 2022).

3 RESULTS

3.1 Flight Activity Surveys

3.1.1 Target Species Flights

A total of 214 flights by 13 target species were recorded during the Year 1 (2021-22) FAS, with flights by one of these species detailed within the Confidential Annex. Of the remaining 12 target species, greylag goose was the species recorded most frequently during the FAS, followed by curlew (60 and 14 flights, respectively). Fewer than 10 flights were recorded for each of the other target species.

With the exception of the protected species detailed in the Confidential Annex, a summary of all target species flights recorded during the FAS, broken down by species and season, is provided in Table 1 and full details of each target species flight are presented in Table A4.1, Appendix 4. Flight lines are shown in Figures 5–7, Appendix 1.

Table 1: Summary of target species flights recorded during the Year 1 (2021-22) FAS

Species*	Number of flights				Figure no.
	Non-breeding season (September to February)	Breeding season (March to August)	Total	No. of birds per flight	
Greylag goose	4	56	60	1-30	5
Pink-footed goose	6	-	6	12-40	
Mute swan	-	1	1	2	
Goldeneye	-	3	3	1-2	6
Goosander	-	1	1	2	
Great crested grebe	-	3	3	1	
Oystercatcher	-	1	1	1	
Curlew	-	14	14	1-15	
Goshawk	2	4	6	1	7
Hen harrier	1	-	1	1	
Red kite	-	5	5	1	
Peregrine	-	3	3	1	
Total**	13	201	214		

*Species names and order follow the British List maintained by the BOU[1]

** Note that these values are for all species, including flights detailed in the Confidential Annex

3.1.2 Incidental Records of Target Species

In addition to birds observed in flight within the VP viewsheds, there were incidental records of wildfowl and waders during the FAS. Incidental records of target species included those that were not in flight or were heard but not seen during the FAS. Incidental records generally involved low numbers of mute swan, curlew and snipe, moderate flocks of between 30-60 greylag goose, and a single flock of 35 golden plover. A notable mixed flock

of approximately 200 ducks, including teal and goldeneye, was also recorded on the Carron Valley Reservoir during the FAS at VP1 on the 28/09/2021.

3.1.3 Secondary Species Registrations

Fourteen identified secondary species were recorded during the Year 1 FAS, with buzzard observed most regularly (during 47 survey visits), followed by raven (during 36 visits) and great black-backed gull (during 23 visits). Kestrel, black-headed gull and lesser black-backed gull were also recorded frequently (kestrel and black-headed gull during 18 visits, and lesser black-backed gull during 14 visits). The remaining secondary species, namely Canada goose, mallard, common gull, herring gull, cormorant, grey heron, sparrowhawk and tawny owl, were all recorded during fewer than 10 survey visits. Additionally, two unidentified gulls were recorded during the FAS at VP2 on the 06/12/2021.

Birds were generally recorded in low numbers (10 or fewer individuals), with the exception of black-headed gull which was regularly recorded in moderate to large flocks of up to 200 birds. Additionally, there were occasional larger flocks of cormorant, common gull and lesser black-backed gull (up to 40, 19 and 27 birds, respectively).

Occasional flocks of up to 100 starling and 15 fieldfare were also recorded (although these were not classed as secondary species, they were noted down by the surveyor due to flock sizes and their status as Red-listed BoCC[14]).

3.2 Black Grouse Survey

No black grouse were recorded during any of the Year 1 (2022) Black Grouse Surveys.

3.3 Breeding Raptor Surveys

3.3.1 Target Raptor Species

One target raptor species was confirmed to have bred within the Breeding Raptor Survey Area in Year 1 (2022), with a further three considered to have potentially bred or held territory within the Breeding Raptor Survey Area. Further details of all four species are provided in the Confidential Annex.

In addition, a single male hen harrier was recorded during the Breeding Raptor Survey. However, there was no evidence that hen harrier attempted to breed or establish a territory within the Breeding Raptor Survey Area in 2022.

3.3.2 Secondary Raptor Species

Three secondary species were recorded during the Year 1 Breeding Raptor Surveys. Registrations are briefly summarised below for each species.

- Sparrowhawk: a single registration of a female carrying prey was recorded over woodland to the east of the Site (north of Dundaff Hill), indicating that sparrowhawk may have bred within the Breeding Raptor Survey Area.
- Buzzard: buzzard was regularly recorded and eight, the majority of which were within the Site Boundary pairs were confirmed or likely breeding within the Breeding Raptor Survey Area.
- Kestrel: there were occasional registrations of kestrel and it is considered probable that a pair bred within the Breeding Raptor Survey Area (most likely within the Site Boundary), although no nest site was identified.

Approximate territory centres or, where identified, nest sites, for all three of these species are shown in Figure 8, Appendix 1.

3.4 Moorland Breeding Bird Survey

A total of 65 bird species were recorded within the MBBS Area during the MBBS, including 43 species of conservation concern (as defined in Section 2.4). Species recorded during the MBBS included five raptors; registrations of these species were used to inform territory analysis of breeding raptors described in Section 3.3 (details of breeding raptors are therefore excluded from this section).

3.4.1 Species of Conservation Concern

3.4.1.1 Waders

A total of six wader species were considered to have bred or held territory within the MBBS Area in 2022: oystercatcher, lapwing, curlew, snipe, common sandpiper and redshank. Territories were concentrated in the east (particularly the southeast), with a small number also present in the north; details are summarised in Table 2 and shown in Figure 9, Appendix 1.

Table 2: Summary of breeding wader territories recorded during the Year 1 (2022) MBBS

Species*	Number of breeding territories			Details
	Site	Buffer Area**	Total	
Oystercatcher	-	2	2	Two territories were identified in the southeast of the MBBS Area, to the southwest of Craigannet Hill.
Lapwing	-	3	3	Three territories were identified within the southeast of the MBBS Area, one on the northern slopes of Craigannet Hill, and two to the south.
Curlew	-	6	6	A total of six territories were identified within the MBBS Area, with two present in the north (west of Easter Clingate), and four in the southeast (one to the north of Craigannet Hill and three to the south).
Snipe	-	8	8	Eight territories were identified across the north and east of the MBBS Area, with two present in the north, two in the northeast and four in the southeast.
Common sandpiper	-	2	2	Two possible common sandpiper territories were present in the southeast of the MBBS Area, along the banks of the Carron Valley Reservoir.
Redshank	-	1	1	A single possible redshank territory was present within the southeast of the MBBS Area, to the south of Craigannet Hill.

*Species names and order follow the British List maintained by the BOU[1]

**The part of the MBBS Area falling outside the Site but within the 500 m buffer of the Site Boundary

3.4.1.2 Other Non-Passerine Species

Excluding waders (described in Section 3.4.1.1) and four raptor species (described in Section 3.3.1), a further 10 non-passerine species of conservation concern were recorded: greylag goose, wigeon, mallard, swift, cuckoo, stock dove, woodpigeon, black-headed gull, great black-backed gull and lesser black-backed gull. Some of these species may have breed within the MBBS Area.

3.4.1.3 Passerine Species

Twenty-three passerine species of conservation concern were recorded, one of which is detailed within the Confidential Annex. Most of the remaining 22 species were confirmed or likely to have bred within the MBBS Area: rook, skylark, house martin, willow warbler, grasshopper warbler, wren, starling, song thrush, mistle thrush, fieldfare, spotted flycatcher, redstart, whinchat, wheatear, house sparrow, dunnock, grey wagtail, , meadow pipit, linnet, lesser redpoll, siskin and reed bunting. According to NS guidance[10], it is generally considered that passerine species are not significantly impacted by wind farms and surveys of moorland and woodland breeding passerines are not typically required. Therefore, territories of these species have not been analysed.

3.4.2 Other Species

The remaining 22 species, which are generally common and widespread[16], were as follows: Canada goose, pheasant, buzzard (detailed in Section 3.3.2), great spotted woodpecker, jackdaw, carrion crow, raven, coal tit, blue tit, great tit, sand martin, swallow, chiffchaff, garden warbler, goldcrest, nuthatch, blackbird, robin, stonechat, pied wagtail, chaffinch and goldfinch. The majority of these species were confirmed or likely to have bred within the MBBS Area.

3.5 Incidental Records of Non-avian Species

3.5.1 Protected Mammal Species

An otter (*Lutra lutra*) spraint was recorded at Earl's Burn in the northeast of the MBBS Area (at approximately NS 71341 86407) during the first MBBS visit in May 2022. Otter is a European Protected Species (EPS) and is fully protected in Scotland under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended)[17].

3.5.2 Notable Plant Records

During the first MBBS visit in May, approximately 60 tussocks of locally scarce greater tussock-sedge (*Carex paniculata*), were recorded at OSNGR NS 69600 86654. A strip of over 100 shepherd's cress (*Teesdalia nudicaulis*), a locally rare species listed as Near Threatened on the Vascular Plant Red Data List for Great Britain[18] and the SBL[15], was also recorded along both sides of a track at NS 71486 86051 during the first MBBS visit.

[16] UK BoCC Green-listed species that are not afforded special protection under Annex I of the Birds Directive or Schedule 1 of the Wildlife and Countryside Act 1981 (as amended).

[17] < https://www.legislation.gov.uk/uksi/1994/2716/contents/made > (accessed December 2022)

[18] Vascular Plant Red Data List for Great Britain (revised 2021). Available at: < Taxon lists – Botanical Society of Britain & Ireland (bsbi.org)> (accessed December 2022).

4 SUMMARY

4.1 Flight Activity by Target Species

A total of 214 flights by 13 target species were recorded during the Year 1 (2021-22) FAS, with flights by one of these species detailed within the Confidential Annex. Of the remaining 12 target species, greylag goose was the species recorded most frequently during the FAS (60 flights), followed by curlew (14 flights). Fewer than 10 flights were recorded for each of the other target species, with the majority of flights recorded during the breeding season (March to August, inclusive).

4.2 Breeding Raptors

A single target raptor species was confirmed to have bred within the Breeding Raptor Survey Area in Year 1 (2022), with additional historic records of this species provided by the Central Scotland RSG. A further three target raptor species potentially bred or held territory within the Breeding Raptor Survey Area in 2022. Full details of all four species, including FAS results where relevant, are provided within the Confidential Annex. A single male hen harrier was also recorded on one occasion during the Breeding Raptor Surveys, but was not considered to have bred or held territory within the Breeding Raptor Survey Area.

Three secondary raptors, sparrowhawk, buzzard and kestrel, were also recorded during the Year 1 Breeding Raptor Surveys. Buzzard was regularly recorded, with approximately eight territories present within the Breeding Raptor Survey Area. Sparrowhawk and kestrel were only occasionally recorded and no nests were located, but it is considered that both species likely bred within the Breeding Raptor Survey Area.

4.3 Breeding Waders

A total of six wader species were considered to have bred or held territory within the MBBS Area in Year 1 (2022): oystercatcher, lapwing, curlew, snipe, common sandpiper and redshank. Breeding densities were relatively low overall, with snipe breeding in the highest density within the MBBS Area (eight territories), followed by curlew (six territories). Three or fewer territories were identified for the remaining four wader species, oystercatcher, lapwing, common sandpiper and redshank. Wader territories were concentrated in the east (particularly the southeast), with a small number of snipe and curlew territories also present in the north.

APPENDIX 1: FIGURES

Figure 1: Site Boundary

Figure 2: Statutory Sites Designated for Ornithological Features

Figure 3: Vantage Point Locations and Viewsheds

Figure 4: Ornithology Survey Areas

Figure 5: Target Species Flights - Goose and Swan

Figure 6: Target Species Flights - Duck, Grebe and Wader

Figure 7: Target Species Flights - Raptor

Figure 8: Breeding Raptor Territories

Figure 9: Breeding Wader Territories

APPENDIX 2: BIRD SPECIES NAMES AND CONSERVATION DESIGNATIONS

Table A2.1 list provides English vernacular and scientific names, together with details of relevant legislation and conservation status, for all bird species named in this report. Taxonomic order and nomenclature are based on the BOU 'British List'[1].

Table A2.1: List of English vernacular and scientific names of bird species mentioned in this report

Species*		Schedule 1/Annex I listings	Conservation listings**
English (British) vernacular name	Scientific name		
Canada goose	*Branta canadensis*	-	-
Greylag goose	*Anser anser*	-	Amber
Taiga bean goose	*Anser fabalis*	-	Red; SBL
Pink-footed goose	*Anser brachyrhynchus*	-	Amber
Mute swan	*Cygnus olor*	-	-
Wigeon	*Mareca penelope*	-	Amber
Mallard	*Anas platyrhynchos*	-	Amber
Teal	*Anas crecca*	-	Amber
Goldeneye	*Bucephala clangula*	Schedule 1	Red
Goosander	*Mergus merganser*	-	-
Black grouse	*Lyrurus tetrix*	-	Red; SBL
Pheasant	*Phasianus colchicus*	-	-
Nightjar	*Caprimulgus europaeus*	Annex I	Amber; SBL
Swift	*Apus apus*	-	Red; SBL
Cuckoo	*Cuculus canorus*	-	Red; SBL
Stock dove	*Columba oenas*	-	Amber
Woodpigeon	*Columba palumbus*	-	Amber
Great crested grebe	*Podiceps cristatus*	-	-
Oystercatcher	*Haematopus ostralegus*	-	Amber
Lapwing	*Vanellus vanellus*	-	Red; SBL
Golden plover	*Pluvialis apricaria*	Annex I	SBL
Curlew	*Numenius arquata*	-	Red; SBL
Snipe	*Gallinago gallinago*	-	Amber
Common sandpiper	*Actitis hypoleucos*	-	Amber
Redshank	*Tringa totanus*	-	Amber
Black-headed gull	*Chroicocephalus ridibundus*	-	Amber; SBL
Common gull	*Larus canus*	-	Amber
Great black-backed gull	*Larus marinus*	-	Amber
Herring gull	*Larus argentatus*	-	Red; SBL
Lesser black-backed gull	*Larus fuscus*	-	Amber
Cormorant	*Phalacrocorax carbo*	-	-
Grey heron	*Ardea cinerea*	-	-
Sparrowhawk	*Accipiter nisus*	-	Amber
Goshawk	*Accipiter gentilis*	Schedule 1	-
Hen harrier	*Circus cyaneus*	Schedule 1, Schedule 1A; Annex I	Red; SBL
Red kite	*Milvus milvus*	Schedule 1, Schedule 1A; Annex I	SBL
Buzzard	*Buteo buteo*	-	-

Species*		Schedule 1/Annex I listings	Conservation listings**
English (British) vernacular name	Scientific name		
Tawny owl	*Strix aluco*	-	Amber
Great spotted woodpecker	*Dendrocopos major*	-	-
Kestrel	*Falco tinnunculus*	-	Amber; SBL
Peregrine	*Falco peregrinus*	Schedule 1; Annex I	SBL
Jackdaw	*Coloeus monedula*	-	-
Rook	*Corvus frugilegus*	-	Amber
Carrion crow	*Corvus corone*	-	-
Raven	*Corvus corax*	-	-
Coal tit	*Periparus ater*	-	-
Blue tit	*Cyanistes caeruleus*	-	-
Great tit	*Parus major*	-	-
Skylark	*Alauda arvensis*	-	Red; SBL
Sand martin	*Riparia riparia*	-	-
Swallow	*Hirundo rustica*	-	-
House martin	*Delichon urbicum*	-	Red
Willow warbler	*Phylloscopus trochilus*	-	Amber
Chiffchaff	*Phylloscopus collybita*	-	-
Grasshopper warbler	*Locustella naevia*	-	Red; SBL
Garden warbler	*Sylvia borin*	-	-
Goldcrest	*Regulus regulus*	-	-
Wren	*Troglodytes troglodytes*	-	Amber
Nuthatch	*Sitta europaea*	-	-
Starling	*Sturnus vulgaris*	-	Red; SBL
Song thrush	*Turdus philomelos*	-	Amber; SBL
Mistle thrush	*Turdus viscivorus*	-	Red
Blackbird	*Turdus merula*	-	-
Fieldfare	*Turdus pilaris*	Schedule 1	Red
Spotted flycatcher	*Muscicapa striata*	-	Red; SBL
Robin	*Erithacus rubecula*	-	-
Redstart	*Phoenicurus phoenicurus*	-	Amber
Whinchat	*Saxicola rubetra*	-	Red
Stonechat	*Saxicola rubicola*	-	-
Wheatear	*Oenanthe oenanthe*	-	Amber
House sparrow	*Passer domesticus*	-	Red; SBL
Dunnock	*Prunella modularis*	-	Amber; SBL
Grey wagtail	*Motacilla cinerea*	-	Amber
Pied wagtail	*Motacilla alba*	-	-
Meadow pipit	*Anthus pratensis*		Amber
Chaffinch	*Fringilla coelebs*	-	-
Linnet	*Linaria cannabina*	-	Red; SBL
Lesser redpoll	*Acanthis cabaret*	-	Red; SBL
Goldfinch	*Carduelis carduelis*	-	-
Siskin	*Spinus spinus*	-	SBL
Reed bunting	*Emberiza schoeniclus*	-	Amber; SBL

Species*		Schedule 1/Annex I listings	Conservation listings**
English (British) vernacular name	Scientific name		
*Species names and order follow the British List maintained by the BOU[1] ** Red = UK BoCC Red list[14]; Amber = UK BoCC Amber list[14]; SBL = Scottish Biodiversity List[15]			

APPENDIX 3: SURVEY TIMES AND WEATHER CONDITIONS

Flight Activity Surveys

Full details of the Year 1 (2021-22) FAS at each VP location, including hourly weather conditions, are presented below in Tables A3.1 to A3.3.

