



Cairnoch Hill Wind Farm

Shadow Habitats Regulations Appraisal

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Basis of Report

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Acronyms and Abbreviations

AA	Appropriate Assessment
ALSE	Assessment of Likely Significant Effects
AOD	Above Ordnance Datum
CJEU	Court of Justice of the European Union
DRP	Decommissioning and Restoration Plan
ECU	Energy Consents Unit
EIA	Environmental Impact Assessment
GWDTE	Ground Water Dependent Terrestrial Ecosystems
HRA	Habitats Regulations Appraisal
JNCC	Joint Nature Conservation Committee
LSE	Likely Significant Effect
NPF4	National Planning Framework 4
NVC	National Vegetation Classification
SAC	Special Area of Conservation
SEPA	Scottish Environment Protection Agency
SPA	Special Protection Area
sHRA	Shadow Habitats Regulations Appraisal
UKHab	UK Habitat Classification
WF	Wind Farm



1.0 Introduction

1.1 Background

This shadow Habitats Regulations Appraisal (sHRA) Report has been prepared by SLR Consulting Ltd on behalf of Eurowind Energy Limited (hereafter referred to as “the Applicant”) and accompanies an Environmental Impact Assessment (EIA), for the construction and operation of the proposed Cairnoch Hill Wind Farm (“the Proposed Development”). The Proposed Development location (“the Site”) is situated on land near the Carron Valley Reservoir, within the Stirling Council administrative area.

This sHRA includes information for the Competent Authority, the Local Planning Authority (LPA), in this case Stirling Council, to determine if the Proposed Development works are likely to have a significant effect on ‘European’ / Internationally important sites with regard to their conservation objectives. This document includes the screening stages only.

1.2 Project Overview

The Proposed Development comprises four three-bladed horizontal axis wind turbines and associated infrastructure. It is expected to operate for up to 40 years, following which decommissioning of the wind turbines and other infrastructure would be undertaken, or an application may be submitted to repower the Site.

Refer to Section 5.0 and **Figure 1 and 2** for further detail on the Site layout.

1.3 Site Description

For the purpose of this appraisal, the term ‘Site’ refers specifically to the area within the red line Site boundary (see **Figure 2**). The Site covers an area of approximately 573ha. The Site is located immediately (within 30m) north of the Carron Valley Reservoir, and approximately 6km east of the settlement of Fintry, Stirlingshire.

The Site is situated on the slopes of Cairnoch Hill at 413m Above Ordnance Datum (AOD) (slope degrees typically range from 4-8 to >12 degrees) rising from the Carron Valley Reservoir at the location of the Site entrance, refer to **Figure 3.1** in the EIA Report. The landscape is associated with small watercourses feeding the Carron Valley Reservoir, Endrick Water and the River Carron. The Carron Valley Reservoir is a man-made reservoir impounded at both ends by dams. Cairnoch Hill is owned by the Scottish Ministers and managed by Forestry and Land Scotland (FLS) and is dominated by commercial conifer plantation.

1.4 Report Purpose

The purpose of this sHRA Report is to provide the information for Stirling Council to carry out a screening assessment for likely significant effects on European sites as a result of the Proposed Development, in accordance with and fulfilment of the requirements of the Conservation (Natural Habitats &c) Regulations, 1994, as amended.



1.5 Relevant Legislation and Policy

1.5.1 Legislation and National Planning Policy

The requirement for Appropriate Assessment (AA) screening and AA is set out in Regulation 48 of the Conservation (Natural Habitats &c) Regulations, 1994, as amended. This requirement is extended as a matter of policy to Ramsar sites¹.

Policy 4 of the National Planning Framework 4 (NPF4) reiterates the legal requirement for AA. Policy 4(b) states that:

“Development proposals that are likely to have a significant effect on an existing or proposed European site (Special Area of Conservation (SAC) or Special Protection Areas (SPA)) and are not directly connected with or necessary to their conservation management are required to be subject to an “appropriate assessment” of the implications for the conservation objectives.”