Table A3.1: Year 1 (2021–22) FAS times and hourly weather conditions for VP1

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
28/09/21	EMcL	11:00	14:00	1	3	SSW	0	6	2	2	0	0	VP very sheltered. Wind on hill BF 3
				2	3	SSW	0	7	2	2	0	0	VP very sheltered. Wind on hill BF 3
				3	3	SSW	3	7	2	2	0	0	VP very sheltered. Wind on hill BF 3
		14:30	17:30	1	3	SSE	3	7	2	2	0	0	
				2	3	SSE	2	8	2	2	0	0	
				3	3	S	0	6	2	2	0	0	
23/10/21	EMcL	10:20	13:20	1	2	S	0	8	2	2	0	0	
				2	3	S	0	8	2	2	0	0	
				3	3	S	0	8	2	2	0	0	
		13:50	16:50	1	3	SSW	0	8	2	2	0	0	
				2	3	SSW	0	8	2	2	0	0	
				3	3	SSW	0	8	2	2	0	0	
22/11/21	EMcL	09:35	12:35	1	1	SSW	0	1	2	2	1	0	
				2	1	WSW	0	2	2	2	0	0	
				3	2	WSW	0	5	2	2	0	0	
		13:05	16:05	1	2	W	0	7	2	2	0	0	
				2	2	W	0	7	2	2	0	0	
				3	2	W	0	6	2	2	0	0	
13/12/21	EMcL	09:40	12:40	1	2	SW	0	4	2	2	0	0	
				2	2	SW	0	2	2	2	0	0	
				3	3	SW	0	4	2	2	0	0	

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
		13:10	16:10	1	2	SW	0	5	2	2	0	0	
				2	2	SW	0	6	2	2	0	0	
				3	2	SW	0	6	2	2	0	0	
31/01/22	EMcL	09:10	12:10	1	2	WNW	0	2	2	2	1	0	
				2	3	WNW	0	2	2	2	1	0	
				3	3	WNW	0	6	2	2	0	0	
		12:40	15:40	1	3	WNW	0	7	2	2	0	0	
				2	4	WNW	0	7	2	2	0	0	
				3	4	WNW	0	7	2	2	0	0	
21/02/22	EMcL	09:30	12:30	1	4	W	0	1	2	2	0	0	
				2	5	W	0	3	2	2	0	0	
				3	5	W	0	5	2	2	0	0	
		13:00	16:00	1	4	NW	2	3	2	2	0	0	
				2	3	NW	0	2	2	2	0	0	
				3	3	NW	0	2	2	2	0	0	
30/03/22	MH	06:35	09:35	1	3	NNE	2	8	2	2	0	0	Light snow showers
				2	3	NNE	3	6-8	2	2	0	0	Heavy snow showers
				3	3	NNE	0	7-8	2	2	0	0	
		10:05	13:05	1	3	NNE	2	6	2	2	0	0	Snow showers
				2	3-4	NE	0	5	2	2	0	0	
				3	3-4	NE-NW	2	5-6	2	2	0	0	Snow showers
23/04/22	EMcL	08:00	11:00	1	4	NE	0	0	-	2	0	0	
				2	4	NE	0	1	2	2	0	0	
				3	5	NE	0	4	2	2	0	0	
		11:30	14:30	1	4	NE	0	2	2	2	0	0	
				2	5	NE	0	3	2	2	0	0	
				3	5	NE	0	3	2	2	0	0	

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
20/05/22	EMcL	09:20	12:20	1	3	S	0	8	2	2	0	0	
				2	3	S	0	6	2	2	0	0	
				3	3	S	0	7	2	2	0	0	
		12:50	15:50	1	3	S	0	8	2	2	0	0	
				2	3	S	2	8	2	2	0	0	
				3	3	S	3	8	2	2	0	0	
09/06/22	EMcL	13:30	15:30	1	2	S	0	8	2	2	0	0	
				2	2	S	1	8	2	1	0	0	
		15:50	17:50	1	2	S	1	8	2	1	0	0	
				2	2	S	0	8	2	2	0	0	
28/06/22	EMcL	08:40	10:40	1	2	SE	3	8	2	2	0	0	
				2	2	SE	5	8	1	1	0	0	
29/07/22	EMcL	10:15	13:15	1	1	S	0	7	2	2	0	0	
				2	1	S	0	6	2	2	0	0	
				3	1	S	0	3	2	2	0	0	
31/07/22	EMcL	08:10	11:10	1	2	SW	0	4	2	2	0	0	
				2	2	SW	0	4	2	2	0	0	
				3	2	SW	0	8	2	2	0	0	
30/08/22	EMcL	10:00	13:00	1	1	E	0	8	0	1	0	0	
				2	1	E	0	8	1	1	0	0	
				3	1	E	0	8	1	1	0	0	
		13:30	16:30	1	2	E	0	8	1	1	0	0	
				2	3	E	0	8	1	2	0	0	
				3	3	E	0	8	1	2	0	0	

- Observer: EMcL = Enda McLoughlin; MH = Matt Harding
- Wind speed: according to Beaufort Scale
- Wind direction: according to 16-point compass

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes

- Rain: 0 = None; 1 = Drizzle/Mist; 2 = Light showers; 3 = Heavy showers; 4 = Light rain; 5 = Heavy rain
- Cloud cover: in eighths of sky (oktas)
- Cloud height: 0 = <150 m; 1 = 150-500 m; 2 = >500 m
- Visibility: 0 = Poor (<1 km); 1 = Moderate (1-2 km); 2 = Good (>2 km)
- Frost: 0 = None; 1 = Ground frost; 2 = All day frost
- Snow: 0 = None; 1 = On site; 2 = On high ground

Table A3.2: Year 1 (2021–22) FAS times and hourly weather conditions for VP2

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
29/09/21	EMcL	09:50	12:50	1	3	W	0	0	-	2	0	0	
				2	3	W	0	4	2	2	0	0	
				3	3	W	0	6	2	2	0	0	
		13:20	16:20	1	3	W	0	5	2	2	0	0	
				2	3	W	2	4	2	2	0	0	
				3	4	W	0	2	2	2	0	0	
06/10/21	EMcL	10:10	13:10	1	0	-	0	0	-	2	0	0	
				2	2	S	0	0	-	2	0	0	
				3	1	S	0	0	-	2	0	0	
		13:40	16:40	1	1	S	0	1	2	2	0	0	
				2	1	S	0	1	2	2	0	0	
				3	1	S	0	1	2	2	0	0	
16/11/21	EMcL	09:05	12:05	1	4	SW	1	8	1	2	0	0	
				2	4	SW	1	8	1	2	0	0	
				3	4	SW	3	8	1	1	0	0	

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
		12:35	15:35	1	4	SW	3	8	1	1	0	0	
				2	4	SW	3	8	1	1	0	0	
				3	4	SW	3	8	1	1	0	0	
06/12/21	EMcL	09:40	12:40	1	2	W	0	5	2	2	0	2	
				2	2	W	0	4	2	2	0	2	
				3	2	W	1	4	2	2	0	2	
		13:10	16:10	1	3	W	3	5	2	2	0	2	
				2	3	W	3	6	2	2	0	2	
				3	3	W	3	6	2	2	0	2	
11/01/22	EMcL	09:20	12:20	1	3	SW	0	5	2	2	0	0	
				2	3	SW	0	6	2	2	0	0	
				3	3	SW	1	8	2	2	0	0	
		12:50	15:50	1	3	SW	0	5	2	2	0	0	
				2	3	SW	1	6	2	2	0	0	
				3	3	SW	2	6	2	2	0	0	
11/02/22	EMcL	09:30	12:30	1	2	SW	0	7	2	2	1	2	
				2	2	SW	0	6	2	2	1	2	
				3	2	SW	0	7	2	2	1	2	
		13:00	16:00	1	2	SW	0	6	2	2	0	2	
				2	3	SW	0	7	2	2	0	2	
				3	3	SW	0	7	2	2	0	2	
17/03/22	EMcL	10:00	13:00	1	4	SW	1	8	1	1	0	0	
				2	5	SW	0	8	2	2	0	0	
				3	5	SW	0	7	2	2	0	0	
		13:30	16:30	1	5	SW	3	8	2	1	0	0	
				2	4	SW	3	8	2	2	0	0	
				3	4	SW	0	5	2	2	0	0	

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
03/04/22	MH	07:45	10:45	1	1	SW	0	<1	2	2	1	0	
				2	1-3	SW	0	<1	2	2	1	0	
				3	3	SW	0	1	2	2	0	0	
		11:15	14:15	1	3	SW	0	4	2	2	0	0	
				2	3-4	SW	0	6	2	2	0	0	
				3	3-4	SW	0	7-8	2	2	0	0	
19/05/22	EMcL	08:05	11:05	1	4	SW	0	6	2	2	0	0	
				2	3	SW	0	5	2	2	0	0	
				3	3	SW	0	5	2	2	0	0	
		11:35	14:35	1	3	SW	0	4	2	2	0	0	
				2	3	SW	0	3	2	2	0	0	
				3	3	SW	0	3	2	2	0	0	
12/06/22	MH	05:00	08:00	1	3	SW	0	4-6	0-2	2	0	0	Rain overnight. Cloud still on tops, Site clear
				2	3	SW	4	6-8	0-2	1	0	0	
				3	3	SW	0	6	0-2	2	0	0	
		09:00	12:00	1	4	SW	2	5-7	0-2	2	0	0	
				2	3	SW	2	6-8	1-2	2	0	0	
				3	3	SW	2	6-8	1	2	0	0	
28/07/22	EMcL	13:00	16:00	1	2	SE	1	8	2	2	0	0	
				2	2	SE	1	8	2	2	0	0	
				3	2	SE	0	8	2	2	0	0	
29/07/22	EMcL	06:45	09:45	1	1	S	0	8	2	2	0	0	
				2	1	S	0	8	2	2	0	0	
				3	1	S	0	8	2	2	0	0	
04/08/22	MH	09:55	12:55	1	3-4	SW	0	4	2	2	0	0	
				2	3-4	SW	0	3-6	2	2	0	0	

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
				3	3-4	SW	0	5-6	2	2	0	0	
		16:00	19:00	1	4	SW	0	3-6	2	2	0	0	
				2	3-4	SW	2	3-7	2	2	0	0	
				3	3-4	SW	2	3-7	2	2	0	0	

- Observer: EMcL = Enda McLoughlin; MH = Matt Harding
- Wind speed: according to Beaufort Scale
- Wind direction: according to 16-point compass
- Rain: 0 = None; 1 = Drizzle/Mist; 2 = Light showers; 3 = Heavy showers; 4 = Light rain; 5 = Heavy rain
- Cloud cover: in eighths of sky (oktas)
- Cloud height: 0 = <150 m; 1 = 150-500 m; 2 = >500 m
- Visibility: 0 = Poor (<1 km); 1 = Moderate (1-2 km); 2 = Good (>2 km)
- Frost: 0 = None; 1 = Ground frost; 2 = All day frost
- Snow: 0 = None; 1 = On site; 2 = On high ground

Table A3.3: Year 1 (2021–22) FAS times and hourly weather conditions for VP3

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
01/10/21	EMcL	07:10	10:10	1	3	SW	3	8	2	1	0	0	
				2	3	SW	2	8	2	2	0	0	
				3	4	SW	2	6	2	2	0	0	
		10:40	13:40	1	4	SW	2	6	2	2	0	0	
				2	4	SW	2	7	2	2	0	0	
				3	4	SW	3	7	2	2	0	0	
22/10/21	EMcL	09:25	12:25	1	1	NW	0	2	2	2	0	0	
				2	0	-	0	4	2	2	0	0	

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
				3	2	WNW	0	4	2	2	0	0	
		12:55	15:55	1	3	W	0	6	2	2	0	0	
				2	2	WNW	0	5	2	2	0	0	
				3	2	WNW	0	5	2	2	0	0	
29/11/21	EMcL	10:00	13:00	1	2	WSW	0	8	1	1	1	0	Cloud dropping
				2	3	WSW	1	8	1	1	1	0	Cloud dropping
				3	2	WSW	1	8	0	0	1	0	Poor visibility
03/12/21	EMcL	07:45	10:45	1	3	W	0	2	2	2	0	0	
				2	2	W	0	5	2	2	0	0	
				3	3	W	0	7	2	2	0	0	
31/12/21	EMcL	09:50	12:50	1	2	SW	3	8	1	1	0	0	
				2	3	SW	3	8	0	1	0	0	
				3	3	SW	3	8	0	1	0	0	
		13:20	16:20	1	3	SW	4	8	1	1	0	0	
				2	3	SW	2	8	1	1	0	0	
				3	2	SW	0	8	1	2	0	0	
24/01/22	EMcL	08:45	11:45	1	2	SW	1	8	0	1	0	0	
				2	2	SW	0	8	0	1	0	0	
				3	2	SW	1	8	1	1	0	0	
		12:15	15:15	1	2	SW	1	8	0	1	0	0	
				2	2	SW	1	8	0	1	0	0	
				3	2	SW	1	8	0	1	0	0	
17/02/22	EMcL	10:15	13:15	1	5	W	3	4	2	2	0	0	
				2	5	W	0	7	2	2	0	0	
				3	5	W	0	7	2	2	0	0	
		13:40	16:40	1	5	W	3	5	2	2	0	0	
				2	5	W	0	3	2	2	0	0	

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
				3	5	W	3	4	2	2	0	0	
10/03/22	MH	09:15	12:15	1	3-4	SE	0-1	8	0-2	1-2	0	2	Small snow patches high up
				2	4	SE	0	7	1-2	2	0	2	Small snow patches high up
				3	3-4	E-SE	0-1	8	1	2	0	2	Small snow patches high up
		12:45	15:45	1	3	SSE	1	8	1	2	0	2	Small snow patches
				2	3	SSE	1	8	0-1	2	0	2	Small snow patches
				3	3	SSE	0-1	8	1	2	0	2	Small snow patches
22/04/22	EMcL	08:30	11:30	1	4	E	0	0	-	2	0	0	
				2	4	E	0	0	-	2	0	0	
				3	4	E	0	0	-	2	0	0	
		12:00	15:00	1	4	E	0	1	2	2	0	0	
				2	4	E	0	1	2	2	0	0	
				3	4	E	0	1	2	2	0	0	
22/05/22	MH	06:30	09:30	1	3	S	0-2	8	0-1	2	0	0	
				2	2-3	SSW	0	8	0-1	2	0	0	
				3	3	SSW-SW	0	8	1	2	0	0	
		10:00	13:00	1	3	SSW	0	>7	1	2	0	0	
				2	3-4	SSW	0	>7	1-2	2	0	0	
				3	2-3	SSW	0-2	>7	2	2	0	0	Brightening, then showers from 12:46
07/06/22	EMcL	14:40	17:40	1	3	E	0	1	2	2	0	0	
				2	3	E	0	0	-	2	0	0	
				3	4	E	0	0	-	2	0	0	
		18:10	21:10	1	3	E	0	0	-	2	0	0	
				2	3	E	0	1	2	2	0	0	
				3	3	E	0	1	2	2	0	0	
01/07/22	MH	09:20	12:20	1	2	WSW	0	6	1-2	2	0	0	

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
				2	3	W	0	6	1-2	2	0	0	
				3	2	W	0	6	2	2	0	0	
		12:50	15:50	1	2	WSW	0	7	1-2	2	0	0	
				2	2-3	WSW	2	6-7	2	2	0	0	
				3	3	WSW	0	6	2	2	0	0	
29/08/22	EMcL	08:50	11:50	1	2	E	0	7	2	2	0	0	
				2	1	E	0	6	2	2	0	0	
				3	1	E	0	7	2	2	0	0	
		12:20	15:20	1	1	E	0	7	2	2	0	0	
				2	2	E	0	8	2	2	0	0	
				3	1	E	0	8	2	2	0	0	

- Observer: EMcL = Enda McLoughlin; MH = Matt Harding
- Wind speed: according to Beaufort Scale
- Wind direction: according to 16-point compass
- Rain: 0 = None; 1 = Drizzle/Mist; 2 = Light showers; 3 = Heavy showers; 4 = Light rain; 5 = Heavy rain
- Cloud cover: in eighths of sky (oktas)
- Cloud height: 0 = <150 m; 1 = 150-500 m; 2 = >500 m
- Visibility: 0 = Poor (<1 km); 1 = Moderate (1-2 km); 2 = Good (>2 km)
- Frost: 0 = None; 1 = Ground frost; 2 = All day frost
- Snow: 0 = None; 1 = On site; 2 = On high ground

Black Grouse Survey

Full details of the Year 1 (2022) Black Grouse Survey, including hourly weather conditions, are presented below in Table A3.4.

Table A3.4: Year 1 (2022) Black Grouse Survey times and hourly weather conditions

Visit	Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
1	18/03/22	EMcL	06:00	08:40	1	2	S	0	0	-	2	1	0	
					2	2	S	0	1	2	2	1	0	
					3	3	S	0	1	2	2	1	0	
	21/03/22	EMcL	05:40	08:30	1	2	NE	0	5	2	2	1	0	
					2	2	NE	0	3	2	2	1	0	
					3	2	NE	0	2	2	2	1	0	
2	22/04/22	EMcL	05:10	08:00	1	3	E	0	8	2	2	0	0	A little gusty at times
					2	3	E	0	8	2	2	0	0	A little gusty at times
					3	3	E	0	8	2	2	0	0	A little gusty at times
	29/04/22	EMcL	05:00	07:30	1	1	E	0	0	-	2	1	0	
					2	1	E	0	0	-	2	0	0	
					3	2	E	0	0	-	2	0	0	

- Observer: EMcL = Enda McLoughlin
- Wind speed: according to Beaufort Scale
- Wind direction: according to 16-point compass
- Rain: 0 = None; 1 = Drizzle/Mist; 2 = Light showers; 3 = Heavy showers; 4 = Light rain; 5 = Heavy rain
- Cloud cover: in eighths of sky (oktas)
- Cloud height: 0 = <150 m; 1 = 150-500 m; 2 = >500 m
- Visibility: 0 = Poor (<1 km); 1 = Moderate (1-2 km); 2 = Good (>2 km)
- Frost: 0 = None; 1 = Ground frost; 2 = All day frost
- Snow: 0 = None; 1 = On site; 2 = On high ground

Breeding Raptor Surveys

Full details of the Year 1 (2022) Breeding Raptor Surveys, including hourly weather conditions, are presented below in Table A3.5.

Table A3.5: Year 1 (2022) Breeding Raptor Survey times and hourly weather conditions

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
18/03/22	EMcL	09:20	14:20	1	3	S	0	1	2	2	0	0	
				2	3	S	0	1	2	2	0	0	
				3	3	S	0	3	2	2	0	0	
				4	3	S	0	1	2	2	0	0	
				5	3	S	0	1	2	2	0	0	
21/03/22	EMcL	08:50	14:30	1	2	NE	0	1	2	2	0	0	Light winds
				2	2	NE	0	1	2	2	0	0	
				3	1	NE	0	0	-	2	0	0	
				4	1	NE	0	0	-	2	0	0	
				5	1	NE	0	0	-	2	0	0	
				6	1	NE	0	0	-	2	0	0	
10/04/22	MH	06:00	12:45	1	1	NW	0	5	2	2	1	0	
				2	1	NW	0	4	2	2	0	0	
				3	1-3	NW	0	3-5	2	2	0	0	
				4	3	NW	0	6	2	2	0	0	
				5	3	SW	0	5	2	2	0	0	
				6	2-3	SW	0	5	2	2	0	0	
				7	2	SW	0	7	2	2	0	0	
29/04/22	EMcL	08:50	11:30	1	3	E	0	0	-	2	0	0	
				2	3	E	0	1	2	2	0	0	
				3	3	E	0	1	2	2	0	0	
19/05/22	EMcL	15:00	18:00	1	4	SW	0	4	2	2	0	0	
				2	4	SW	0	4	2	2	0	0	

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
				3	4	SW	0	4	2	2	0	0	
20/05/22	EMcL	05:15	08:20	1	3	S	0	8	2	2	0	0	
				2	3	S	0	8	2	2	0	0	
				3	3	S	0	8	2	2	0	0	
21/05/22	EMcL	07:10	12:00	1	4	WSW	0	4	2	2	2	0	
				2	4	WSW	0	5	2	2	2	0	
				3	4	SW	3	8	2	2	2	0	
				4	4	SW	3	8	2	2	2	0	
				5	4	SW	3	8	2	2	2	0	
19/06/22	MH	07:00	12:50	1	3-4	WNW	0	2	2	2	0	0	
				2	3-4	NW	0	4	2	2	0	0	
				3	3	NW	0	6	2	2	0	0	
				4	2-3	WNW	0	5	2	2	0	0	
				5	3	NW	0	5	2	2	0	0	
				6	3	NW	0	5	2	2	0	0	
27/07/22	EMcL	10:15	15:40	1	3	S	0	8	2	2	0	0	
				2	3	S	0	8	2	2	0	0	
				3	3	S	0	8	2	2	0	0	
				4	3	S	0	8	2	2	0	0	
				5	3	S	0	8	2	2	0	0	
				6	3	S	0	8	2	2	0	0	

- Observer: EMcL = Enda McLoughlin; MH = Matt Harding
- Wind speed: according to Beaufort Scale
- Wind direction: according to 16-point compass
- Rain: 0 = None; 1 = Drizzle/Mist; 2 = Light showers; 3 = Heavy showers; 4 = Light rain; 5 = Heavy rain
- Cloud cover: in eighths of sky (oktas)

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes

- Cloud height: 0 = <150 m; 1 = 150-500 m; 2 = >500 m
- Visibility: 0 = Poor (<1 km); 1 = Moderate (1-2 km); 2 = Good (>2 km)
- Frost: 0 = None; 1 = Ground frost; 2 = All day frost
- Snow: 0 = None; 1 = On site; 2 = On high ground

Moorland Breeding Bird Surveys

Full details of the Year 1 (2022) MBBS, including hourly weather conditions, are presented below in Table A3.6.

Table A3.6: Year 1 (2022) MBBS times and hourly weather conditions

Visit no.	Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
1	01/05/22	MH	09:15	17:10	1	2-3	ENE	0	8	0-1	2	0	0	Rain overnight. Cloud down on higher tops
					2	2-3	SE	0	>7	1	2	0	0	
					3	2-3	ENE	0	8	1	2	0	0	
					4	2-3	ENE	2	8	1	2	0	0	
					5	2	SE	0	8	1-2	2	0	0	
					6	1-2	E	0	8	2	2	0	0	
					7	1	ESE	0	8	2	2	0	0	
					8	1	ESE	0	8	2	2	0	0	
2	14/06/22	EMcL	09:00	14:00	1	3	S	1	8	2	2	0	0	
					2	3	S	0	8	2	2	0	0	
					3	3	S	2	8	2	2	0	0	
					4	3	SW	0	8	2	2	0	0	
					5	3	SW	0	8	2	2	0	0	
3	01/07/22	EMcL	09:45	12:30	1	3	W	0	7	2	2	0	0	

Visit no.	Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
					2	3	W	0	8	2	2	0	0	
					3	3	W	0	8	2	2	0	0	
	05/07/22	EMcL	09:35	11:10	1	3	W	0	6	2	2	0	0	
					2	3	W	0	6	2	2	0	0	
4	27/07/22	MH	09:00	15:25	1	2-3	WSW	0	1	2	2	0	0	
					2	2	WSW	0	3	2	2	0	0	
					3	3	WSW	0	6	2	2	0	0	
					4	3-4	SW	2	4-7	2	2	0	0	
					5	4	SW	0	5	2	2	0	0	
					6	4	SW	0	4	2	2	0	0	
					7	4	SW	0	4	2	2	0	0	

- Observer: EMcL = Enda McLoughlin; MH = Matt Harding
- Wind speed: according to Beaufort Scale
- Wind direction: according to 16-point compass
- Rain: 0 = None; 1 = Drizzle/Mist; 2 = Light showers; 3 = Heavy showers; 4 = Light rain; 5 = Heavy rain
- Cloud cover: in eighths of sky (oktas)
- Cloud height: 0 = <150 m; 1 = 150-500 m; 2 = >500 m
- Visibility: 0 = Poor (<1 km); 1 = Moderate (1-2 km); 2 = Good (>2 km)
- Frost: 0 = None; 1 = Ground frost; 2 = All day frost
- Snow: 0 = None; 1 = On site; 2 = On high ground

APPENDIX 4 – DETAILS OF TARGET SPECIES FLIGHTS

With the exception of one protected species detailed in the Confidential Annex, full details of each target species flight recorded during the Year 1 (2021–22) FAS are presented below in Table A4.1.

Table A4.1: Details of each target species flight recorded during the Year 1 (2021-22) FAS, listed by species

Species*	Date	VP	Observer**	Flight start time	Flight duration (s)	Minimum no. of birds	Key no.***	Notes
Greylag goose	28/09/21	VP1	EMcL	16:17	192	30	7	Regular transit/commuting, flew out of sight
	31/01/22	VP1	EMcL	10:28	100	15	18	Regular transit/commuting, flew out of sight
	11/02/22	VP2	EMcL	10:15	105	2	19	Flew out of sight
	11/02/22	VP2	EMcL	11:44	30	2	20	Flew out of sight
	10/03/22	VP3	MH	12:54	47	11	35	Regular transit/commuting, flew out of sight
	10/03/22	VP3	MH	13:07	89	2	36	Regular transit/commuting, flew out of sight
	10/03/22	VP3	MH	09:19	33	6	23	Regular transit/commuting, four landed and two flew out of sight
	10/03/22	VP3	MH	09:26	93	7	24	Regular transit/commuting, four landed and three flew out of sight
	10/03/22	VP3	MH	14:00	46	1	38	Regular transit/commuting, flushed by car then flew out of sight
	10/03/22	VP3	MH	09:41	74	6	25	Regular transit/commuting, landed
	10/03/22	VP3	MH	09:49	39	2	26	Regular transit/commuting, flushed by cyclist then flew out of sight
	10/03/22	VP3	MH	14:10	61	1	39	Regular transit/commuting, landed
	10/03/22	VP3	MH	14:16	75	6	40	Regular transit/commuting, landed
	10/03/22	VP3	MH	09:57	37	2	27	Regular transit/commuting, flew out of sight
	10/03/22	VP3	MH	10:31	119	2	28	Regular transit/commuting, flew out of sight
	10/03/22	VP3	MH	14:51	28	30	41	Regular transit/commuting, flew out of sight
	10/03/22	VP3	MH	11:14	28	2	31	Regular transit/commuting, flew out of sight
	10/03/22	VP3	MH	11:18	11	2	118	Regular transit/commuting, landed
	10/03/22	VP3	MH	11:41	89	1	32	Regular transit/commuting, flew out of sight
	10/03/22	VP3	MH	11:49	160	2	33	Regular transit/commuting, flew out of sight
	17/03/22	VP2	EMcL	10:20	75	2	42	Pair; regular transit/commuting, flew out of sight

Species*	Date	VP	Observer**	Flight start time	Flight duration (s)	Minimum no. of birds	Key no.***	Notes
	17/03/22	VP2	EMcL	12:50	10	2	43	Pair; regular transit/commuting, landed
	30/03/22	VP1	MH	06:43	69	1	44	Regular transit/commuting, flew out of sight
	30/03/22	VP1	MH	10:05	119	2	74	Regular transit/commuting, landed
	30/03/22	VP1	MH	10:20	184	2	75	Regular transit/commuting, flew out of sight
	30/03/22	VP1	MH	06:45	61	2	45	Regular transit/commuting, flew out of sight
	30/03/22	VP1	MH	06:48	91	2	46	Regular transit/commuting, flew out of sight
	30/03/22	VP1	MH	10:33	20	2	76	Regular transit/commuting, landed
	30/03/22	VP1	MH	07:01	18	1	48	Regular transit/commuting, flew out of sight
	30/03/22	VP1	MH	10:42	24	2	78	Regular transit/commuting, landed
	30/03/22	VP1	MH	10:43	12	3	79	Regular transit/commuting, flew out of sight
	30/03/22	VP1	MH	07:04	22	2	49	Regular transit/commuting, flew out of sight
	30/03/22	VP1	MH	11:05	86	2	80	Regular transit/commuting, flew out of sight
	30/03/22	VP1	MH	11:11	131	2	81	Regular transit/commuting, flew out of sight
	30/03/22	VP1	MH	07:14	101	2	52	Regular transit/commuting, flew out of sight
	30/03/22	VP1	MH	12:43	11	2	82	Regular transit/commuting, flew out of sight
	30/03/22	VP1	MH	12:48	26	3	83	Regular transit/commuting, landed
	30/03/22	VP1	MH	13:00	44	1	84	Regular transit/commuting, flew out of sight
	30/03/22	VP1	MH	07:39	54	2	57	Regular transit/commuting, flew out of sight
	30/03/22	VP1	MH	07:47	21	2	58	Regular transit/commuting, landed
	30/03/22	VP1	MH	07:50	40	2	59	Regular transit/commuting, landed
	30/03/22	VP1	MH	08:14	20	2	62	Regular transit/commuting, flew out of sight
	30/03/22	VP1	MH	09:07	16	2	66	Regular transit/commuting, landed
	30/03/22	VP1	MH	09:20	17	1	182	Regular transit/commuting, landed
	30/03/22	VP1	MH	09:23	15	2	183	Regular transit/commuting, flew out of sight
	30/03/22	VP1	MH	09:25	142	2	70	Regular transit/commuting, flew out of sight

Species*	Date	VP	Observer**	Flight start time	Flight duration (s)	Minimum no. of birds	Key no.***	Notes
	30/03/22	VP1	MH	09:27	35	2	71	Regular transit/commuting, landed
	30/03/22	VP1	MH	09:30	84	1	72	Regular transit/commuting, flew out of sight
	30/03/22	VP1	MH	09:32	29	2	73	Regular transit/commuting, flew out of sight
	03/04/22	VP2	MH	09:58	11	9	85	Regular transit/commuting, flew out of sight
	23/04/22	VP1	EMcL	12:03	65	2	94	Regular transit/commuting, landed
	23/04/22	VP1	EMcL	08:59	60	2	89	Breeding behaviour, landed
	23/04/22	VP1	EMcL	10:32	160	2	92	Regular transit/commuting, flew out of sight
	22/05/22	VP3	MH	07:29	33	4	228	Regular transit/commuting, flew out of sight
	22/05/22	VP3	MH	07:47	15	2	229	Flushed by farmer on vehicle then flew out of sight. The surveyor stopped watching this flight to watch curlew flight key no. 233
	22/05/22	VP3	MH	11:07	38	3	242	Regular transit/commuting, landed
	22/05/22	VP3	MH	11:40	6	1	243	Regular transit/commuting, landed on Loch Walton
	22/05/22	VP3	MH	09:01	19	2	230	Regular transit/commuting, flew out of sight
	22/05/22	VP3	MH	09:18	160	2	231	Regular transit/commuting, flew out of sight
	22/05/22	VP3	MH	09:29	44	2	232	Regular transit/commuting, flew out of sight
Pink-footed goose	28/09/21	VP1	EMcL	15:08	135	34	5	Regular transit/commuting, flew out of sight
	28/09/21	VP1	EMcL	12:14	325	38	9	Regular transit/commuting, flew out of sight
	28/09/21	VP1	EMcL	12:14	325	18	10	Regular transit/commuting, flew out of sight
	28/09/21	VP1	EMcL	12:14	200	40	11	Regular transit/commuting, flew out of sight
	29/09/21	VP2	EMcL	12:36	50	12	12	Regular transit/commuting, flew out of sight
	22/11/21	VP1	EMcL	15:30	26	21	16	Regular transit/commuting, flew out of sight
Mute swan	23/04/22	VP1	EMcL	09:01	30	2	90	Possibly disturbed by fishermen, flew out of sight
Goldeneye	30/03/22	VP1	MH	07:24	54	2	54	Male and female adults, male flew past the VP to land and was joined by female
	30/03/22	VP1	MH	07:30	11	1	55	Female; transit/commuting, landed
	30/03/22	VP1	MH	08:14	25	1	61	Female; transit/commuting, landed

Species*	Date	VP	Observer**	Flight start time	Flight duration (s)	Minimum no. of birds	Key no.***	Notes
Goosander	10/03/22	VP3	MH	09:17	48	2	22	Male and female; transit/commuting, flew out of sight
Great crested grebe	30/03/22	VP1	MH	07:54	54	1	60	Transit/commuting, landed
	30/03/22	VP1	MH	09:10	68	1	67	Transit/commuting, flew out of sight
	01/07/22	VP3	MH	09:31	15	1	123	Transit/commuting, flew out of sight. The surveyor stopped watching this flight to watch goshawk flight key no. 122
Oystercatcher	10/03/22	VP3	MH	11:03	20	1	30	Foraging, landed
Curlew	10/03/22	VP3	MH	13:15	20	1	37	Transit/commuting, flew out of sight
	10/03/22	VP3	MH	11:03	20	15	29	Hunting/foraging, landed in field to forage
	30/03/22	VP1	MH	10:39	31	1	77	Transit/commuting, flew out of sight
	30/03/22	VP1	MH	07:12	10	2	51	Transit/commuting, flew out of sight
	30/03/22	VP1	MH	07:20	21	2	53	Transit/commuting, landed
	30/03/22	VP1	MH	07:32	107	2	56	Transit/commuting, flew out of sight
	30/03/22	VP1	MH	08:19	40	1	64	Transit/commuting, flew out of sight
	03/04/22	VP2	MH	11:37	17	1	86	Breeding behaviour, flew out of sight
	22/05/22	VP3	MH	07:45	119	1	233	Flushed by farmer on vehicle then flew out of sight
	22/05/22	VP3	MH	10:58	8	1	241	Breeding behaviour, landed
	22/05/22	VP3	MH	08:46	51	1	234	Transit/commuting, flew out of sight
	09/06/22	VP1	EMcL	17:25	125	1	116	Transit/commuting, landed
	12/06/22	VP2	MH	07:03	31	1	246	Transit/commuting, flew out of sight
	01/07/22	VP3	MH	11:14	115	1	129	Breeding behaviour, flew out of sight
Goshawk	01/10/21	VP3	EMcL	07:48	210	1	15	Adult; hunting, flew out of sight
	06/12/21	VP2	EMcL	15:05	160	1	17	Hunting, flew out of sight
	22/05/22	VP3	MH	08:18	149	1	235	Adult; flew out of sight
	12/06/22	VP2	MH	05:06	36	1	244	Hunting, flew out of sight
	12/06/22	VP2	MH	11:32	23	1	249	Adult male; hunting, flew out of sight

Species*	Date	VP	Observer**	Flight start time	Flight duration (s)	Minimum no. of birds	Key no.***	Notes
	01/07/22	VP3	MH	09:31	148	1	122	Transit/commuting, flew out of sight
Hen harrier	22/10/21	VP3	EMcL	13:54	40	1	14	Adult male; hunting/foraging then flew out of sight
Red kite	22/04/22	VP3	EMcL	08:40	85	1	87	Hunting, flew out of sight
	23/04/22	VP1	EMcL	12:50	570	1	96	Hunting, flew out of sight
	20/05/22	VP1	EMcL	13:25	180	1	107	Hunting, flew out of sight
	20/05/22	VP1	EMcL	11:15	180	1	104	Transit/commuting, flew out of sight
	20/05/22	VP1	EMcL	11:35	1170	1	105	Hunting, flew out of sight, probably the same bird as key no. 104
Peregrine	10/03/22	VP3	MH	11:59	332	1	34	Immature female; hunting then flew out of sight
	30/03/22	VP1	MH	07:09	42	1	50	Transit/commuting, flew out of sight
	20/05/22	VP1	EMcL	13:32	500	1	108	Hunting then flew out of sight

*Species names, and the taxonomic order in which they are listed in the Table, follow the British List maintained by the BOU[1]
**Observer: EMcL = Enda McLoughlin; MH = Matt Harding
***Key numbers allow identification of individual flights, and correspond with the numbers shown on Figures 5–7, Appendix 1

Carron Valley Wind Farm

Year 2 Baseline Ornithology Report

PREPARED FOR
Eurowind Energy

DATE
16 February 2024

REFERENCE
0669621



DOCUMENT DETAILS

The details entered below are automatically shown on the cover and the main page footer. PLEASE NOTE: This table must NOT be removed from this document.	
DOCUMENT TITLE	Carron Valley Wind Farm
DOCUMENT SUBTITLE	Year 2 Baseline Ornithology Report
PROJECT NUMBER	0669621
Date	21 February 2024
Version	2.0
Author	Will Scott
Client name	Eurowind Energy

DOCUMENT HISTORY

				ERM APPROVAL TO ISSUE		
VERSION	REVISION	AUTHOR	REVIEWED BY	NAME	DATE	COMMENTS
Version	1.2	Will Scott	Matt Slaymaker			
Version	1.2	Will Scott		Peter Rodgers	16.02.2024	Draft for Client Comment
Version	2.0	Will Scott	Dr David McCaughie		21.02.2024	Client review

SIGNATURE PAGE

Carron Valley Wind Farm

Year 2 Baseline Ornithology Report

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ACRONYMS AND ABBREVIATIONS

Acronyms	Description
BoCC	Birds of Conservation Concern
BOU	British Ornithologists' Union
BTO	British Trust for Ornithology
ERM	Environmental Resources Management
FAS	Flight Activity Survey
FLS	Forestry and Land Scotland
MBBS	Moorland Breeding Bird Survey
NS	Nature Scot
OSNGR	Ordnance Survey National Grid Reference
SBL	Scottish Biodiversity List
VP	Vantage Point

1. INTRODUCTION

1.1 BACKGROUND

Environmental Resources Management Limited ('ERM')[1] was commissioned by Eurowind Energy to evaluate the ornithological interest at the proposed Carron Valley Wind Farm ('the Development'), located on the north shore of Carron Valley Reservoir ('the Site') in Stirlingshire, approximately 6 km north of Kilsyth and 10 km west of Denny.

The Site Boundary is shown in Figure 1, Appendix 1.

Baseline Ornithology Surveys of the Site and surrounding area have been completed between September 2021 and August 2023. This report details the survey methods and results of the second year of Baseline Ornithology Surveys (September 2022 to August 2023 inclusive).

Species names used in this report follow the British List[2], which is maintained by the British Ornithologists' Union (BOU), with all species referred to by their British (English) vernacular name. A list of scientific names, as well as details of relevant legislation and conservation status, of all bird species referred to in this report is provided in Table A2.1, Appendix 2.

1.2 SITE DESCRIPTION

The habitat within the Site is comprised primarily of plantation forestry with topography rising steeply to a peak of 413 m at Cairnoch Hill, situated just east of the centre of the Site. Several small tributaries run across the Site, with Carron Valley Reservoir located to the south and southwest of the Site, the northern banks adjacent to the Site Boundary. There are several gravel roads and paths present throughout the Site and a single public road cuts across the northwest corner of the Site from southwest to northeast.

The wider area comprises undulating open habitats, with woodland blocks, farms, scattered dwellings, and numerous waterbodies and watercourses. Existing wind farms are present to the north and northeast of the Site, including Craigengelt, Earlsburn and Kingsburn Wind Farms. Carron Valley Forest, regularly used for recreation by mountain bikers and walkers, is located to the south of Carron Valley Reservoir. The town of Kilsyth, approximately 6 km south of the Site, is the largest settlement in the vicinity of the Site.

[1] Surveys were originally carried out by Arcus Consultancy Services, a company that was acquired by ERM during the course of the surveys.
[2] British Ornithologists' Union. (2017). The British List: A Checklist of Birds of Britain (9th Edition). *Ibis* 160: 190-240.

2. METHODS

Based on the habitats present at the Site, the ornithological sensitivities known to occur in the area (including consideration of year 1 survey results), and professional experience, the 2022-23 Baseline Ornithology Survey program matched that of year 1 and comprised the following:

- Flight Activity Surveys (FAS; September 2022 to August 2023);
- Black Grouse Survey (April 2023);
- Breeding Raptor Survey (March to August 2023); and
- Moorland Breeding Bird Survey (MBBS; May to June 2023).

Full details of the methods followed for each of these surveys are provided below. Survey methods were based on current NS guidance[3], with any deviations noted.

2.1 FLIGHT ACTIVITY SURVEYS

FAS were carried out between September 2022 and August 2023 using a series of watches from Vantage Points (VPs) overlooking the Site and a surrounding 500 m buffer, to record flight activity of target bird species. Target species included the following:

- All wild swan, goose and duck species (except Canada goose and mallard);
- All Schedule 1-listed[4] and Annex I-listed[5] raptor and owl species;
- All wader species;
- Black grouse; and
- Nightjar.

The flight lines of all target species observed during the FAS were recorded on large scale maps in the field. Each recorded flight line was numbered and cross-referenced to the following flight data:

- Time (when first seen);
- Species, age and sex (when identification of age/sex was possible);
- Number of birds;
- Duration of flight within the VP viewshed; and
- Flight height in one of four height bands, that correspond to key dimensions of the potential turbine models being considered:
  1. < 10 m;
  2. 10-20 m;
  3. 21-200 m; and
  4. > 200 m.

In addition to recording target species, the number and activity of 'secondary' species was summarised for every 5-minute period during each of the FAS. Secondary species included the

[3] NatureScot (2017) *Recommended bird survey methods to inform impact assessment of onshore wind farms,* (version 2, March 2017). NatureScot.
[4] Wildlife and Countryside Act (1981) as amended. Available at: http://www.legislation.gov.uk/ukpga/1981/69 (accessed January 2024).
[5] The Birds Directive (2009/147/EC). Available at: https://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm (accessed January 2024).

following: Canada goose, mallard, cormorant, grey heron, all other raptor species (i.e. those not listed on Schedule 1[4] or Annex I[5], all gull species and raven. Recording of target species took priority over that of secondary species.

2.1.1 VANTAGE POINT LOCATIONS

Three VP locations were used during Year 1 of Baseline Surveys:

- VP1 (Ordnance Survey National Grid Reference (OSNGR) NS 68234 84459);
- VP2 (OSNGR NS 70451 84613); and
- VP3 (OSNGR NS 69148 86860).

The VP locations and viewsheds are shown in Figure 2, Appendix 1.

2.1.2 SURVEY EFFORT

A total of 72 hours of survey per VP was completed during the FAS, with 36 hours completed during the non-breeding season (September to February), and 36 hours during the breeding season (March to August), in line with NS guidance[3].

Surveys were spread through the year, with six hours of survey per VP completed in most months, with occasional exceptions, as per Table 1.