1.5.2 Amendments to Legislation Post EU Exit

Post-Brexit, the Habitats Regulations remain in force and the process for assessment remains largely unaltered, but UK sites are no longer part of the EU's Natura 2000 network, instead forming a national network of protected sites. Key terminology is primarily unchanged, with the terms 'European site', 'Special Area of Conservation' and 'Special Protection Area' all being retained.

In cases where an 'adverse effect on integrity' cannot be ruled out the competent authority (i.e. Stirling Council in this case) would previously have been required to seek the opinion of the European Commission on whether the plan or project should be carried out for 'imperative reasons of overriding public interest'. Since exiting the European Union, this now falls under the remit of the Scottish Ministers.

1.6 Statement of Authority

This assessment has been carried out by SLR Senior Ecologist Rowan Smith, BSc (Hons) MSc. Rowan has over 6 years' experience in Ecology, in both ecological consultancy and research sectors. She has a broad environmental science background and expertise in terrestrial and aquatic ecology. Her experience includes undertaking and contributing to EIA/EcIA and HRA assessments for a range of energy generation projects including pumped storage hydro schemes, wind farms, solar and linear infrastructure projects.

This report has been technically reviewed by SLR Technical Director Duncan Watson CEnv MCIEEM. Duncan is an Ecologist with over 28 years' professional experience, much of which relates to projects in the renewable energy sector. Duncan has a particular interest in Ecological Impact Assessment and Habitats Regulations Assessment and was a member of the technical review group responsible for revising and updating the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in the UK (published in 2018 and recently updated). He has also led CIEEM workshops on Ecological Impact Assessment and Habitats Regulations Assessment.

¹ Scottish Government. (2025). Wetlands – protecting Ramsar sites: updated Scottish Government policy. [Online] Available at: [Wetlands - protecting Ramsar sites: updated Scottish Government policy - gov.scot](https://www.gov.scot/publications/wetlands-protecting-ramsar-sites/pages/1-1-introduction.aspx)



2.0 Methodology

2.1 General approach

NatureScot guidance² describes a series of stages which should be completed when carrying out a HRA and these are followed here with the addition of sub-headings for further clarity. The assessment applies only to European and Ramsar sites. More specifically, it only applies to the qualifying interest features of such sites i.e., the features which are the reason that the site was designated.

2.2 Initial Search Area & Source-Pathway-Receptor Model

All European sites within 10km of the Site were included within the initial search area. This was extended beyond 10km where hydrological connectivity was established or where habitats within the Site may otherwise be functionally linked to qualifying interests of European and Ramsar sites beyond 10km. For example, where migratory species, e.g. Atlantic salmon, may pass through the Site to a European site upstream of the Proposed Development.

Under the 'source-pathway-receptor' model the relevant designated sites and their primary and secondary designated features are considered to be the 'receptors'. The 'pathway' is the route or means through which the 'receptors' could be positively or negatively impacted by the 'source.' The 'source' is the construction and operation of the Proposed Development. If no pathway exists between the receptor and the source, then impacts on the receptor can be screened out. If a pathway does exist, then the impact on the receptor site must be quantified and it must be determined whether a Likely Significant Effect (LSE) on the receptor is possible.

2.3 Baseline Information

Existing biological information for the Proposed Development Site and surrounding area was gathered through a desk-based study, which was undertaken in May 2024 and a range of field surveys.

2.3.1 Ecological Desk Study

The desk-based study considered previous data, reports and survey work which was collated into EIA Report **Technical Appendix 8.1: Desk Study**. The desk study included a search for:

- European and Ramsar sites within 10km of the Proposed Development, extending to 20km for sites for which geese represent qualifying features; and
- Annex I habitats and Annex II species (of the Habitats Directive) within 10km of the Proposed Development to identify habitats/species that could be functionally linked to designated sites.

Online resources examined included ecology data held on NatureScot's Site Link, NatureScot's Carbon and Peatland Map and Stirling planning portal to obtain documents for nearby developments. Additional information and advice were sought through consultation with the Loch Lomond Fisheries Trust on the passability of natural barriers to migratory fish and/or fish data for the catchment, however, no response was received.

² NatureScot. (2026). Habitats Regulations Appraisal. [Online] Available at: [Habitats Regulations Appraisal \(HRA\) | NatureScot](#)



2.3.1.1 Data Sources

Data to inform the desk study were derived from a number of sources including:

- NatureScot SiteLink³ for information on European and Ramsar sites and their qualifying interests;
- NatureScot Carbon and Peatland Map⁴ to identify the presence of carbon-rich soils, deep peat and priority habitat;
- Stirling Council Planning Portal to obtain any documents for developments within 10km of the Site, including Environmental Impact Assessment (EIA) reports submitted as part of planning applications and any post consent/construction information for wind farms and other developments within 10km of the Site (where available);
- SEPA Water Classification Hub⁵; and
- Scotland Environment Web⁶.

The following ecological reports have been referred to in this assessment:

- Cairnoch Hill Wind Farm EIA Report Chapter 8: Terrestrial Ecology;
- Cairnoch Hill Wind Farm EIA Report Technical Appendix 8.1: Desk Study;
- Cairnoch Hill Wind Farm EIA Report Technical Appendix 8.2: Habitat Report;
- Cairnoch Hill Wind Farm EIA Report Technical Appendix 8.3: Protected Species Report;
- Cairnoch Hill Wind Farm EIA Report Technical Appendix 8.5: Fish;
- Cairnoch Hill Wind Farm EIA Report Technical Appendix 9.1: Year 1&2 Baseline Ornithology Reports; and
- Cairnoch Hill Wind Farm EIA Report Technical Appendix 9.2: Confidential Annex.

This does not provide an exhaustive list of reports compiled to support the EIA but includes those most relevant to this sHRA.

2.3.2 Habitat Survey

The habitats Survey Area for the Proposed Development included the Site boundary and a 250m survey buffer. The large Survey Area assisted with the placement of infrastructure and Site design, due to the requirement to ensure sufficient areas were surveyed to account for the presence of potential ground water dependent terrestrial ecosystem (GWDTEs), as per SEPA (2024) guidance, as well as informing progressive layout iterations of the Proposed Development as the design became more refined. Furthermore, it allowed for detailed consideration for candidate areas suitable for ecological and biodiversity enhancements.

A National Vegetation Classification (NVC) survey (Refer to **Technical Appendix 8.2** of the EIA Report) was conducted of semi-natural habitats within the Survey Area. Surveys were

³ NatureScot. (2025). SiteLink. [Online] Available at: <https://sitelink.nature.scot/> (Accessed 17/10/2025)

⁴ NatureScot. (2016). Carbon and Peatland 2016 Map. [Online] Available at: <https://opendata.nature.scot/> (Accessed 17/10/2025)

⁵ SEPA. (2025). Water Classification Hub. [Online] Available at: <https://informatics.sepa.org.uk/WaterClassificationHub/> (Accessed 17/10/2025)

⁶ Scotland's Environment Web. (2025). Map: Obstacles to Fish Migration. [Online] Available at: <https://map.environment.gov.scot/sewebmap/> (Accessed 17/10/2025)



conducted to account for the potential presence of habitats listed on Annex I of the Habitats Directive and groundwater dependent terrestrial ecosystems (GWDTE).

The survey followed the methodology described in the NVC Users Handbook⁷. Plant communities were identified from representative quadrat samples with reference to the standard community descriptions and constancy tables in Rodwell *et al.*⁸. The survey excluded highly modified habitats, such as conifer plantations and agricultural areas, which were mapped using the UK Habitat Classification (UKHab). Full methodologies for both NVC and UKHab surveys are provided in Technical Appendix 8.2 of the EIA Report. The mapped results are shown on **Figures 8.2.1a-y** and **Figures 8.2.2a-i** (with proposed infrastructure locations overlain) of the EIA Report.