TABLE 1 SUMMARY OF SURVEY HOURS PER VP DURING THE YEAR 2 (2022-23) FAS

VP	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Total Hours
VP 1	6	6	0	12	6	6	6	0	9	9	6	6	72
VP 2	6	6	6	6	6	6	6	6	6	6	6	6	72
VP 3	6	6	6	6	6	6	6	0	12	6	3	9	72

Survey times were varied to cover all times of day, including the hours around dawn and dusk. Each watch lasted no more than three hours of continuous duration, with a minimum 30-minute break in between consecutive watches to minimise observer fatigue.

Full details of survey dates, times and hourly weather conditions are presented in Tables A3.1 to A3.3, Appendix 3.

2.2 BLACK GROUSE SURVEY

A Black Grouse Survey was completed, based on the method detailed in Gilbert *et al*. (1998)[6]. The survey covered all potentially suitable lekking habitat within the Site and a surrounding 1.5 km buffer (access permitting). The Black Grouse Survey Area is shown in Figure 3, Appendix 1.

[6] Gilbert, G., Gibbons, D.W., Evans, J. (1998). *Bird Monitoring Methods*. RSPB, Sandy.

Three survey visits were completed to all areas of suitable habitat during April 2023, to detect and count any lekking males and attendant females. Surveys were carried out around the hours of dawn, commencing from up to one hour before sunrise and continuing for up to three hours after sunrise. Full details of survey dates, times and hourly weather conditions are presented in Table A3.4, Appendix 3.

2.3 BREEDING RAPTOR SURVEYS

Monthly Breeding Raptor Surveys were completed between mid-March and early August 2022. In line with NS guidance[3], the Breeding Raptor Survey Area included suitable habitat within the Site and the following buffer areas (access permitting):

- 1 km for breeding barn owl and goshawk; and
- 2 km for all other breeding raptor species listed on Schedule 1[4] and/or Annex I[5] potentially present in the area.

The Breeding Raptor Survey Area is shown in Figure 3, Appendix 1.

All Breeding Raptor Surveys were completed with reference to the methods detailed in Hardey *et al*. (2013)[7]. This involved a combination of watches from VPs overlooking areas of suitable breeding habitat to identify any evidence of breeding (such as birds performing breeding displays or carrying prey), and walkovers of suitable habitat to search for nests and other signs of raptor presence (such as prey remains, pellets or feathers).

Although the surveys focused on recording 'target' raptor species, i.e. those listed on Schedule 1[4] and/or Annex I[5], observations of 'secondary' raptor species (buzzard, sparrowhawk, tawny owl and kestrel) were also recorded. Observations were recorded on large-scale maps, with notes on behaviour taken where appropriate.

Full details of survey dates, times and hourly weather conditions are presented in Table A3.5, Appendix 3.

2.4 MOORLAND BREEDING BIRD SURVEY

A MBBS was undertaken between early May and late June 2023 (inclusive). In line with NS guidance[3], the survey followed an adapted Brown and Shepherd (1993)[8] method (designed to census upland breeding waders), with four survey visits completed at least seven days apart. The MBBS Area (Figure 3, Appendix 1) included areas of open habitat within the Site and a surrounding 500 m buffer (access permitting).

Although the survey focused on identifying breeding waders, the method was modified such that all species seen or heard were recorded, with notable observations of other species of conservation importance mapped. Species of conservation importance are defined as birds listed on one or more of the following:

- Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)[4];
- Annex I of the Birds Directive[5];

[7] Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. & Thompson, D. (2013). *Raptors: a field guide to survey and monitoring*, 3rd edition. The Stationery Office, Edinburgh.
[8] Brown, A.F. and Shepherd, K.B. (1993) A method for censusing upland breeding waders. *Bird Study* 40: 189-195.

- The UK Birds of Conservation Concern (BoCC) Red or Amber list[9]; and
- The Scottish Biodiversity List (SBL)[10].

Observations were recorded on large scale maps using standard British Trust for Ornithology (BTO) species and behaviour codes, as listed in Gilbert *et al*. (1998)[6].

Full details of survey dates, times and hourly weather conditions are presented in Table A3.6, Appendix 3.

2.4.1.1 BREEDING TERRITORY ANALYSIS

Upon completion of all four MBBS visits, all registrations of waders were transferred from the field maps to produce 'species summary maps' from which the number and distribution of likely territories for each species could be determined. The method was based on that described by Brown and Shepherd (1993)[8], with an element of professional judgement. Where there was any uncertainty regarding breeding status, a precautionary approach was followed, with a bird deemed to be holding a breeding territory if that was considered a possibility, e.g. if a pair of waders was observed in suitable habitat during just one of the four MBBS visits.

2.5 SURVEY LIMITATIONS

2.5.1 WEATHER CONDITIONS

The majority of surveys were carried out in suitable weather conditions, with good visibility during diurnal surveys. However, it was not always possible to avoid periods of poor weather during the FAS, including rain, strong winds, moderate visibility and occasional frost and snow, especially when conditions varied from those forecast. Some VP surveys were postponed due to weather, but were caught up as soon as possible when conditions were favourable. It is considered that undertaking surveys in a range of conditions is more likely to capture bird activity that is representative of the Site and surrounding area. As such, weather conditions are not considered to represent a significant constraint to the robustness of the baseline data obtained.

2.5.2 ACCESS

There were no access limitations within the Site; however, there was no access to areas north of the Site, where landowners had not given the surveyors permission to access their land. This area is shown on Figure 3, Appendix 1, and included parts of the MBBS, Black grouse and Raptor survey areas. These areas were surveyed using binoculars and telescope from distance to capture as much activity or evidence of target species as possible however, some activity by target species within these areas may have been missed during the surveys. For example, a black grouse survey of the northern survey area on 17/04/2023 was limited to the road only, listening and viewing with binoculars and telescope across the survey area. This limitation did not affect the FAS as the VP locations were located outwith the restricted areas.

[9] Stanbury, A.J., Eaton, M.A., Aebischer, N.J., Balmer, D., Brown, A.F., Douse, A., Lindley, P., McCulloch, N., Noble, D.G. & Win, I. (2021). The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. *British Birds* 114, 723-747.
[10] Scottish Biodiversity List (2020). Available at: <https://www.nature.scot/doc/scottish-biodiversity-list> (accessed November 2022).

2.5.3 DISTURBANCE EVENTS

Disturbance events were recorded twice during the FAS: forestry staff were present on Cairnoch Hill for an hour on 17/03/2023 and three rowing boats (fishing) and two low flying paragliders over the reservoir during August. These few disturbance events are representative of the area within and surrounding the Site and are therefore not considered to affect the robustness of the baseline data obtained.

2.5.4 RECORDING SECONDARY SPECIES

During a VP survey in July, secondary species were not recorded due to the high number of osprey flights. The recording of target species took priority over that of secondary species, as stated in section 2.1. During a VP survey in April, secondary gull flights were not recorded due to increased gull activity around the reservoir in relation to the gull colony there.

3. RESULTS

3.1 FLIGHT ACTIVITY SURVEYS

3.1.1 TARGET SPECIES FLIGHTS

A total of 132 flights by 14 target species were recorded during the Year 2 (2022-23) FAS. Of these species, osprey was the species recorded most frequently, followed by graylag goose (75 and 23 flights, respectively). Fewer than 10 flights were recorded for each of the other target species.

A summary of all target species flights recorded during the FAS, broken down by species and season, is provided in Table 1 and full details of each target species flight are presented in Table A4.1, Appendix 4. Flight lines are shown in Figures 4–7, Appendix 1.

TABLE 2 SUMMARY OF TARGET SPECIES FLIGHTS RECORDED DURING THE YEAR 2 (2022-23) FAS

Species*	Number of flights				Figure no.
	Non-breeding season (September to February)	Breeding season (March to August)	Total	No. of birds per flight	
Greylag goose	9	14	23	1-10	4
Pink-footed goose	3	-	3	30-75	4
Teal	4	-	4	1-6	5
Pochard	1	-	1	4	5
Tufted duck	3	-	3	1-5	5
Goldeneye	7	2	9	1-3	5
Goosander	1	-	1	2	5
Curlew	-	2	2	1	5
Osprey	-	75	75	1-2	6
Goshawk	1	-	1	1	7
Marsh harrier	-	1	1	1	7
Red kite	7	-	7	1-2	7
Merlin	-	1	1	1	7
Peregrine	-	1	1	1	7

*Species names and order follow the British List maintained by the BOU[2]

3.1.2 INCIDENTAL RECORDS OF TARGET SPECIES

Incidental records of target species included those that were not observed in flight or were heard but not seen during the FAS. Incidental records included great crested grebe and garganey on the reservoir on 29/09/2022, two goldeneye on the reservoir on 13/01/2023 and a tawny owl calling 200m south of VP3 on 26/05/2023. There was also a flock of 145 greylag geese present on the reservoir on 29/06/2023.

3.1.3 SECONDARY SPECIES REGISTRATIONS

Thirteen secondary species were recorded during the Year 2 FAS, with buzzard observed most regularly (during 53 three-hour FAS watches), followed by raven (during 39 three-hour FAS watches) and cormorant (during 18 three-hour FAS watched). Black-headed gull, great black-backed gull and kestrel were also recorded frequently (during 16, 15 and 10 three-hour FAS watches respectively). The remaining secondary species, namely Canada goose, mallard, common gull, herring gull, lesser black-backed gull, grey heron and sparrowhawk, were all recorded during fewer than 10 three-hour FAS watches.

Birds were generally recorded in low numbers (10 or fewer individuals). There were occasional larger flocks of herring gull (28), Canada goose (20), black-headed gull (20), cormorant (17) and lesser black-backed gull (10).

A flock of 30 fieldfare and a mixed flock of 400 redwing and fieldfare were also recorded (although these were not classed as secondary species, they were noted down by the surveyor due to flock sizes and their status as Red-listed BoCC[9]).

3.2 BLACK GROUSE SURVEY

No black grouse were recorded during any of the Year 2 (2023) Black Grouse Surveys.

3.3 BREEDING RAPTOR SURVEYS

3.3.1 TARGET RAPTOR SPECIES

There was no evidence of target raptor species nesting within the Breeding Raptor Survey Area.

Ospreys were regularly recorded, occasionally over or near historic nest sites during April, though no territories were identified. A pair of Ospreys called to each other within the Site during July. These birds may have been a pair that failed locally (per Forestry and Land Scotland, FLS).

Goshawk were observed during the April Breeding Raptor Surveys and included a pair displaying in the 2 km buffer. There was no breeding evidence found during subsequent searches and were considered by the surveyor not to be nesting within the survey area, although they may have bred in the wider area and parts of the Breeding Raptor Survey Area may fallen within their territory. Red kites were observed occasionally, and included a pair that were thought to have been possibly pair bonding / nest searching during a VP survey during February. However, there was no further evidence of any breeding or territorial activity, with just a single observation of a bird transiting through the area during a Breeding Raptor Survey visit in April.

Single peregrine and merlin were observed hunting during VP surveys on 17/03/2023 and 03/07/2023 respectively, and a juvenile marsh harrier passed through during an August VP survey.

3.3.2 SECONDARY RAPTOR SPECIES

Four secondary species were recorded during the Year 2 Breeding Raptor Surveys. Registrations are briefly summarised below for each species.

- **Sparrowhawk:** observed occasionally with a possible nest site within the 2 km buffer.
- **Buzzard**: buzzard was regularly recorded and five pairs were confirmed or likely breeding within the Breeding Raptor Survey Area, four of which were within the Site Boundary.
- **Kestrel**: there was a single registration of a female kestrel hunting during the breeding season. A search of Cairnoch Hill found no evidence of a territory in the area.
- **Tawny owl**: a tawny owl was incubating eggs in a kestrel box within the Site on 14/04/2023. A bird was also calling 200 m south of VP3 on 26/05/2023.

Approximate territory centres or, where identified, nest sites of secondary raptor species within the Site boundary are shown in Figure 9, Appendix 1.

3.4 MOORLAND BREEDING BIRD SURVEY

A total of 41 bird species were recorded within the MBBS Area during the MBBS, including 22 species of conservation importance (as defined in Section 2.4).

3.4.1 SPECIES OF CONSERVATION CONCERN

3.4.1.1 WADERS

Two wader species were considered to have bred or held territory within the MBBS Area in 2023: curlew and snipe. No territories were identified within the Site, with those that were present concentrated in the east (particularly the southeast) of the buffer, with a single curlew territory also present in the north. Details are summarised in Table 2 and shown in Figure 8, Appendix 1.

A single oystercatcher flew over the area and two single lapwing were recorded, but showed no signs of breeding.

TABLE 3 SUMMARY OF BREEDING WADER TERRITORIES RECORDED DURING THE YEAR 2 (2023) MBBS

Species*	Number of breeding territories			Details
	Site	Buffer Area**	Total	
Curlew	0	5	5	Four territories were identified in the MBBS buffer to the east of the Site and a single territory to the north.
Snipe	0	1	1	A single territory was located in the east of the MBBS buffer.

*Species names and order follow the British List maintained by the BOU
**The part of the MBBS Area falling outside the Site but within the 500 m buffer of the Site Boundary

3.4.1.2 OTHER NON-PASSERINE SPECIES

Excluding waders (described in Section 3.4.1.1), a further six non-passerine species of conservation importance were recorded: pink-footed goose, mallard, swift, cuckoo, woodpigeon, and black-headed gull. Of these, woodpigeon, mallard, and cuckoo may have breed within the MBBS Area.

3.4.1.3 PASSERINE SPECIES

Twelve passerine species of conservation importance were recorded. Most of these species were confirmed or likely to have bred (or held territory) within the MBBS Area: skylark, house martin, willow warbler, wren, starling, song thrush, redstart, wheatear, dunnock, grey wagtail, meadow pipit, and reed bunting.

According to NS guidance[3], it is generally considered that passerine species are not significantly impacted by wind farms and surveys of moorland and woodland breeding passerines are not typically required. Therefore, territories of these species have not been analysed.

3.4.2 OTHER SPECIES

The remaining 21 species, which are generally common and widespread[11], were as follows: Canada goose, pheasant, buzzard (detailed in Section 3.3.2), great spotted woodpecker, jackdaw, carrion crow, raven, coal tit, blue tit, great tit, swallow, chiffchaff, blackcap, wren, blackbird, robin, stonechat, pied wagtail, chaffinch, goldfinch and siskin. The majority of these species were confirmed or likely to have bred within the MBBS Area.

[11] UK BoCC Green-listed species that are not afforded special protection under Annex I of the Birds Directive or Schedule 1 of the Wildlife and Countryside Act 1981 (as amended).

4. RESULTS SUMMARY

4.1 FLIGHT ACTIVITY BY TARGET SPECIES

A total of 132 flights by 14 target species were recorded during the Year 2 (2022-23) FAS. Of these species, osprey was the species recorded most frequently during the FAS, followed by graylag goose (75 and 23 flights, respectively).

Fewer than 10 flights were recorded for each of the other target species, which were: pink-footed goose, teal, pochard, tufted duck, goldeneye, goosander, curlew, goshawk, marsh harrier, red kite, merlin and peregrine.

The majority of flights recorded during the non-breeding season (September to February).

4.2 BREEDING RAPTORS

There was no confirmed breeding by any target raptor species within the Breeding Raptor Survey Area. Osprey were recorded fairly regularly during the breeding season, mostly hunting and was observed taking food off-Site. Occasionally birds were observed near historic nest sites, though no breeding attempts were identified.

Four secondary raptors; sparrowhawk, buzzard, kestrel, and tawny owl were also recorded during the Year 2 Breeding Raptor Surveys. Buzzard was regularly recorded, with five territories present within the Breeding Raptor Survey Area. Sparrowhawk may have bred within the Breeding Raptor Survey Area and a single kestrel was observed hunting, though no territory was identified. A single tawny owl nest was found.

4.3 BREEDING WADERS

Two wader species were considered to have bred or held territory within the MBBS Area in Year 2 (2023): curlew and snipe. Breeding densities were low and only recorded in the MBBS Area buffer, with five curlew territories and a single snipe territory. Oystercatcher and Lapwing were observed within the MBBS Area, but no evidence of breeding was recorded.

APPENDIX A FIGURES

FIGURE 1: SITE BOUNDARY

FIGURE 2: VANTAGE POINT LOCATIONS AND VIEWSHEDS

FIGURE 3: ORNITHOLOGY SURVEY AREAS

FIGURE 4: TARGET SPECIES FLIGHTS - GREYLAG AND PINK-FOOTED GOOSE FLIGHTS

FIGURE 5: TARGET SPECIES FLIGHTS – DUCK SPECIES AND CURLEW

FIGURE 6: TARGET SPECIES FLIGHTS – OSPREY

FIGURE 7: TARGET SPECIES FLIGHTS – OTHER RAPTOR SPECIES

FIGURE 8: BREEDING WADER TERRITORIES

FIGURE 9: BREEDING SECONDARY RAPTOR TERRITORIES

APPENDIX B BIRD SPECIES NAMES AND CONSERVATION DESIGNATIONS

Table A2.1 provides English vernacular and scientific names, together with details of relevant legislation and conservation statuses, for all bird species named in this report. Taxonomic order and nomenclature are based on the BOU 'British List'[2].

TABLE A2.1 LIST OF ENGLISH VERNACULAR AND SCIENTIFIC NAMES OF BIRD SPECIES MENTIONED IN THIS REPORT

Species*		**Schedule 1/Annex I listings**	**Conservation listings****
English (British) vernacular name	**Scientific name**		
Canada goose	*Branta canadensis*		
Greylag goose	*Anser anser*	Sch1.2 (Outer Hebrides, Caithness, Sutherland and Wester Ross only)	Amber
Pink-footed goose	*Anser brachyrhynchus*		Amber
Garganey	*Spatula querquedula*	Sch1.1	Amber, SBL
Mallard	*Anas platyrhynchos*		Amber
Teal	*Anas crecca*		Amber
Pochard	*Aythya rufina*		Red, SBL
Tufted duck	*Aythya fuligula*		Green
Goldeneye	*Bucephala clangula*	Sch1.2	Red
Swift	*Apus apus*		Red, SBL
Cuckoo	*Cuculus canorus*		Red, SBL
Woodpigeon	*Columba palumbus*		Amber
Oystercatcher	*Haematopus ostralegus*		Amber
Lapwing	*Vanellus vanellus*		Red, SBL
Curlew	*Numenius arquata*		Red, SBL
Snipe	*Gallinago gallinago*		Amber
Black-headed gull	*Chroicocephalus ridibundus*		Amber, SBL
Common gull	*Larus canus*		Amber
Great black-backed gull	*Larus marinus*		Amber
Herring gull	*Larus argentatus*		Red, SBL
Lesser black-backed gull	*Larus fuscus*		Amber
Cormorant	*Phalacrocorax carbo*		Green

Grey heron	*Ardea cinerea*		Green
Osprey	*Pandion haliaetus*	Sch1.1, Annex I	Amber, SBL
Sparrowhawk	*Accipiter nisus*		Amber
Goshawk	*Accipiter gentilis*	Sch1.1	Green
Red kite	*Milvus milvus*	Sch1.1 & 1A, Annex I	Green, SBL
Buzzard	*Buteo buteo*		Green
Tawny owl	*Strix aluco*		Amber
Kingfisher	*Alcedo atthis*	Sch1.1, Annex I	Green, SBL
Great spotted woodpecker	*Dendrocopos major*		Green
Kestrel	*Falco tinnunculus*		Amber, SBL
Merlin	*Falco columbarius*	Sch1.1, Annex I	Red, SBL
Peregrine	*Falco peregrinus*	Sch 1.1, Annex I	Green, SBL
Jackdaw	*Coloeus monedula*		Green
Carrion crow	*Corvus corone*		Green
Raven	*Corvus corax*		Green
Coal tit	*Periparus ater*		Green
Blue tit	*Cyanistes caeruleus*		Green
Great tit	*Parus major*		Green
Skylark	*Alauda arvensis*		Red, SBL
Swallow	*Hirundo rustica*		Green
House martin	*Delichon urbicum*		Red
Long-tailed tit	*Aegithalos caudatus*		Green
Willow warbler	*Phylloscopus trochilus*		Green
Chiffchaff	*Phylloscopus collybita*		Green
Blackcap	*Sylvia atricapilla*		Green
Wren	*Troglodytes troglodytes*		Amber
Starling	*Sturnus vulgaris*		Red, SBL
Song thrush	*Tudus philomelos*		Amber, SBL
Mistle thrush	*Turdus viscivorus*		Red
Redwing	*Turdus iliacus*	Sch1.1	Amber, SBL
Blackbird	*Turdus merula*		Green

Fieldfare	*Turdus pilaris*	Sch1.1	Red
Robin	*Erithacus rubecula*		Green
Redstart	*Phoenicurus phoenicurus*		Amber
Stonechat	*Saxicola rubecula*		Green
Wheatear	*Oenanthe oenanthe*		Amber
Dunnock	*Prunella modularis*		Amber, SBL
Grey wagtail	*Motacilla cinerea*		Amber
Pied wagtail	*Motacilla alba*		Green
Meadow pipit	*Anthus pratensis*		Amber
Chaffinch	*Fringilla coelebs*		Green
Linnet	*Linaria cannabina*		Red, SBL
Crossbill	*Loxia curvirostra*	Sch1.1	Green
Goldfinch	*Carduelis carduelis*		Green
Siskin	*Spinus spinus*		Green, SBL
Reed bunting	*Emberiza schoeniclus*		Amber, SBL

*Species names and order follow the British List maintained by the BOU[2]
** Red = UK BoCC Red list[9]; Amber = UK BoCC Amber list[9]; SBL = Scottish Biodiversity List[10]

APPENDIX C SURVEY TIMES AND WEATHER CONDITION

FLIGHT ACTIVITY SURVEYS

Full details of the Year 2 (2022-23) FAS at each VP location, including hourly weather conditions, are presented below in Tables A3.1 to A3.3.