2.3.3 Protected Species Surveys

A walkover survey for protected and notable species (focused on otter (*Lutra lutra*), water vole (*Arvicola amphibius*), red squirrel (*Sciurus vulgaris*), badger (*Meles meles*) and pine marten (*Martes martes*)) was undertaken over the course of the Summer 2024. The species specifically targeted were based on the likelihood of occurrence of each species, ascertained from known species distribution and habitat suitability. Surveys followed standard methodologies in place at the time of survey for otter^{9,10,11}, water vole¹², red squirrel¹³, badger^{14,15} and pine marten^{16,17}. Refer to **Technical Appendix 8.3** of the EIA Report for full methodologies.

Surveys were carried out within all suitable habitat on Site and within 100m for water vole, red squirrel and badger, and 200m for pine marten and otter in line with relevant guidance. The survey areas are shown in **Figure 8.3.1** and **Figure 8.3.2** of the EIA Report.

2.3.4 Aquatic Surveys

A desk study was undertaken to support this sHRA to identify watercourses classified by SEPA and potential barriers to fish migration for watercourses downstream of the Site.

A fish habitat assessment was undertaken in May 2024 to assess the potential for fish species of conservation value (e.g. salmonids, lamprey (sp.), European eel (*Anguilla anguilla*) and freshwater pearl mussel (*Margaritifera margaritifera*)) to be present in watercourses within the Site plus a 100m buffer. The survey was based on an adapted version of the methodologies developed by Hendry and Cragg-Hine¹⁸ and the Scottish Fisheries Co-ordination Centre (SFCC) Habitat Survey Methodology¹⁹. Full details can be found in **Technical Appendix 8.5** of the EIA Report.

⁷ Rodwell. (2006). NVC Users' Handbook. [Online] Available at: [NVC Users' Handbook | JNCC Resource Hub](#)

⁸ Rodwell et al. (1991). British Plant Communities. Volume 1. Woodlands and scrub. Cambridge University Press.

⁹ Chanin, P. (2003). Ecology of the European Otter. Conserving Natura 2000 Rivers, Ecology Series No. 10. English Nature: Peterborough

¹⁰ Bang, P. & Dahlström, P. (2001). Animal Tracks and Signs. Oxford University Press: Oxford.

¹¹ Sargent, G. & Morris, P. (2003) How to find & Identify Mammals. The Mammal Society: London.

¹² Strachan, R. (2006). *Water Vole Conservation Handbook*. 2nd Edition.

¹³ Gurnell, J., Lurz, P. & Pepper, H. (2001). Practical Techniques for Surveying and Monitoring Squirrels.

¹⁴ Neal, E. & Cheeseman, C. (1996). *Badgers*. Poyser Natural History, London.

¹⁵ Reynolds, P. & Harris, M. (2005). Inverness Badger Survey 2003. Scottish Natural Heritage Commissioned Report No. 096

¹⁶ P., Bang & R. Dahlstrom (2006) Animal Tracks and Signs. Oxford University Press.

¹⁷ Balharry, E.A., McGowan, G.M., Kruuk, H., Halliwell, 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.

¹⁸ Hendry, K. & Cragg-Hine, D. (2003). Ecology of the Atlantic Salmon. Conserving Natura 2000 Rivers Ecology Series No 7. English Nature: Peterborough.

¹⁹ Scottish Fisheries Co-ordination Centre. (2010). Habitat Surveys Training Course Manual. pp. 1-64. [Online] Available at: <https://fms.scot/wp-content/uploads/2019/03/SFCC-Training-Manual.pdf>.



Electrofishing was conducted in August 2024 by three experienced SFCC qualified persons using an EF-500B-SYS Electric Fishing Backpack System and single anode at 350 volts. Fully quantitative electrofishing surveys were conducted at a total of seven survey locations determined by the fish habitat assessment; those considered to have 'moderate' or higher potential to support fish were subject to electrofishing surveys. No fish were identified during any of the electrofishing surveys, as such analysis of electrofishing data was not required.

2.3.5 Ornithological Surveys

Ornithological surveys were conducted between September 2021 and August 2023. Surveys included flight activity surveys, black grouse (*Tetrao tetrix*) surveys, breeding raptor surveys and moorland breeding bird surveys. The survey methodologies were developed based on the habitats present within the Site, the species assemblage known to occur in the area, and NatureScot guidance.

Full details of all ornithological surveys can be found in **Technical Appendix 9.1: Year 1&2 Baseline Ornithology Reports** and **Technical Appendix 9.3** of the EIA Report.

2.4 Guidance Documents

This sHRA makes reference to key HRA guidance documents, including:

- Scottish Government 'Habitats Regulations Appraisal (HRA)'²⁰;
- NatureScot 'Habitats Regulations Appraisal'²;
- UK Government 'Guidance on the use of Habitats Regulations Assessment'²¹;
- NatureScot 'Guidance for Competent Authorities when dealing with proposals affecting SAC freshwater sites'²²;
- NatureScot 'Assessing Connectivity with Special Protection Areas'²³;
- European Commission 'Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC 2021/C 437/01'²⁴; and
- European Commission 'Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC'²⁵.

2.5 Assessment Methodology

This Section details the assessment methodology used to compile a sHRA from screening through to the completion of an Appropriate Assessment (AA), however, in cases where LSE

²⁰ Scottish Government. (2024). Habitats Regulations Appraisal (HRA). [online] Available at: <https://www.gov.scot/policies/environmental-assessment/habitats-regulations-appraisal-hra/>

²¹ UK Government. (2019). Guidance on the use of Habitats Regulations Assessment. [online] Available at: <https://www.gov.uk/guidance/appropriate-assessment>

²² NatureScot. (2006). Guidance for Competent Authorities when dealing with proposals affecting SAC freshwater sites.

²³ NatureScot. (2016). Assessing Connectivity with Special Protection Areas'. [Online] Available at: [Assessing connectivity with special protection areas.pdf](#)

²⁴ European Commission. (2021). Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC 2021/C 437/01.

²⁵ European Commission. (2018). Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC'.



can be screened out, only Stages 1-3 are completed and are referred to collectively as 'Screening'.

Stages 4-5 are undertaken where LSE can't be ruled out and an AA is required. Stages 6-9 include consideration of alternative solutions, Imperative Reasons for Overriding Public Interest (IROPI) and compensation, which are required where an AA can't rule out an Adverse Effect on Integrity for one or more European Sites.

This report only considers Stages 1-3.

2.5.1 Stage 1: Proposed Development Description

Stage 1 of the HRA process, as outlined in NatureScot guidance², requires a description of the project to be provided. This should provide details of the Proposed Development including (in this case) details of construction, operation and maintenance and decommissioning, containing enough information for potential impact pathways to be understood. A description of the Proposed Development is provided at Section 5.0 of this sHRA Report.

Stage 2: Management of the Site

Stage 2 of the HRA process is to ascertain whether the Proposed Development is directly connected with or necessary to the management of a European or Ramsar site. Typically, this applies only to a management plan, or similar, which has the purpose of maintaining or restoring the conservation interest of a European or Ramsar site, and which would not have a negative effect on any other European or Ramsar site.

As the Proposed Development is not wholly or partially connected with, or necessary for, the management of any European or Ramsar site or contributes to achieving any site's conservation objectives, this step has not been considered further in this sHRA.

Stage 3: Identification of Likely Significant Effects (Screening)

Step 1: Sources of Impact

Step 1 should identify the aspects of the Proposed Development which have the potential to affect European or Ramsar sites, either alone or in combination with other projects and plans. This may include for example emissions to air and water, noise and increases in recreational activity ('Sources').

Step 2: Identify Relevant European Sites

Step 2 should identify which (if any) European or Ramsar sites may be affected, considering the potential effects of the Proposed Development alone or in combination with other plans or projects. This step is subdivided into:

Step 2, Part 1: generate an initial list of European and Ramsar sites to be considered in the screening process, which are those which are potentially connected (via a pathway) to the Proposed Development including:

1. any which overlap with the Proposed Development Site or are close enough to experience increased noise, vibration, light, visible human activity or spread of invasive non-native species;
2. those that may have downstream connectivity via watercourses or groundwater to the Proposed Development Site or associated aspects of the development, e.g. transport routes;
3. those that may receive deposition of pollutants as a result of emissions to air from the Proposed Development or associated aspects of the development;



4. those which may support migratory or mobile species populations which may also use the Proposed Development Site or its environs; and
5. those which may receive additional recreational activity once the Proposed Development is operational.