TABLE A3.1: YEAR 2 (2022–23) FAS TIMES AND HOURLY WEATHER CONDITIONS FOR VP1

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
29/09/2022	EMcL	09:20	12:20	1	2	North	0	2	2	2	0	0	
				2	3	North	0	4	2	2	0	0	
				3	3	NE	0	6	2	2	0	0	
		12:50	15:50	1	2	NE	0	7	2	2	0	0	
				2	1	NE	0	7	2	2	0	0	
				3	Not recorded								
31/10/2022	EMcL	08:50	11:50	1	3	SSE	0	8	2	2	0	0	
				2	3	SSE	2	8	2	2	0	0	
				3	3	SSE	2	8	2	2	0	0	
		12:20	15:20	1	3	SSE	2	8	2	2	0	0	
				2	3	SSE	2	8	2	2	0	0	
				3	3	SSE	2	8	2	2	0	0	
05/12/2022	EMcL	09:35	12:35	1	2	North	0	6	2	2	0	0	
				2	2	North	0	7	2	2	0	0	
				3	2	North	0	7	2	2	0	0	
		13:05	16:05	1	2	North	0	4	2	2	0	0	
				2	2	North	0	3	2	2	0	0	

				3	2	North	0	3	2	2	0	0	
29/12/2022	EMcL	08:50	11:50	1	3	SW	3	8	1	2	0	0	
				2	3	SW	3	8	1	2	0	0	
				3	3	SW	3	8	2	2	0	0	
		12:20	15:20	1	3	SW	2	7	2	2	0	0	
				2	3	SW	3	7	2	2	0	0	
				3	3	SW	3	7	2	2	0	0	
13/01/2023	EMcL	08:35	11:35	1	2	West	0	3	2	2	0	0	
				2	2	West	0	3	2	2	0	0	
				3	3	West	0	4	2	2	0	0	
		12:05	15:05	1	2	West	0	3	2	2	0	0	
				2	2	West	0	3	2	2	0	0	
				3	2	West	0	4	2	2	0	0	
28/02/2023	EMcL	09:15	12:15	1	1	NW	0	8	2	2	0	0	
				2	1	North	0	7	2	2	0	0	
				3	1	North	0	7	2	2	0	0	
		12:45	15:45	1	1	North	0	8	2	2	0	0	
				2	1	North	0	7	2	2	0	0	
				3	2	North	0	8	2	2	0	0	
17/03/2023	EMcL	10:15	13:15	1	2	South	0	6	2	2	0	0	
				2	2	South	0	6	2	2	0	0	
				3	2	South	0	5	2	2	0	0	
		13:45	16:45	1	2	South	2	8	2	2	0	0	
				2	2	South	5	8	2	1	0	0	
				3	2	South	5	8	1	1	0	0	

04/05/2023	EMcL	09:20	12:20	1	5	East	0	8	2	2	0	0	
				2	5	East	0	8	2	2	0	0	
				3	6	East	0	8	2	2	0	0	
		12:50	15:50	1	6	East	0	8	2	2	0	0	
				2	6	East	0	8	2	2	0	0	
				3	6	East	0	7	2	2	0	0	
17/05/2023	EMcL	09:15	12:15	1	2	East	0	8	2	2	0	0	
				2	2	East	0	8	2	2	0	0	
				3	3	East	0	8	2	2	0	0	
01/06/2023	EMcL	09:10	12:10	1	0	N/A	0	8	2	2	0	0	
				2	1	NE	0	8	2	2	0	0	
				3	1	NE	0	8	2	2	0	0	
29/06/2023	EMcL	08:15	11:15	1	3	SW	0	7	2	2	0	0	
				2	3	SW	0	5	2	2	0	0	
				3	3	SW	0	2	2	2	0	0	
		11:45	14:45	1	3	SW	2	7	2	2	0	0	
				2	3	SW	2	7	2	2	0	0	
				3	3	SW	2	7	2	2	0	0	
07/07/2023	EMcL	08:00	11:00	1	2	South	2	8	0	2	0	0	
				2	2	South	0	8	2	2	0	0	
				3	2	South	0	8	2	2	0	0	
		11:30	14:30	1	2	South	0	8	2	2	0	0	
				2	2	South	0	8	2	2	0	0	
				3	2	South	0	8	2	2	0	0	
27/08/2023	EMcL	08:50	11:50	1	0	N/A	0	8	2	2	0	0	

				2	1	West	0	8	2	2	0	0	
				3	1	West	0	8	2	2	0	0	
		12:20	15:20	1	WSW	1	0	8	2	2	0	0	
				2	WSW	1	0	8	2	2	0	0	
				3	WSW	1	0	8	2	2	0	0	

TABLE A3.2: YEAR 2 (2022–23) FAS TIMES AND HOURLY WEATHER CONDITIONS FOR VP2

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
27/09/2022	EMcL	09:25	12:25	1	2	West	0	2	2	2	0	0	
				2	3	West	0	2	2	2	0	0	
				3	3	West	0	3	2	2	0	0	
		13:00	16:00	1	3	West	0	6	2	2	0	0	
				2	2	West	0	7	2	2	0	0	
				3	2	West	0	8	2	2	0	0	
26/10/2022	EMcL	09:00	12:00	1	3	SSW	5	8	1	1	0	0	
				2	3	SSW	0	1	2	2	0	0	
				3	5	SSW	0	1	2	2	0	0	
		12:30	15:30	1	5	SW	0	3	2	2	0	0	
				2	5	SW	0	4	2	2	0	0	
				3	5	SW	0	4	2	2	0	0	
25/11/2022	EMcL	09:50	12:50	1	4	SW	3	8	2	2	0	0	
				2	4	SW	3	8	2	2	0	0	

				3	4	SW	3	8	2	1	0	0	
		13:20	16:20	1	4	SW	3	8	2	1	0	0	
				2	4	SW	3	8	2	1	0	0	
				3	4	SW	2	4	2	2	0	0	
14/12/2022	EMcL	09:40	12:40	1	1	North	0	0	N/A	2	1	0	
				2	1	North	0	0	N/A	2	1	0	
				3	1	North	0	0	N/A	2	1	0	
		13:10	16:10	1	1	North	0	0	N/A	2	1	0	
				2	1	North	0	0	N/A	2	1	0	
				3	1	North	0	0	N/A	2	1	0	
31/01/2023	EMcL	08:05	11:05	1	4	SW	3	7	2	2	0	0	
				2	5	SW	3	7	2	2	0	0	
				3	5	SW	3	6	2	2	0	0	
		11:35	14:35	1	5	SW	3	7	2	2	0	0	
				2	4	SW	3	7	2	2	0	0	
				3	4	SW	3	7	2	2	0	0	
09/02/2023	EMcL	10:15	13:15	1	4	SW	0	8	2	2	0	0	
				2	3	SW	0	7	2	2	0	0	
				3	3	SW	2	7	2	2	0	0	
		13:45	16:45	1	3	SW	2	7	2	2	0	0	
				2	4	SW	2	7	2	2	0	0	
				3	4	SW	2	6	2	2	0	0	
14/03/2023	EMcL	10:00	13:00	1	2	North	2	8	2	1	0	1	
				2	1	North	0	8	2	2	0	1	
				3	1	North	0	8	2	2	0	1	

		13:30	16:30	1	1	North	0	8	2	2	0	1	
				2	1	North	0	4	2	2	0	1	
				3	2	North	0	3	2	2	0	1	
14/04/2023	EMcL	06:45	09:45	1	1	SW	0	3	2	2	0	0	
				2	3	SW	0	4	2	2	0	0	
				3	3	SW	0	4	2	2	0	0	
		10:15	13:15	1	3	SW	0	5	2	2	0	0	
				2	3	SW	0	5	2	2	0	0	
				3	3	SW	0	6	2	2	0	0	
31/05/2023	EMcL	09:10	12:10	1	0	N/A	0	8	1	0	0	0	Low cloud
				2	0	N/A	0	8	1	1	0	0	
				3	0	N/A	0	8	1	2	0	0	
		13:10	16:10	1	0	N/A	0	8	2	2	0	0	
				2	0	N/A	0	8	2	2	0	0	
				3	1	West	0	7	2	2	0	0	
07/06/2023	EMcL	09:55	12:55	1	2	East	0	8	1	2	0	0	
				2	2	East	0	8	2	2	0	0	
				3	2	East	0	8	2	2	0	0	
		13:30	16:30	1	2	East	0	6	2	2	0	0	
				2	3	East	0	2	2	2	0	0	
				3	3	East	0	1	2	2	0	0	
03/07/2023	EMcL	08:20	11:20	1	4	SW	0	6	2	2	0	0	
				2	4	SW	3	6	2	2	0	0	
				3	4	SW	2	6	2	2	0	0	
		11:50	14:50	1	4	West	0	5	2	2	0	0	

				2	4	West	0	5	2	2	0	0	
				3	4	West	0	5	2	2	0	0	
19/08/2023	EMcL	12:50	15:50	1	4	SW	3	8	1	1	0	0	
				2	4	SW	2	8	2	2	0	0	
				3	4	SW	2	8	2	2	0	0	
		09:20	12:20	1	3	SW	2	8	2	2	0	0	
				2	4	SW	3	8	1	1	0	0	
				3	5	SW	3	8	1	1	0	0	

TABLE A3.3: YEAR 2 (2022–23) FAS TIMES AND HOURLY WEATHER CONDITIONS FOR VP3

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
28/09/2022	EMcL	10:45	13:45	1	3	NW	0	5	2	2	0	0	
				2	3	NW	0	7	2	2	0	0	
				3	3	NW	0	7	2	2	0	0	
		14:15	17:15	1	3	NW	0	7	2	2	0	0	
				2	3	NW	0	7	2	2	0	0	
				3	3	NW	2	8	2	2	0	0	
25/10/2022	EMcL	10:05	13:05	1	3	SW	0	7	2	2	0	0	
				2	3	SW	0	6	2	2	0	0	
				3	3	SW	0	7	2	2	0	0	

		13:35	16:35	1	2	SSW	0	5	2	2	0	0	
				2	2	SW	0	4	2	2	0	0	
				3	1	SW	0	5	2	2	0	0	
22/11/2022	EMcL	08:50	11:50	1	2	NE	0	3	2	2	0	0	
				2	1	NE	0	4	2	2	0	0	
				3	1	NE	0	5	2	2	0	0	
		12:20	15:20	1	1	North	0	3	2	2	0	0	
				2	1	North	0	2	2	2	0	0	
				3	1	North	0	2	2	2	0	0	
19/12/2022	EMcL	09:35	12:35	1	3	South	5	8	1	1	0	2	
				2	3	South	3	8	1	1	0	2	
				3	3	South	3	8	1	1	0	2	
		13:05	16:05	1	3	South	2	8	1	1	0	0	
				2	3	South	3	8	1	1	0	0	
				3	2	South	3	8	0	1	0	0	
20/01/2023	EMcL	09:25	12:25	1	0	N/A	0	0	N/A	2	1	0	
				2	0	N/A	0	0	N/A	2	1	0	
				3	0	N/A	0	0	N/A	2	1	0	
		12:55	15:55	1	0	N/A	0	0	N/A	2	1	0	
				2	0	N/A	0	0	N/A	2	1	0	
				3	0	N/A	0	0	N/A	2	1	0	
15/02/2023	EMcL	08:20	11:20	1	3	SW	3	8	2	1	0	0	
				2	3	SW	3	8	2	1	0	0	
				3	3	SW	1	7	2	2	0	0	

		11:50	14:50	1	3	SW	0	8	2	2	0	0	
				2	3	SW	0	8	2	2	0	0	
				3	3	SW	0	8	2	2	0	0	
07/03/2023	EMcL	10:10	13:10	1	2	West	0	0	N/A	2	0	0	
				2	2	West	0	0	N/A	2	0	0	
				3	3	West	0	3	2	2	0	0	
		13:40	16:40	1	2	West	0	3	2	2	0	0	
				2	2	West	2	3	2	2	0	0	Light snow showers
				3	3	West	0	3	2	2	0	0	
03/05/2023	EMcL	09:30	12:30	1	2	East	0	8	2	2	0	0	
				2	2	East	1	8	2	1	0	0	
				3	2	East	2	8	2	1	0	0	
		13:00	16:00	1	2	ENE	1	8	1	1	0	0	
				2	2	ENE	0	8	2	2	0	0	
				3	2	ENE	0	8	2	2	0	0	
26/05/2023	EMcL	09:20	12:20	1	0	N/A	0	8	2	2	0	0	
				2	1	SW	0	7	2	2	0	0	
				3	1	SW	0	7	2	2	0	0	
		12:50	15:50	1	1	SW	0	6	2	2	0	0	
				2	1	SW	0	7	2	2	0	0	
				3	1	SW	0	7	2	2	0	0	
08/06/2023	EMcL	07:15	10:15	1	3	ENE	0	8	2	2	0	0	
				2	3	ENE	0	8	2	2	0	0	

				3	3	ENE	0	8	2	2	0	0	
		10:45	13:45	1	3	East	0	8	2	2	0	0	
				2	4	East	0	8	2	2	0	0	
				3	4	East	0	8	2	2	0	0	
05/07/2023	EMcL	14:15	17:15	1	3	West	0	6	2	2	0	0	
				2	3	West	0	7	2	2	0	0	
				3	3	West	0	7	2	2	0	0	
01/08/2023	EMcL	08:40	11:40	1	2	NE	0	8	1	2	0	0	
				2	2	NE	1	8	0	1	0	0	
				3	2	NE	1	8	0	1	0	0	
28/08/2023	EMcL	06:30	09:30	1	1	West	0	8	2	2	0	0	
				2	2	West	0	7	2	2	0	0	
				3	2	West	0	7	2	2	0	0	
29/08/2023	EMcL	16:10	19:10	1	4	WSW	0	2	2	2	0	0	
				2	3	WSW	0	2	2	2	0	0	
				3	3	WSW	0	2	2	2	0	0	

BREEDING RAPTOR SURVEYS

Full details of the Year 2 (2022-23) Breeding Raptor Surveys, including hourly weather conditions, are presented below in Tables A3.4.

TABLE A3.4: YEAR 2 (2022–23) BREEDING RAPTOR SURVEY TIMES AND HOURLY WEATHER CONDITIONS

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
22/03/2023	EMcL	09:20	15:00	1	7	South	0	7	2	2	0	0	
				2	6	South	2	6	2	2	0	0	
				3	6	South	2	7	2	2	0	0	
				4	5	South	0	6	2	2	0	0	
				5	5	South	0	6	2	2	0	0	
				6	5	South	0	6	2	2	0	0	
27/03/2023	EMcL	10:00	16:00	1	1	South	0	0	N/A	2	1	2	
				2	1	South	0	0	N/A	2	0	2	
				3	1	South	0	0	N/A	2	0	0	
				4	2	South	0	0	N/A	2	0	0	
				5	2	South	0	0	N/A	2	0	0	
				6	2	South	0	0	N/A	2	0	0	
03/04/2023	EMcL	08:45	14:00	1	2	SE	0	2	2	2	0	0	
				2	2	SE	0	1	2	2	0	0	
				3	3	SE	0	1	2	2	0	0	
				4	3	SE	0	2	2	2	0	0	
				5	3	SE	0	2	2	2	0	0	
				6	3	SE	0	2	2	2	0	0	
04/04/2023	EMcL	09:00	15:00	1	2	SE	0	8	2	2	0	0	
				2	2	SE	0	8	2	2	0	0	
				3	2	SE	0	8	2	2	0	0	

				4	2	SE	0	8	2	2	0	0	
				5	2	SE	0	8	2	2	0	0	
				6	2	SE	0	8	2	2	0	0	
17/05/2023	EMcL	12:30	15:15	1	3	East	0	8	2	2	0	0	
				2	3	East	0	8	2	2	0	0	
				3	3	East	0	8	2	2	0	0	
01/06/2023	EMcL	12:30	15:35	1	2	East	0	8	2	2	0	0	
				2	2	East	0	8	2	2	0	0	
				3	3	East	0	7	2	2	0	0	
09/06/2023	EMcL / CC	10:00	15:45	1	3	SW	0	7	2	2	0	0	
				2	3	SW	0	5	2	2	0	0	
				3	3	SW	3	5	2	2	0	0	
				4	3	SW	0	4	2	2	0	0	
				5	3	SW	0	5	2	2	0	0	
				6	3	SW	0	5	2	2	0	0	
03/07/2023	EMcL	15:00	17:45	1	4	West	0	4	2	2	0	0	
				2	4	West	0	4	2	2	0	0	
				3	4	West	0	4	2	2	0	0	
04/07/2023	EMcL	07:50	10:30	1	2	West	1	8	1	2	0	0	
				2	2	West	1	8	1	2	0	0	
				3	2	West	3	8	1	1	0	0	
05/07/2023	EMcL	08:15	14:10	1	2	West	0	6	2	2	0	0	
				2	2	West	0	7	2	2	0	0	
				3	2	West	0	7	2	2	0	0	
				4	2	West	0	7	2	2	0	0	

				5	2	West	0	7	2	2	0	0	
				6	2	West	0	8	2	2	0	0	
01/08/2023	EMcL	12:10	15:00	1	2	NE	0	8	0	2	0	0	
				2	2	NE	0	8	0	2	0	0	
				3	2	NE	0	8	0	2	0	0	

MOORLAND BREEDING BIRD SURVEYS

Full details of the Year 2 (2022-23) MBBS, including hourly weather conditions, are presented below in Tables A3.5.

TABLE A3.5: YEAR 2 (2022–23) MBBS TIMES AND HOURLY WEATHER CONDITIONS

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
03/05/2023	CC	11:30	17:30	1	2	NE	2	8	1	1	0	0	
				2	2	East	0	8	1	1	0	0	
				3	1	East	0	8	1	1	0	0	
				4	1	SE	0	6	1	2	0	0	
				5	2	East	0	5	1	2	0	0	
				6	2	East	0	8	1	2	0	0	
17/05/2023	CC	09:00	18:00	1	1	SW	0	4	2	2	0	0	
				2	2	WSW	0	3	2	2	0	0	
				3	3	WSW	0	3	2	2	0	0	

				4	3	West	0	7	2	2	0	0	
				5	3	West	0	Not recorded	2	2	0	0	
				6	Not recorded								
				7									
				8									
				9									
02/06/2023	CC	10:00	16:00	1	2	East	0	0	N/A	2	0	0	
				2	1	SE	0	0	N/A	2	0	0	
				3	2	East	0	0	N/A	2	0	0	
				4	1	SE	0	0	N/A	2	0	0	
				5	3	East	0	1	2	2	0	0	
				6	3	East	0	1	2	2	0	0	
28/06/2023	CC	08:30	13:30	1	2	SW	1	8	1	1	0	0	
				2	2	WSW	0	8	1	2	0	0	
				3	3	West	1	8	1	1	0	0	
				4	2	West	0	8	1	2	0	0	
				5	2	West	0	8	1	2	0	0	

BLACK GROUSE SURVEYS

Full details of the Year 2 (2022-23) black grouse surveys, including hourly weather conditions, are presented below in Tables A3.6.