Step 2, Part 2: compile basic information on the European and Ramsar sites identified in Part 1, including a list of qualifying interest features/special conservation interest (the Receptors), their conservation objectives, the distance and direction from the Proposed Development (including associated aspects of the development such as transport routes) and how it is or is not connected, using the Source-Pathway-Receptor model. Likely significant effects can usually be immediately excluded for any European or Ramsar sites and any qualifying /special conservation interest features which clearly lack a pathway or where it can be demonstrated there is a very weak pathway, such that any effects would not be appreciable, provided there is also no risk of in combination effects.

Step 3: Assess Risks

Step 3 should assess whether LSE on European or Ramsar sites can be ruled out, in view of their conservation objectives. This step is sub-divided into:

Step 3, Part 1: assessing LSE for the Proposed Development alone, determining whether there is a risk that the Proposed Development could undermine the conservation objectives for the qualifying interest features/special conservation interest for those European or Ramsar sites for which a pathway has been identified. This is a scientific determination which considers both direct and indirect effects. If there is any uncertainty, or detailed investigation or mitigation are required, LSE are assumed.

Step 3, Part 2: assessing LSE for the Proposed Development in combination with other projects and plans. Along the same lines as Part 1, this considers whether the effects of the Proposed Development, if not capable of undermining the conservation objective(s) on their own, could do so cumulatively with other projects and plans. It also considers whether the risk of undermining conservation objective(s) is elevated when cumulative effects are considered.

Step 4: Conclusion

The conclusion should state whether LSE arising from the Proposed Development, alone and in-combination with projects and plans, on European and Ramsar sites can be excluded. If they cannot, the conclusion should identify which sites and which qualifying interest features/special conservation interest are at risk from significant effects, and the relevant impact sources and pathways. If the latter, an AA will be required (Stage 4 below). The conclusion should not consider any mitigation measures designed to avoid LSE on a European or Ramsar site.

Stage 4: Appropriate Assessment

Step 1: Information on the Project and on the European Sites

This step is sub-divided into:

Step 1, Part 1: information on the Proposed Development. Whilst the Proposed Development will have been described in outline at Stage 1, a more detailed description should be provided here at Stage 4 including construction/ decommissioning methods, relevant details of the design and timescales, providing all the details needed by the competent authority to complete its AA.

Step 1, Part 2: information on the European and Ramsar sites. Further information on the sites identified at Stage 1 for which LSE cannot be excluded should be provided at this



stage, where relevant to the assessment. This should include a complete list of the qualifying interest features (if not already provided), further investigation into the feature condition and distribution of qualifying habitats and species populations, a description of the site and further information on the conservation objectives, including any site-specific advice, and the main threats and pressures.

Step 2: Implications for the European or Ramsar Sites

Step 2 involves assessing the implications of the Proposed Development in view of the site's conservation objectives, individually or in combination with other plans or projects. This step is sub-divided into:

Step 2, Part 1: Assessment of the Proposed Development alone

A scientific assessment of the potential effects of the Proposed Development on the qualifying interest features of the European and Ramsar site(s), based on the impact factors and pathways identified at Stage 3. For example, determining whether the effects could result in a population decline or the loss or degradation of a habitat.

Step 2, Part 2: Assessment of the Proposed Development 'in combination'

This includes confirmation of the projects and plans (from Stage 3) which could act in combination with the Project and could collectively result in effects such as a population decline or the loss or degradation of a habitat that are greater than the effects already identified for the Proposed Development alone. Those included are other plans or projects that have been already completed, approved but not yet completed, or submitted for consent, and have LSE on the same European and Ramsar sites as the Proposed Development. All projects and plans are considered together with the Proposed Development, and (where relevant) assessments already made at the plan level (especially the relevant LPA development plans) are used to inform the assessment.

Step 2, Part 3: Implications for the Conservation Objectives

Conservation objectives usually require the maintenance or restoration of the qualifying feature(s) to favourable condition. If site-specific conservation and management advice has not been published it is assumed that the favourable condition is at or above the condition of the feature when the site was designated, and unfavourable condition is below that level. Conservation objectives can apply to, for example, the area of the qualifying habitat and its quality, the population and distribution of a qualifying species, and the extent and quality of habitat for that species within the designated site. Where relevant, the assessment should also consider supporting populations of the same and other species, and connected habitats.

Following the assessment at Step 2, Part 1, the assessment should identify whether effects which would undermine the conservation objectives can be excluded for the Proposed Development alone, or if not which conservation objective(s) could be undermined, the level or risk and to what degree. Then, following on from Step 2, Part 2, the assessment should consider whether the effects in combination could undermine the conservation objectives, even where the Proposed Development does not do so alone, and whether these effects are more/less likely to happen or be worsened/lessened when all plans and projects are considered together.

Low level effects of short duration and from which habitats and species populations would quickly recover may be regarded as not undermining the conservation objectives.

Step 3: Mitigation Measures

Step 3 is to identify mitigation measures (where required). For any effect that could have an adverse effect on the integrity of a European site, avoidance and mitigation measures should be identified with the aim of removing the risk to the integrity of the identified European sites,



including in combination effects with other projects and plans. Measures to compensate for adverse effects on site integrity are not considered at this Stage, and neither are actions designed to enhance biodiversity.

2.5.2 Stage 5: Consideration of Effects on Site Integrity

Considering the mitigation identified at Stage 4, it must be ascertained whether the Proposed Development will adversely affect the integrity of a European Site or Ramsar site. This stage aims to determine whether the risk to the conservation objectives have been reduced or removed such that they will not be undermined, and adverse effects on the integrity of all European and Ramsar sites can be excluded.



3.0 Consultation

NatureScot provided the following advice regarding the Proposed Development and its potential to impact European and Ramsar sites:

'We advise that sufficient information should be provided in the EIA report to enable an appraisal of the likely impact of the proposed development on the qualifying interests of the River Endrick SAC. A Habitats Regulations Appraisal (HRA) will be required²⁶.'

This advice is reflected within this sHRA report.

²⁶ NatureScot. (2024). Scoping Opinion.



4.0 Summary of Relevant Baseline Information

4.1 Desk Study

4.1.1 European or Ramsar Sites

The initial search identified four European sites within the search parameters:

- Endrick Water SAC;
- Flanders Mosses SAC;
- Firth of Forth SPA and Ramsar Site (geese only); and
- Slamannan Plateau SPA.

Further details are provided for each site within the screening assessment in Section 6.3.Habitats

One Annex 1 habitat was identified within the Survey Area, transition mires and quaking bogs [H7140]. A total of 16 habitats listed on the Scottish Biodiversity List (SBL) were identified within the Survey Area, these are summarised in **Table 4-1**, alongside other habitat types identified.

One invasive non-native species, giant hogweed, *Heracleum mantegazzianum*, was identified within the Survey Area but not within the Site boundary.

One area of ancient woodland (ID:9871) was identified along the southeast of the Site boundary on the margins of the Carron Valley Reservoir which is a long-established (of plantation origin) woodland²⁷. This lies fully outwith the Site and would not be directly affected by the Proposed Development.