TABLE A3.6: YEAR 2 (2022–23) BLACK GROUSE SURVEY TIMES AND HOURLY WEATHER CONDITIONS

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
03/04/2023	EMcL	06:05	08:45	1	1	SE	0	0	N/A	2	0	0	
				2	1	SE	0	0	N/A	2	0	0	
				3	1	SE	0	2	2	2	0	0	
04/04/2023	EMcL	06:15	08:45	1	1	South	0	1	2	2	0	0	
				2	2	South	0	7	2	2	0	0	
				3	2	South	0	7	2	2	0	0	
17/04/2023	EMcL	05:40	08:30	1	2	East	0	0	N/A	2	0	0	
				2	2	East	0	0	N/A	2	0	0	
				3	2	East	0	0	N/A	2	0	0	

APPENDIX D DETAILS OF TARGET SPECIES FLIGHTS

Full details of each target species flight recorded during the Year 2 (2022–23) FAS are presented below in Table A4.1.

The key numbers provided in Table A4.1 allow identification of individual flights, and correspond with the numbers shown on Figures 5–7, Appendix 1

TABLE A4.1 DETAILS OF EACH TARGET SPECIES FLIGHT RECORDED DURING THE YEAR 2 (2022-23) FAS, LISTED BY SPECIES

Species	Date	VP	Flight start time	Flight duration (seconds)	Minimum no. of birds	Key number	Notes
Greylag goose	13/01/2023	1	09:10	90	1	259	
Greylag goose	13/01/2023	1	09:20	159	2	260	
Greylag goose	13/01/2023	1	10:38	60	1	261	
Greylag goose	13/01/2023	1	10:52	40	1	263	
Graylag goose	31/01/2023	2	09:15	15	2	268	
Greylag goose	31/01/2023	2	09:26	20	8	269	
Greylag goose	28/02/2023	1	09:22	125	1	272	
Greylag goose	28/02/2023	1	10:10	70	2	274	
Greylag goose	28/02/2023	1	10:50	15	1	275	
Greylag goose	28/02/2023	1	14:25	40	2	282	
Greylag goose	05/03/2023	3	11:20	75	2	302	
Greylag goose	14/04/2023	2	07:50	25	2	298	

Greylag goose	14/04/2023	2	09:25	30	2	299	
Greylag goose	14/04/2023	2	11:47	25	2	300	
Greylag goose	01/06/2023	1	10:15	115	2	307	
Greylag goose	03/07/2023	3	10:35	168	8	287	
Greylag goose	03/07/2023	3	10:35	125	10	288	
Greylag goose	03/07/2023	3	11:50	40	3	289	
Greylag goose	03/07/2023	3	11:50	75	2	290	
Greylag goose	03/07/2023	3	14:20	30	2	291	
Greylag goose	03/07/2023	3	15:15	65	4	292	
Greylag goose	03/07/2023	3	15:18	60	4	293	
Greylag goose	06/08/2023	3	08:50	45	1	339	
Pink-footed goose	27/09/2022	2	15:44	95	30	213	
Pink-footed goose	29/09/2022	1	09:32	60	55	215	
Pink-footed goose	29/09/2022	1	13:50	250	75	218	
Teal	29/09/2022	1	10:35	15	2	216	
Teal	29/09/2022	1	11:30	10	1	217	
Teal	29/09/2022	1	15:05	10	2	220	
Teal	31/10/2022	1	09:22	15	6	223	

Pochard	31/10/2022	1	13:35	15	4	225	
Tufted duck	29/09/2022	1	13:20	20	5	219	
Tufted duck	29/09/2022	1	15:25	10	1	221	
Tufted duck	31/10/2022	1	12:32	25	5	224	
Goldeneye	13/01/2023	1	10:45	15	1	262	
Goldeneye	13/01/2023	1	11:03	35	2	264	
Goldeneye	13/01/2023	1	12:37	85	1	265	
Goldeneye	13/01/2023	1	13:50	30	2	266	
Goldeneye	13/01/2023	1	14:53	30	3	267	
Goldeneye	28/02/2023	1	10:53	10	2	276	
Goldeneye	28/02/2023	1	11:57	20	1	279	
Goldeneye	17/03/2023	1	10:24	25	1	283	
Goldeneye	17/03/2023	1	14:35	10	1	286	
Goosander	28/02/2023	1	10:59	10	2	277	Male and female
Curlew	07/03/2023	1	11:39	125	1	284	
Curlew	05/04/2023	1	14:40	120	1	297	
Osprey	05/04/2023	1	11:38	190	1	295	
Osprey	05/04/2023	1	12:15	640	1	296	

Osprey	03/05/2023	1	09:42	190	1	301	
Osprey	07/05/2023	3	14:32	65	1	365	With fish
Osprey	17/05/2023	1	09:35	400	1	303	
Osprey	17/05/2023	1	09:45	136	1	304	
Osprey	17/05/2023	1	10:13	30	1	305	Wish fish
Osprey	31/05/2023	2	16:02	180	1	314	
Osprey	31/05/2023	2	11:44	120	1	315	With fish
Osprey	01/06/2023	1	09:40	810	1	306	Shallow display / dives and calling
Osprey	01/06/2023	1	10:08	360	1	308	
Osprey	01/06/2023	1	11:03	250	1	309	
Osprey	01/06/2023	1	11:09	120	1	310	
Osprey	01/06/2023	1	11:19	355	2	311	
Osprey	01/06/2023	1	11:30	430	2	312	
Osprey	01/06/2023	1	11:53	90	1	313	
Osprey	29/06/2023	1	09:00	25	1	316	
Osprey	29/06/2023	1	09:04	190	1	317	
Osprey	29/06/2023	1	09:14	390	1	318	
Osprey	29/06/2023	1	10:24	35	1	319	With fish

Osprey	29/06/2023	1	11:04	270	1	320	
Osprey	29/06/2023	1	11:12	180	1	321	
Osprey	29/06/2023	1	12:32	960	1	322	
Osprey	29/06/2023	1	12:32	610	1	323	
Osprey	29/06/2023	1	12:40	45	1	324	
Osprey	29/06/2023	1	12:43	300	1	325	
Osprey	29/06/2023	1	13:15	25	1	326	
Osprey	29/06/2023	1	13:11	316	1	327	
Osprey	29/06/2023	1	13:31	240	1	328	
Osprey	29/06/2023	1	13:31	135	1	329	
Osprey	29/06/2023	1	13:49	330	1	330	
Osprey	29/06/2023	1	14:28	606	1	331	
Osprey	03/07/2023	2	10:45	95	1	363	
Osprey	03/07/2023	2	10:45	95	1	364	
Osprey	06/07/2023	2	10:35	120	1	332	
Osprey	06/07/2023	2	11:04	120	1	333	
Osprey	06/07/2023	2	11:04	150	1	334	
Osprey	06/07/2023	2	11:04	270	1	335	

Osprey	06/07/2023	2	12:28	165	1	336	
Osprey	06/07/2023	2	12:34	320	2	337	
Osprey	06/07/2023	3	08:35	180	1	338	
Osprey	07/07/2023	1	08:14	212	1	342	Calling and stooping, display for first minute
Osprey	07/07/2023	1	08:25	225	1	343	
Osprey	07/07/2023	1	08:32	85	1	344	
Osprey	07/07/2023	1	08:32	945	1	345	
Osprey	07/07/2023	1	09:48	564	1	346	
Osprey	07/07/2023	1	10:28	330	1	347	Calling / alarming for first minute
Osprey	07/07/2023	1	10:45	225	1	348	
Osprey	07/07/2023	1	10:52	735	1	349	Calling for first 2/3 minutes. High pitched loud 'chipp'
Osprey	07/07/2023	1	11:48	530	2	350	
Osprey	07/07/2023	1	11:48	125	1	351	
Osprey	07/07/2023	1	12:10	440	1	352	
Osprey	07/07/2023	1	12:13	120	1	353	
Osprey	07/07/2023	1	12:18	765	1	354	
Osprey	07/07/2023	1	12:47	435	1	355	

Osprey	07/07/2023	1	12:53	135	1	356	
Osprey	07/07/2023	1	13:06	1290	1	357	Made 3 or 4 attempts to catch fish
Osprey	07/07/2023	1	13:24	270	1	358	Calling 'chirp'
Osprey	07/07/2023	1	13:54	415	1	359	
Osprey	07/07/2023	1	14:06	250	1	360	
Osprey	07/07/2023	1	14:08	110	1	361	
Osprey	07/07/2023	1	14:24	210	2	362	
Osprey	06/08/2023	3	11:20	180	1	340	Wish fish
Osprey	06/08/2023	3	11:45	35	1	341	
Osprey	27/08/2023	1	10:00	390	1	368	
Osprey	27/08/2023	1	10:00	420	1	369	
Osprey	27/08/2023	1	12:24	270	2	370	Adult and juvenile
Osprey	27/08/2023	1	12:29	375	1	371	
Osprey	27/08/2023	1	12:50	310	1	372	
Osprey	27/08/2023	1	12:59	315	1	373	
Osprey	27/08/2023	1	13:08	150	2	374	Adult and juvenile
Osprey	27/08/2023	1	13:33	385	1	377	Caught fish
Osprey	27/08/2023	1	13:58	30	1	378	Caught fish

Osprey	27/08/2023	1	14:26	270	1	380	
Osprey	27/08/2023	1	14:40	585	1	381	
Goshawk	25/10/2022	3	16:01	65	1	222	
Marsh harrier	29/08/2022	3	16:55	53	1	366	Juvenile
Marsh harrier	29/08/2022	3	16:55	540	1	367	Juvenile
Red Kite	28/09/2022	3	12:09	230	1	214	
Red Kite	15/02/2023	3	13:08	420	1	270	
Red Kite	15/02/2023	3	13:09	300	1	271	
Red Kite	28/02/2023	1	09:40	525	1	273	
Red Kite	28/02/2023	1	11:35	300	1	278	
Red Kite	28/02/2023	1	12:50	360	1	280	Possibly nest searching?
Red Kite	28/02/2023	1	13:55	520	2	281	Possibly pair bonding?
Merlin	03/07/2023	3	15:30	35	1	294	
Peregrine	17/03/2023	1	12:05	250	1	285	

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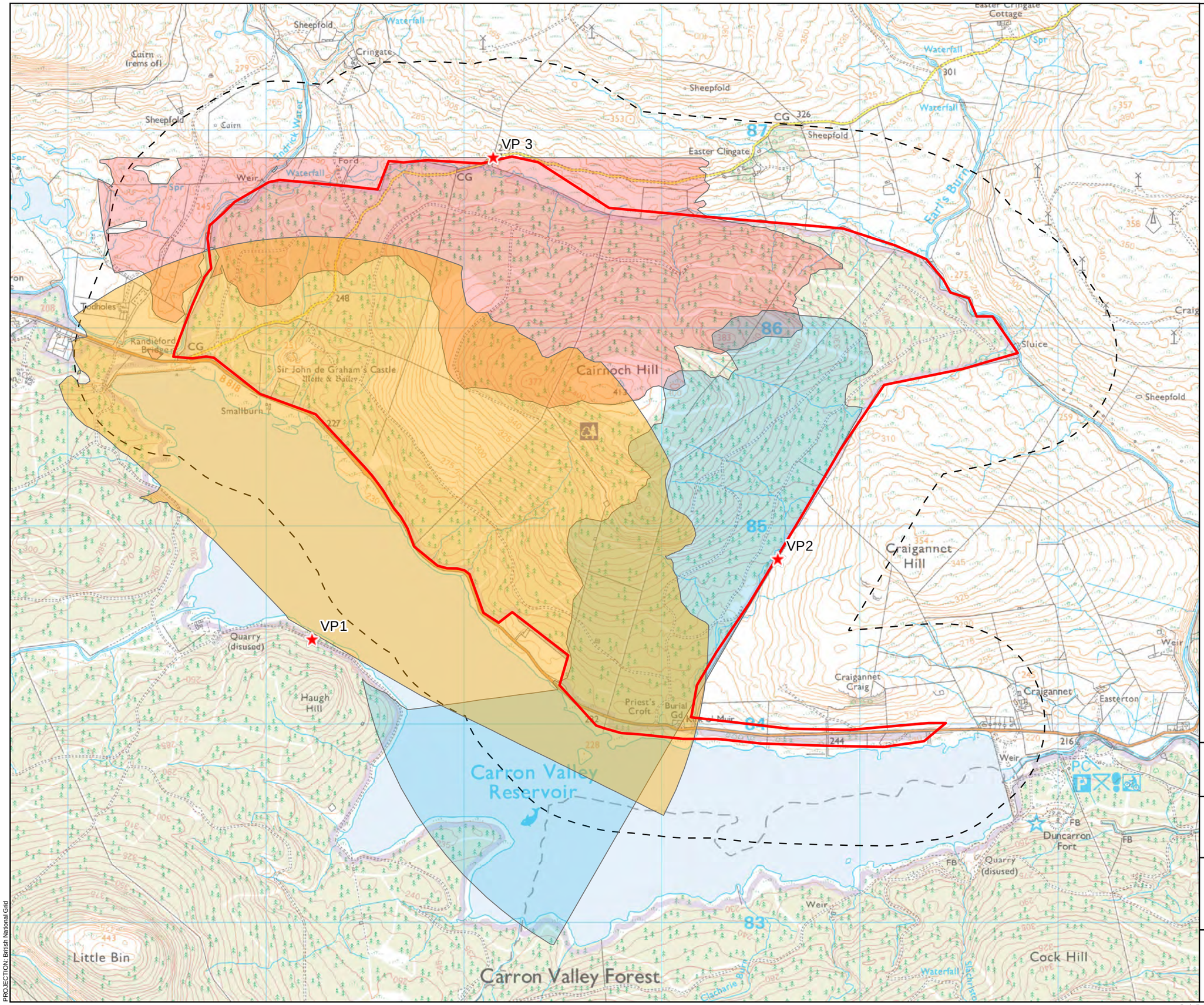
Figure 1
Site Boundary

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VP viewsheds have been calculated assuming a lowest rotor swept height of 20 m.

0 200 400 600
Metres

N

SCALE: See Scale Bar	VERSION: A01
SIZE: A3	DRAWN: RW
PROJECT: 0669621	CHECKED: WS
DATE: 06/02/2024	APPROVED: MS

Figure 2
Vantage Point Locations and Viewsheds

ERM

PROJECTION: British National Grid

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Path: \\uksprdgisfs01\Data\Arcus\Projects\0669621 - Carron Valley\0669621 - Carron Valley.aprx

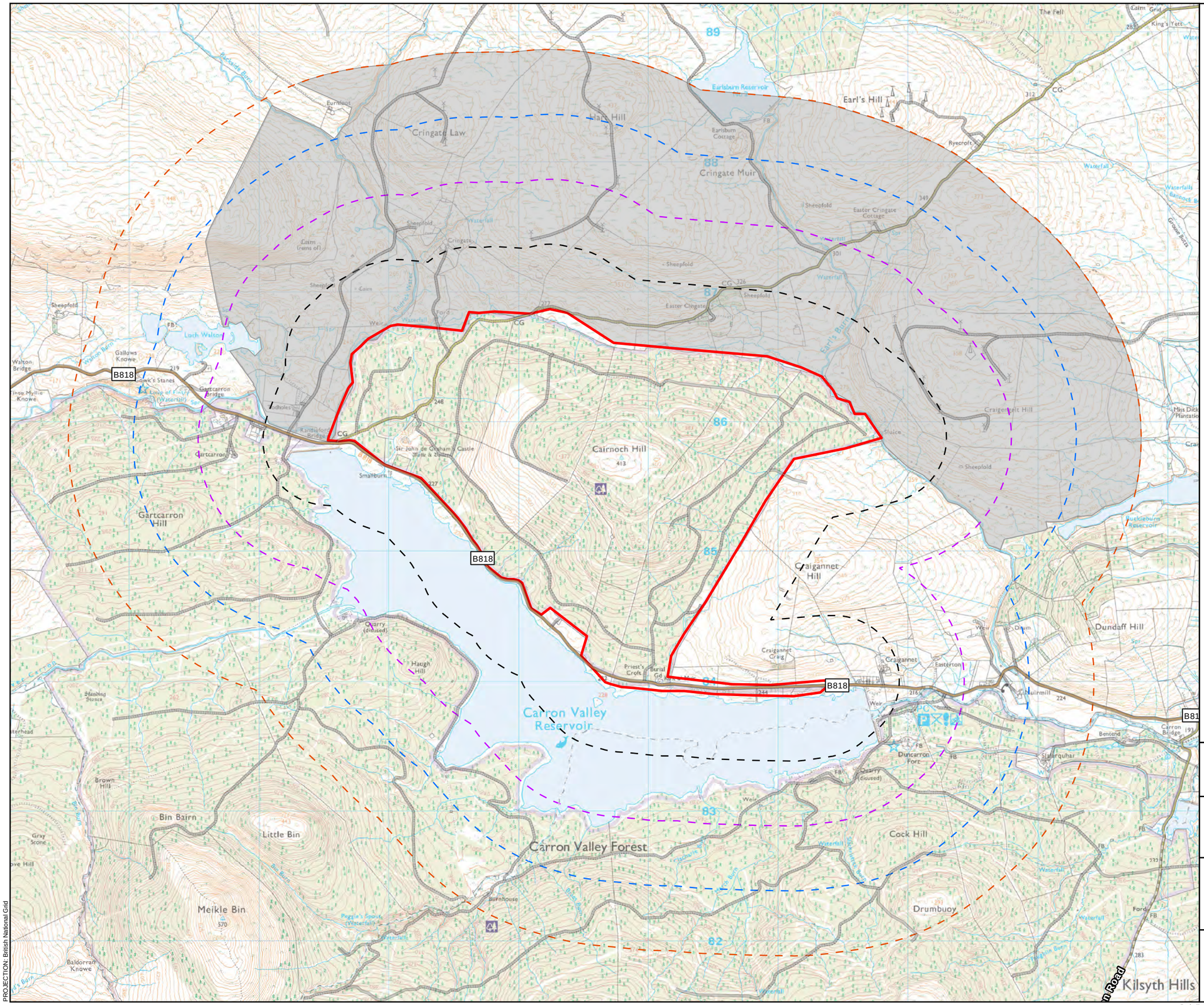


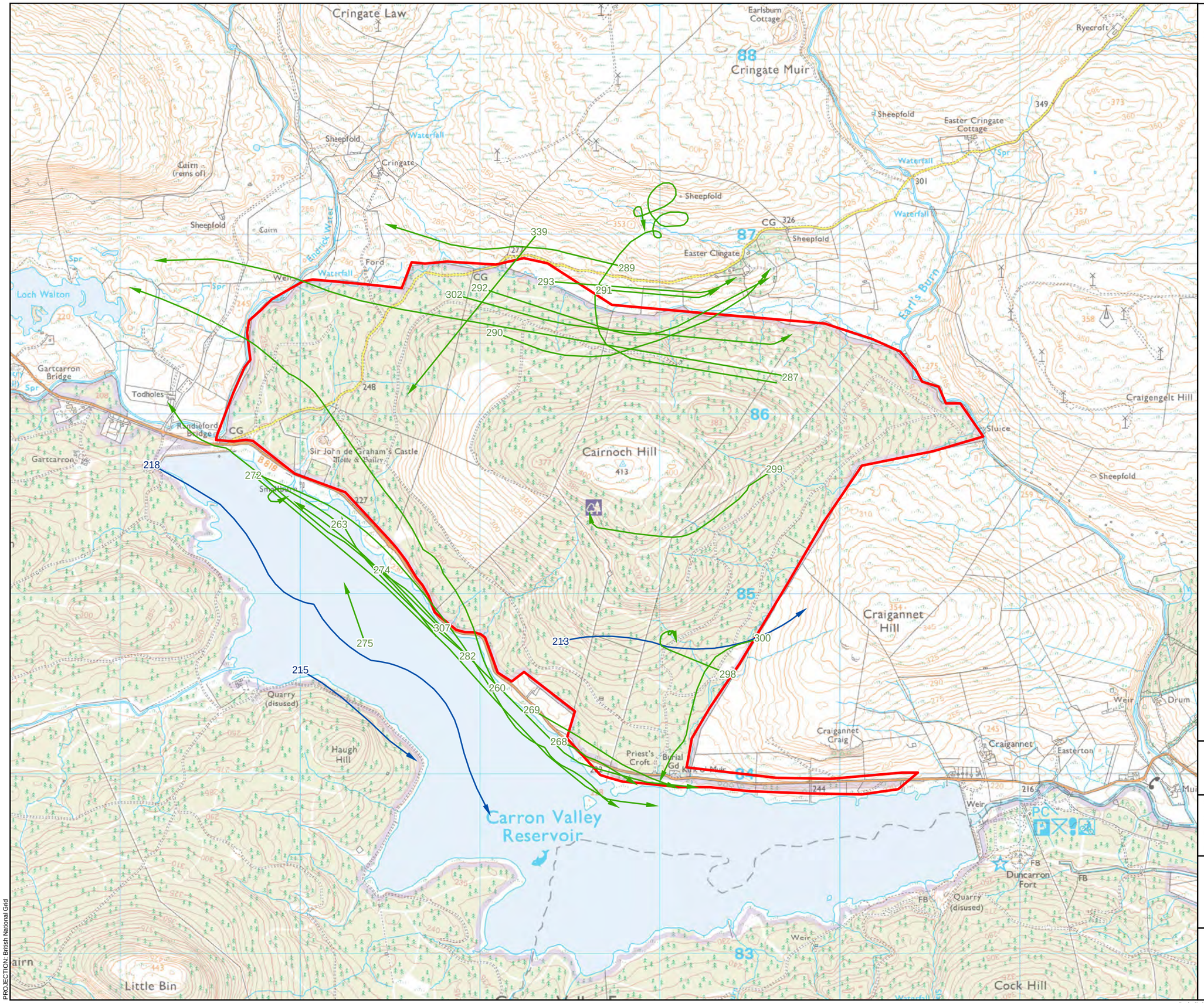
Figure 3
Ornithology Survey Areas

ERM

PROJECTION: British National Grid

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0 200 400 600
Metres

N

SCALE: See Scale Bar	VERSION: A01
SIZE: A3	DRAWN: RW
PROJECT: 0669621	CHECKED: WS
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Figure 4
Target Species Flights - Greylag and Pink-footed Goose

ERM

PROJECTION: British National Grid

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Site Boundary

SPECIES

- Curlew
- Goldeneye
- Goosander
- Pochard
- Teal
- Tufted Duck

0 200 400 600

Metres

N

SCALE: See Scale Bar	VERSION: A01
SIZE: A3	DRAWN: RW
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DATE: 06/02/2024	APPROVED: MS

Figure 5
Target Species Flights - Duck Species and Curlew

ERM

PROJECTION: British National Grid

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Site Boundary

SPECIES

Osprey

0 200 400 600

Metres

N

SCALE: See Scale Bar	VERSION: A01
SIZE: A3	DRAWN: RW
PROJECT: 0669621	CHECKED: WS
DATE: 06/02/2024	APPROVED: MS

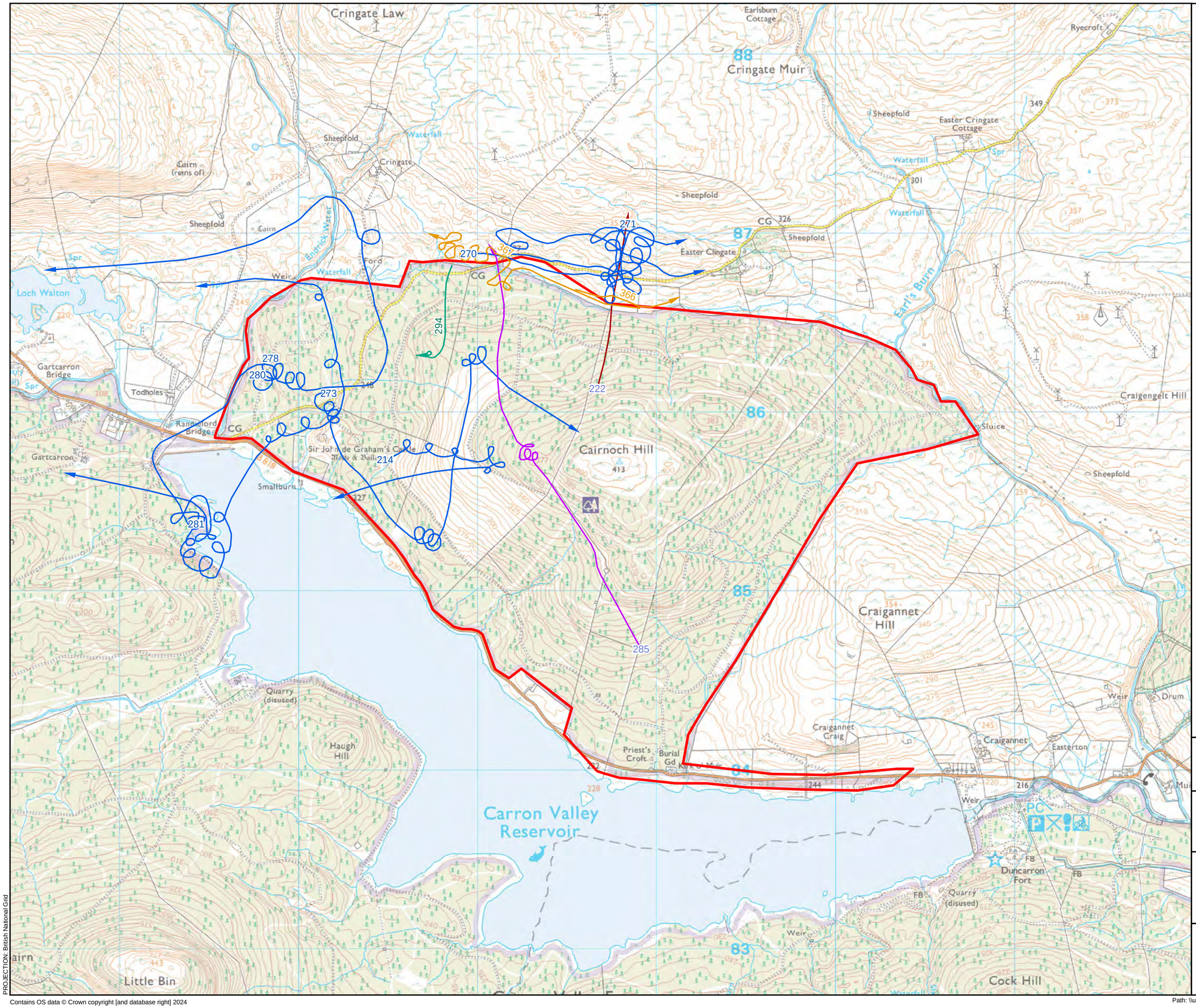
Figure 6
Target Species Flights - Osprey

ERM

PROJECTION: British National Grid

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Site Boundary

SPECIES

- Goshawk
- Marsh Harrier
- Merlin
- Peregrine
- Red Kite

0 200 400 600

Metres

N

SCALE: See Scale Bar	VERSION: A01
SIZE: A3	DRAWN: RW
PROJECT: 0669621	CHECKED: WS
DATE: 06/02/2024	APPROVED: MS

Figure 7
Target Species Flights - Other Raptor Species

ERM

PROJECTION: British National Grid

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Site Boundary

Moorland Breeding Bird Survey Area (500 m Buffer of Site Boundary)

MBBS Results

CU Curlew

SN Snipe

0 250 500 750

Metres

N

SCALE: See Scale Bar	VERSION: A01
SIZE: A3	DRAWN: RW
PROJECT: 0669621	CHECKED: WS
DATE: 06/02/2024	APPROVED: MS

Figure 8
Breeding Wader Territories

ERM

PROJECTION: British National Grid

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Site Boundary

Results

BZ

TO

Breeding Goshawk and Barn Owl Survey Area (1 km Buffer of Site Boundary)

Breeding Raptor Survey Area (2 km Buffer of Site Boundary)

0 250 500 750 1,000

Metres

N

SCALE: See Scale Bar	VERSION: A01
SIZE: A3	DRAWN: RW
PROJECT: 0669621	CHECKED: WS
DATE: 06/02/2024	APPROVED: MS

Figure 9
Breeding Secondary Raptor Territories

ERM

PROJECTION: British National Grid

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Eurowind Energy Limited

Cairnoch Hill Wind Farm:

Collision Risk Modelling Report

Technical Appendix 9.3

Billy Gardener, Evie Underwood, Matt Rea

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Date of issue: **June 2026**

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Revision and Amendment Register

Version Number	Date	Section(s)	Page(s)	Summary of Changes	Approved by
0.1	22/05/2026	All	All	First Draft	EU
0.2	10/06/2026	All	All	Amends	BG
0.3	11/06/2026	All	All	Internal Review	MR
1.0	12/06/2026	All	All	For Issue	MD
1.1	19/06/2026	All	All	Client Review	DM/AS
2.0	22/06/2026	All	All	Finalisation	BG

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Glossary

Term	Definition
Avoidance rate	It is acknowledged that birds take avoiding action when flying in the vicinity of turbines, either macro-avoidance (avoidance of an entire wind farm) or micro-avoidance (avoidance of individual turbines). To account for this an 'avoidance rate' is applied, based on guidance, to correct predicted collisions for each species.
Collision Risk Modelling	Collision Risk Modelling (CRM) is the process for predicting avian collisions likely to arise during the operational phase of the Proposed Development.
Collision Risk Zone	The Collision Risk Zone is the area extending to a radius equal to the rotor length plus 500 m from each turbine. A flight which is within this zone (even if only partially) is considered at risk of collision.
Potential Collision Height	A flight which is at Potential Collision Height is one which is between the lowest and highest extent of a turbine rotor.
Vantage Point	A location from which Flight Activity Surveys were undertaken to determine flight activity.
Viewshed	The visible area at the lowest rotor swept height of a turbine model within a 2 km, 180° arc from a Vantage Point.

Executive Summary

This Collision Risk Modelling (CRM) Report details the methodology and results for CRM undertaken for the proposed Cairnoch Hill Wind Farm. CRM has been undertaken following NatureScot (Band, 2024) guidance to predict collisions associated with the operational phase of the Proposed Development and inform the impact assessment undertaken within the Environmental Impact Assessment.

CRM has been undertaken for target species which were present at sufficient levels to allow for robust modelling, using APEM's professional judgement. Species scoped into the CRM were: greylag goose, pink-footed goose and osprey. CRM was undertaken based upon the parameters provided for one turbine model (Vestas V162).

The results generated from this approach predict less than one greylag goose per annum (0.01 collisions during the breeding season and 0.06 collisions during the non-breeding season), less than one pink-footed goose per annum (<0.01 collisions during the non-breeding season exclusively) and 3 osprey per annum (2.57 collisions, all during the breeding season).

Additional CRM was undertaken for osprey to determine the potential reduction in collision risk following the implementation of mitigation. This would involve the felling of an existing nest and installation of osprey platforms further from turbines, which would result in a reduction in flight activity and associated collision risk. The mitigation and enhancement are detailed in full within the EIA chapter and appendices. This scenario assumes relocation of the nest to south of the loch and was modelled by removing flights likely associated with the breeding pair from the dataset. Resulting CRM predicts a single osprey collision per annum (0.98 during the breeding season exclusively). This equates to approximately 39 birds across the operational lifespan of the wind farm.

1. Introduction

APEM Ltd (APEM) was commissioned by Eurowind Energy Limited (the Applicant) to undertake the Ornithology aspects of the Environmental Impact Assessment (EIA) for the proposed Cairnoch Hill Wind Farm (hereafter referred to as 'the Proposed Development'). To support the impact assessment, Collision Risk Modelling (CRM) has been undertaken to determine the predicted collision mortality for Important Ornithological Features (IOFs) during the operational lifespan of the Proposed Development using data collected during Flight Activity Surveys (FAS) undertaken between 2021-2023.

Predicted collisions have been calculated for a 4-turbine layout using a single candidate turbine model. Turbine parameters, provided as a range and used for modelling have been supplied to APEM by the Applicant. This report is a Technical Appendix to support the Ornithology Chapter of the EIA Report.

2. Methodology

CRM was undertaken following the latest NatureScot guidance (Band, 2024). FAS used to inform the CRM were undertaken in line with NatureScot (20217[1]) guidance on recommended survey methods for onshore wind farms. CRM has been undertaken within the Collision Risk Zone (CRZ), defined in accordance with NatureScot (2025b) guidance as the area extending to a radius equal to the rotor length plus 500 m from each turbine. Based on the chosen turbine model for the Proposed Development (**Table 2**), the CRZ is defined as a 581 m buffer surrounding the turbines. Species recorded within the CRZ were taken forward for CRM where survey data indicated flight activity was sufficient to support robust modelling and there was potentially significant collision risk, based on APEM's professional judgement.

Table 2 outlines the target species recorded during FAS within the CRZ and outlines species which have been scoped in or out of CRM.

As surveys were undertaken in line with NatureScot (2017) guidance, gull species were not considered as target species. It is acknowledged that guidance has since been updated in 2025 and that gull species are currently treated as target species

[1] Updated guidance was released in 2025 however this was after surveys were concluded.

CRM estimates the number of collisions through a process of six stages:

- Stage A establishes the density of flying birds within the CRZ, and the proportion of birds that are flying at potential collision risk height;
- Stage B estimates the potential number of bird passages through rotors in the relevant season, based on density and the available hours during each season;
- Stage C determines the collision probability during a single bird rotor transit;
- Stage D considers the proportion of time in which the turbines are not in operation;
- Stage E takes into consideration the likely proportion of birds avoiding either the wind farm or its turbines; and
- Stage F considers potential uncertainties and an estimate of error in the number of predicted collisions.

Table 1. Summary of Target Species Flights Recorded During FAS within the CRZ

Species	Conservation Status and Legal Protection*	Number of flights during Year 1 surveys	Number of flights during Year 2 surveys	No. of birds per flight	Include in CRM?
Curlew	Red, SBL	3	0	1-2	No – Insufficient records available for a robust assessment of collisions risk. The very low number of flights across the two survey years indicate that collision risk for this species is negligible.
Goshawk	Green, Schedule 1	3	1	1	No – Insufficient records available for a robust assessment of collisions risk. The very low number of flights across the two survey years indicate that collision risk for this species is negligible.
Great crested grebe	Green	1	0	1	No – Insufficient records available for a robust assessment of collisions risk. The very low number of flights across the two survey years indicate that collision risk for this species is negligible.
Greylag goose	Amber, Schedule 1 (Outer Hebrides, Caithness, Sutherland, and Wester Ross only)	11	6	1-9	**Yes – species recorded frequently within the CRZ and is amber-listed.**
Merlin	Red, Schedule 1	0	1	1	No – Insufficient records available for a robust assessment of collisions risk. The very low number of flights across the two survey years indicate that collision risk for this species is negligible.
Osprey	Amber, Schedule 1, Annex 1, SBL	57	25	1-4	**Yes – Species recorded frequently within the CRZ and is amber listed, on Schedule 1, Annex I and the SBL.**
Peregrine	Green, Schedule 1, Annex 1, SBL	1	1	1	No – Insufficient records available for a robust assessment of collisions risk. The very low number of flights across the two survey years indicate that collision risk for this species is negligible.
Pink-footed goose	Amber	2	1	12-38	**Yes – species recorded occasionally in large flocks within the CRZ and is amber-listed.**

Species	Conservation Status and Legal Protection*	Number of flights during Year 1 surveys	Number of flights during Year 2 surveys	No. of birds per flight	Include in CRM?
Red kite	Green, Schedule 1, Annex 1, SBL	3	4	1-2	No – Insufficient records available for a robust assessment of collisions risk. The very low number of flights across the two survey years indicate that collision risk for this species is negligible.
Total		81	39		
* Schedule 1: listed on Schedule 1 of the Wildlife and Countryside Act 1981, Annex 1: listed on Annex I of the Bird's Directive, Red/Amber/Green: Birds of Conservation Concern 5 (BoCC5) Classification (Stanbury et al., 2021), and SBL: listed on the Scottish Biodiversity List (2013).					

2.1 Stage A- Flight activity

Stage A estimates the number of flights that may potentially be at risk of turbine collision in the absence of the displacement of birds, birds taking other avoidance actions, or birds being attracted towards the wind farm.

In the case of non-directional flights, there are two key parameters derived from survey observations that are needed in order describe the magnitude of flight activity:

- Areal bird density (D_A); and
- Proportion of birds flying at risk height (Q_{2R})

Areal bird density (D_A) is defined as the number of birds in flight, at any height, at a particular time, per unit area (typically per square kilometre, km^2). To calculate D_A, bird occupancy is converted to bird density (per m^2) by dividing by the area watched from each VP viewshed. The flight activity during VP watches is recorded in bird seconds, a unit that captures both abundance and duration of flight and is particularly appropriate where bird numbers are low:

$$D_A = \frac{b}{(t \times A) birds\ m^2}$$

Where b is the number of target species flight seconds recorded from a VP; t is the duration (in seconds) of all VP watches during either a month, season or year and A is the area of the VP viewshed (km^2).

D_A is calculated for each VP separately, with the figure subsequently averaged. However, where there exists a considerable difference in the time and/or area that is covered by relevant VP surveys the average figure should be weighted appropriately. Thus, the weighting factor used acknowledges that the quantity of data collected in a watch is proportional both to the size of the area observed and the duration of the VP watch:

$$Mean\ density\ D_A = \frac{\sum \frac{b_i \sqrt{t_i \times A_i}}{t_i \times A_i}}{\sum \sqrt{t_i \times A_i}}$$

In the case of conditions where a VP viewshed results in a significant difference in mean density D_A (for example, due to a difference in underlying habitat), the bird density should then either be calculated separately for each individual VP site and then applied to determine the likely collision risk within that area. Alternatively, a turbine-weighted average bird density should be employed instead, i.e. the bird density for each VP should be weighted by the number of turbines present within that viewshed. In this case, the average areal bird density ($D_{average}$) was estimated using the following:

$$D_{average} = \frac{\sum N_i \times D_i}{\sum N_i}$$

Where D_i is the areal bird density within the VP viewshed (i), N_i is the number of turbines to be sited in that VP viewshed; and $D_{average}$ is the average areal bird density.

The definition of **proportion of birds flying at risk height (Q_{2R})** is the proportion of birds present between the lowest and highest points of a rotor, measured relative to the rotor base. In cases where flights are only recorded in the rotor swept height band, Q_{2R} will be 100%.

2.1.1 Daylight hours and nocturnal activity

Bird surveys are generally undertaken diurnally, with recorded levels of flight activity assumed to be representative of flight activity across all daylight hours. Daylight hours depend on the wind farm site's latitude and the time of year. Daylight and night hours per month are provided within the NatureScot CRM spreadsheet when the latitude of a particular site is inputted. The latitude of the wind farm site is 6.05 North.

Calculations used in the collision model account for collision risk associated with diurnal and nocturnal flights. Diurnal activity is based on the flight activity recorded for each target species during field surveys while nocturnal flight activity is assumed based on diurnal flight activity, and professional judgement regarding the likely levels of nocturnal activity for each target species.

Levels of nocturnal activity by all target species were estimated, using a one to five scale to approximate nocturnal flight (with a score of one equal to 0% nocturnal activity, two equal to 25% of diurnal activity, three equal to 50% of diurnal activity, four equal to 75% of diurnal activity and five whereby nocturnal activity is equal to diurnal activity, see **Table 3**). It should be noted that for truly nocturnal species, this will underestimate nocturnal flight activity, which will be >100% of diurnal activity.

2.2 Stage B- Estimating number of bird flights through rotors

Stage B considers the available figures for bird density (D_A), the proportion of risk height flights (Q_{2R}), the nocturnal activity factor (f_{night}), and the figures for monthly daylight and night hours calculated at **Stage A-** Flight activity**.** In order to estimate the number of birds flying through rotors, the model considers the number of turbines, the turbine rotor radius and the flight speed of the target species. For flight speed, a typical mean flight speed is selected based on standard key literature, acknowledging that flight speed (and thus collision risk) will vary depending on bird behaviour (commuting, migration, foraging etc):

$$Number\ of\ transits = v\left(\frac{D_{average} \times Q_{2R}}{2R}\right) \times (T\pi R2) \times \left(t_{day}\, f_{night} t_{night}\right)$$

Where v is bird speed, relative to the ground (m sec^{-1}), $D_{average}$ is the average areal bird density (Birds m^2), Q_{2R} is the proportion of birds flying at risk height (%), R is the length of the rotor blades, from axis to tip (m), T is the number of turbines, $f_{night}$is the nocturnal activity factor; and t_{day} and t_{night} are daylight and night time hours respectively, across a year.

2.3 Stage C- Probability of collision for a single rotor transit

Stage C utilises information on turbine dimensions and rotor speed (Ω), as well bird biometrics to calculate the collision risk for birds flying through a turbine rotor. Upwind flights have a greater collision risk than downwind flights, and an assumption is made that the proportion of upwind and downwind flights

The probability of collision during a rotor transit is calculated by assessing collision risk at various positions across the rotor disc, using increments of radial distance from r/R=0.05 out to r/R=1, and angular intervals (ϕ) of 10 degrees. The model calculates the collision probability at each combination of radius and angle, then averages these values across the entire area of the rotor disc to generate the average collision risk for a passage at any given point across the rotor.

The calculation should be carried out using a mean operational turbine speed. Preferably, the mean speed utilised in the calculation should be measured over time using an analysis of available wind data to determine the likely frequency distribution of turbine speeds. However, in cases where this is not available, the speed used should be based on the most likely value as anticipated by the wind farm developer.

Table 2: Turbine data

Symbol	Description	Units	Turbine Model (V162)
B	Number of blades	-	3
-	Hub height	m	99
R	Rotor radius	m	81
-	Minimum swept height	m	18
-	Maximum swept height	m	180.0
C	Maximum blade width	m	4.5
Γ	Average blade pitch*	°	7.5
Ω	Average rotation speed	rpm	8.2
-	Average rotational period	s	7.31

Table 3: Bird data and avoidance rates for target species

Target species	Bird length* (m)	Wingspan* (m)	Flight speed** (m/s)	Avoidance rate***	Breeding season****	Non-breeding season*****	Nocturnal factor
Greylag goose	0.825	1.65	12	0.998	April to mid-August	Mid-August to March	3
Pink-footed goose	0.685	1.5	16.9	0.998	April to mid-August	Mid-August to March	3
Osprey	0.56	1.58	10.6	0.98	April to mid-August	Mid-August to March	2
*Species biometrics are taken from Snow *et al*. (1998) **Species flight speeds are taken from Alerstam *et al*. (2007), Bruderer & Bolt (2001) and Provan & Whitfield (2006)							

Target species	Bird length* (m)	Wingspan* (m)	Flight speed** (m/s)	Avoidance rate***	Breeding season****	Non-breeding season*****	Nocturnal factor
***Species avoidance rates are taken from NatureScot (2025a). ****The breeding season for each species is taken from NatureScot guidance (SNH, 2014b). All dates are inclusive. *****Non-breeding seasons are the remaining months of the year.							

2.4 Stage D- Multiplying to yield expected collisions per year

In this stage, the output from Stage B (number of potential transits through rotors) is multiplied by the output of Stage C (collision risk for a single rotor transit) to yield the projected number of bird collisions per month or year.

However, allowance must first be made for the proportion of time that rotors are not operational due to turbine idleness. The non-operational factor (Q_{op}) has been provided by the Applicant based on wind modelling. The single transit risk is multiplied by the factor Q_{op} to allow for the proportion of time that the wind turbines are operational. This is before considering avoidance behaviour, which is Stage E.

2.5 Stage E- Applying the avoidance rate

The preceding stages of the model operate on the assumption that birds will not undertake any avoidance action in response to the presence of wind turbines. However, it is accepted that birds do take avoidance action (macro, meso or micro avoidance) based on the results of considerable studies and that avoidance differs between species.

The potential collision mortality, for each month and for a year, after avoidance was calculated using a range of assumed avoidance rates of 95%, 98%, 99% and 99.5%, as well as the recommended avoidance rate for each species if this differs from those listed.

2.6 Stage F- Expressing uncertainty

Within the NatureScot (Band, 2024) guidance, it states that within the CRM there are sources of variability or uncertainty, which should be considered when determining the accuracy of predicted collisions. It is acknowledged that there are various sources of potential error which include inaccuracies when recording flight data, uncertainty over nocturnal flight activity and limitations and assumptions within the collision model.

However, potential error was limited as much as possible through the use of experienced surveyors familiar with the NatureScot (2017) survey guidance, who undertook baseline

surveys in accordance with guidance, while the CRM has been undertaken in line with NatureScot (Band, 2024) guidance. Although there is the potential for some error in the predicted collisions, it is considered that this has been minimised as far as possible, and that the results should be considered a best estimate based on current guidance. As it is not possible to quantify the level of uncertainty in the results, this has not been considered further.

3. Collision Risk Modelling Results

All Vantage Point (VP) locations used during surveys were consistent throughout the two-year survey period. Viewshed analysis was undertaken for each VP, to determine the spatial coverage. Viewshed analysis was performed using a surface offset equal to the minimum rotor swept height for the proposed turbine model, which mapped visible airspace available to surveyors at the lowest potential collision height.

Spatial coverage of the viewsheds within the CRZ is presented in **Table 4.**

Table 4. Spatial coverage of VPs

Vantage Point	Viewshed coverage within the CRZ at 18 m (km^2)
VP1	1.775
VP2	0.800
VP3	0.666
Total of viewshed areas	3.241
Percentage coverage of CRZ by combined viewsheds	82.7%

3.1 Stage A – Flight Activity

3.1.1 Bird density

FAS were undertaken over two years covering two breeding and two non-breeding seasons between September 2021 to August 2023 from three VPs which covered the CRZ. The surveys achieved 82.7% coverage of the CRZ at a height of 18 m, which is the lowest rotor swept height of the proposed turbine model.

VP watches were undertaken for a minimum of 36 hours during each breeding and non-breeding season as detailed in **Technical Appendix 9.1.** All flights of target species were recorded during each watch period, yielding total flying time in bird-seconds throughout the watch. Flying time was divided by the period of the watch (in seconds) and the area watched to give the average density of birds in flight per square kilometre.

The mean density (DA) for each species during the non-breeding and breeding seasons is detailed in **Table 5.**

An active osprey nest is located close to turbines, and it is considered that a substantial proportion of flights recorded through the CRZ are attributed to the breeding pair associated with this nest. As part of the mitigation put forth for the Proposed Development, is it proposed that this nest is removed and that alternative nesting platforms are installed to the south of the loch, details of which can be found in **Technical Appendix 8.6.** This is intended to encourage relocation of the breeding pair to an area where foraging movement would not

require regular passage through the CRZ and therefore reduce collision risk, particularly for juvenile birds.

In order to quantify the reduction in collision risk following implementation of mitigation, additional CRM has been undertaken with flights likely to be associated with the nest removed from the dataset. Identification of such flights was based on recorded behaviours considered indicative of a breeding pair associated with the nest site. However, it should be noted that this approach is inherently precautionary as a proportion of flights were recorded without behavioural annotation and therefore remain in the dataset. As such the 'mitigation scenario' CRM is likely to represent an overestimate of future activity within the CRZ and therefore underestimate the potential reduction in collision risk. For example, if the nest site was relocated then it is likely that osprey flight activity would be altered, with an overall reduction in flights close to turbines which are approximately 540m from suitable foraging habitat at the reservoir

Accordingly, CRM outputs for osprey are presented for both the full flight dataset and the adjusted dataset to allow comparison and to inform the impact assessment with and without proposed mitigation measures. .

Table 5. Target species mean bird density

Species	Non-breeding season mean density (birds/km2)	Non-breeding season standard deviation	Breeding season mean density (birds/km2)	Breeding season standard deviation
Greylag goose	0.00255	0.00370	0.00080	0.00094
Pink-footed goose	0.00020	0.00041	0.00000	0.00000
Osprey	0.00000	0.00000	0.02523	0.03211
Osprey 'mitigation scenario'	0.00000	0.00000	0.00860	0.01607

Table 6. Proportion of observed birds flying at rotor risk height (%Q2R)

Species	Number of birds observed		Proportion flying in the CRZ	
	Non-breeding season	Breeding season	Non-breeding season	Breeding season
Greylag goose	12	17	0.83	0.88
Pink-footed goose	42	0	0.71	0.00
Osprey	0	106	0.00	1.00
Osprey 'mitigation scenario'	0	35	0.00	1.00

3.1.2 Proportion of flights at risk height

The proportion of observed birds at rotor risk height for the proposed turbine model is shown above in **Table 6.**

The mean density (DA) is given in **Table 5** for each target species and was calculated for each period (breeding and non-breeding) during each survey year, in line with NatureScot guidance (NatureScot, 2025b).

The watches were divided into sessions of three hours in duration with breaks between sessions to limit observer fatigue, and the sessions spread to include a representative sample of daylight hours. All flights of target species were recorded during each watch period, yielding total flying time in bird-seconds throughout the watch. Flying time was divided by the period of the watch (in seconds) and the area watched to give the average density of birds in flight per square kilometre.

3.2 Stage B – Estimating number of flights through rotors

The output from Stage B is the potential number of bird transits through the rotor swept area, presented seasonally. The total number of bird transits expected through rotors is proportional to the number and cross-sectional area of the rotors, and to the density of birds in the airspace within the CRZ at potential collision height. Total number of transits each month, for each species, is detailed in **Table 7** below.

Table 7. Potential number of bird transits through rotors

Species	Number of Transits												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Greylag goose	75.786	68.124	74.936	23.852	24.499	23.635	24.455	49.393	72.296	75.221	73.221	75.891	661.309
Pink-footed goose	7.116	6.397	7.036	0.000	0.000	0.000	0.000	3.484	6.788	7.063	6.875	7.126	51.885
Osprey	0.000	0.000	0.000	567.493	584.073	564.066	583.372	292.669	0.000	0.000	0.000	0.000	2591.674
Osprey 'mitigation scenario'	0.000	0.000	0.000	193.390	199.041	192.223	198.802	99.736	0.000	0.000	0.000	0.000	883.191

3.3 Stage C – Probability of Collision for a single rotor transit

Data relating to the likelihood of a bird being hit when flying through the rotor is derived from the NatureScot CRM spreadsheet. The collision probability for each species with the proposed turbine model is detailed in **Table 8.**

Table 8. Probability of collision for a single rotor transit of the proposed turbine model

Species	Turbine Model V162
Greylag goose	6.42%
Pink-footed goose	5.40%
Osprey (both scenarios)	5.83%

3.4 Stage D – Multiplying to yield expected collisions per year

Following the above steps, the number of bird transits per year through the rotors can be combined with the probability of a bird being hit when flying through the rotor to give a likely collision rate per month and per year (assuming no avoidance).

This stage considers the proportion of time that turbines are likely to be operational. The 85% default operational time is considered industry standard, originally stemming from guidance by the British Wind Energy Association (BWEA), now known as Renewables UK and is a widely used assumption in CRM.

The collision rate for each species, for the proposed turbine model, before accounting for avoidance is detailed in **Table 9.**

Table 9. Predicted collisions before avoidance rate

Species	Number of collisions before avoidance												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Greylag goose	4.138	3.720	4.092	1.302	1.338	1.291	1.335	2.697	3.948	4.107	3.998	4.144	36.110
Pink-footed goose	0.327	0.294	0.323	0.000	0.000	0.000	0.000	0.160	0.312	0.324	0.316	0.327	2.384
Osprey	0.000	0.000	0.000	28.144	28.966	27.974	28.931	14.514	0.000	0.000	0.000	0.000	128.528
Osprey 'mitigation scenario'	0.000	0.000	0.000	9.591	9.871	9.533	9.859	4.946	0.000	0.000	0.000	0.000	43.800

3.5 Stage E- Applying the avoidance rate

There are a range of guidance documents which propose species-specific avoidance rates to use in CRM. Predicted collisions have been calculated for avoidance rates of 95%, 98%, 99%, and 99.5% during the breeding and non-breeding seasons. The avoidance rates recommended by NatureScot (2025a) (see **Table 10**Table 10 and **Table 11)** were applied to estimate the number of bird collisions per annum for the proposed turbine model.

Table 10. Predicted collisions per annum considering 95%, 98%, 99% and 99.5% avoidance rate

Species	Predicted Collisions – 95% avoidance			Predicted Collisions – 98% avoidance			Predicted Collisions – 99% avoidance			Predicted Collisions – 99.5% avoidance		
	B	NB	Year	B	NB	Year	B	NB	Year	B	NB	Year
Greylag goose	0.33	1.47	1.81	0.13	0.59	0.72	0.07	0.29	0.36	0.03	0.15	0.18
Pink-footed goose	0.00	0.12	0.12	0.00	0.05	0.05	0.00	0.02	0.02	0.00	< 0.01	< 0.01
Osprey	6.43	0.00	6.43	2.57	0.00	2.57	1.29	0.00	1.29	0.64	0.00	0.64
Osprey 'mitigation scenario'	2.19	0.00	2.19	0.88	0.00	0.88	0.44	0.00	0.44	0.22	0.00	0.22

Table 11. Predicted collisions considering NatureScot recommended avoidance rates

Species	NatureScot avoidance rates	Predicted collisions per breeding season*	Predicted collisions per non-breeding season	Predicted annual collisions**	Predicted years per collision	Predicted collisions during Proposed Development operational lifespan
Greylag goose	99.8	0.01	0.06	0.07	13.85	2.89
Pink-footed goose	99.8	0.00	0.00	0.00	209.76	0.19
Osprey	98	2.57	0.00	2.57	0.39	102.82
Osprey 'mitigation scenario'	98	0.88	0.00	0.88	1.12	35.04

4. Conclusion

The results generated by running NatureScot's recommended approach for CRM predicted moderate levels of collisions for osprey and low levels of collisions for the other target species; greylag goose and pink-footed goose. Turbine parameters were provided for a single model (Vestas V162).

Based on CRM, predicted collision mortality for greylag goose is estimated at 0.07 individuals per annum, comprising 0.01 collisions during the breeding season and 0.06 collisions during the non-breeding season. For pink-footed goose, predicted collision mortality is less than 0.01 individuals per annum, all occurring during the non-breeding season. Collision mortality for osprey is predicted at 2.57 individuals per annum, all associated with the breeding season. When extrapolated over the operational lifespan of the Proposed Development, this equates to an estimated total of approximately 2.89 greylag goose, 0.19 pink-footed goose and 102.82 ospreys.

Applying the 'mitigation strategy' approach for osprey, the predicted collision rates are 0.88 per annum, all of which are during the breeding season. This equates to 35.04 birds across the operational lifespan of the wind farm.

It is important to note that, as is always the case with a modelled approach, the collision risk model outputs are only considered to be indicative of the number of fatalities resulting from the Proposed Development and should be considered in conjunction with other impacts. For example, the outputs from the model do not take account of potential displacement of birds from the wind farm site, which would reduce collision risk. Further to this, the 'mitigation scenario' CRM is also likely to represent an overestimate of future activity within the CRZ and therefore underestimate the potential reduction in collision risk. If the nest site were relocated, osprey flight behaviour would likely change, resulting in fewer flights occurring near the turbines, which are approximately 540m from suitable foraging habitat at the reservoir

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Appendix 1 – Figures

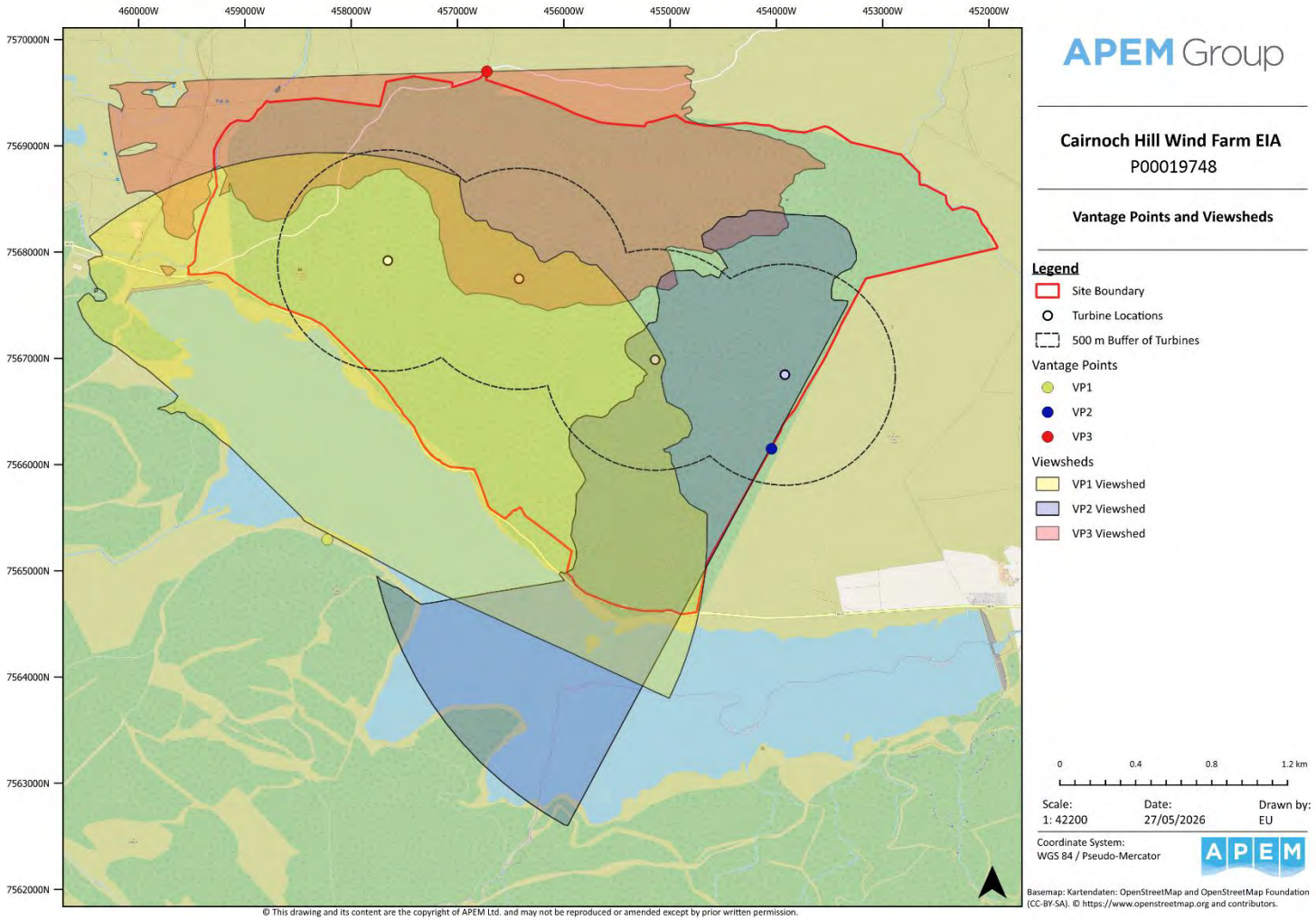


Figure 1. Vantage Points and Viewsheds