Table 4-1 Summary of Habitats within the Survey Area

Habitat	UKHab	NVC	Conservation Status	GWDTE Potential
Grassland	g1b6/g3c Other upland acid grassland/Other neutral grassland	U4 <i>Festuca ovina</i> - <i>Agrostis capillaris</i> - <i>Galium saxatile</i> grassland	N/A	N/A
	g1b6 Other upland acid grassland	U5 <i>Nardus stricta</i> - <i>Galium saxatile</i> grassland	SBL	N/A
	g1c Bracken	U20 <i>Pteridium aquilinum</i> - <i>Galium saxatile</i> community	N/A	N/A
	g2b Upland calcareous grassland	CG10 <i>Festuca ovina</i> - <i>Agrostis capillaris</i> - <i>Thymus praecox</i> grassland	SBL	High
	g3c Other neutral grassland	MG6 <i>Lolium perenne</i> - <i>Cynosurus cristatus</i> grassland	N/A	N/A
		OV27 <i>Epilobium angustifolium</i> community	N/A	N/A
		No NVC	N/A	N/A
	g3c/g3c7 Other neutral grassland/ <i>Deschampsia</i> neutral grassland	MG9 <i>Holcus lanatus</i> - <i>Deschampsia cespitosa</i> grassland	N/A	Moderate

²⁷ NatureScot. (2026). Ancient Woodland Inventory. [Online] Available at: [Ancient Woodland Inventory | NatureScot Spatial Data Hub](#)



Habitat	UKHab	NVC	Conservation Status	GWDTE Potential
	g3c8 <i>Holcus-Juncus</i> neutral grassland	MG10 <i>Holcus lanatus-Juncus effusus</i> rush-pasture	N/A	Moderate
Woodland	w1d Wet woodland	W4 <i>Betula pubescens-Molinia caerulea</i> woodland	SBL	High
		W6 <i>Alnus glutinosa-Urtica dioica</i> woodland	SBL	Moderate
		W7 <i>Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum</i> woodland	SBL	High
	w1g Other broadleaved woodland	W10 <i>Quercus robur-Pteridium aquilinum-Rubus fruticosus</i> woodland	SBL	N/A
	w1h Other woodland; mixed	No NVC	N/A	N/A
	w1h/w1h6 Other woodland; mixed/Other woodland; mixed; mainly conifer	W14 <i>Fagus sylvatica-Rubus fruticosus</i> woodland	N/A	N/A
	w1h5 Other woodland; mixed; mainly broadleaved	No NVC	N/A	N/A
	w1h6 Other woodland; mixed; mainly conifer	No NVC	N/A	N/A
	w2b Other Scot's Pine woodland	No NVC	N/A	N/A
	w2c Other coniferous woodland	No NVC	N/A	N/A
Heathland and shrub	h1b Upland heathland	H9 <i>Calluna vulgaris-Deschampsia flexuosa</i> heath	SBL	N/A
	h3h Mixed scrub	No NVC	N/A	N/A
Wetland	f1a6 Degraded blanket bog	M19 <i>Calluna vulgaris-Eriophorum vaginatum</i> blanket mire	SBL	N/A
		M20 <i>Eriophorum vaginatum</i> blanket and raised mire	SBL	N/A
		No NVC	SBL	N/A
	f2c Upland flushes, fens and swamps	M6 <i>Carex echinata-Sphagnum recurvum/auriculatum</i> mire	SBL	High
		M10 <i>Carex dioica-Pinguicula vulgaris</i> mire	SBL	High
	f2c8 Transition mires and quaking bogs; upland (H7140)	M4 <i>Carex rostrata-Sphagnum recurvum</i> mire	SBL, Annex 1	N/A
		M9 <i>Carex rostrata-Calliergon cuspidatum/giganteum</i> mire	SBL, Annex 1	High
	f2d Aquatic marginal vegetation	S4 <i>Phragmites australis</i> swamp and reed-beds	N/A	N/A
		S27 <i>Carex rostrata-Potentilla palustris</i> tall-herb fen	N/A	N/A
	f2f Other Wetlands	M23 <i>Juncus effusus/acutiflorus-Galium palustre</i> rush-pasture	N/A	High
		M25 <i>Molinia caerulea-Potentilla erecta</i> mire	N/A	Moderate
		M27 <i>Filipendula ulmaria-Angelica sylvestris</i> mire	N/A	Moderate



Habitat	UKHab	NVC	Conservation Status	GWDTE Potential
		M28 <i>Iris pseudacorus-Filipendula ulmaria</i> mire	N/A	Moderate
		S10 <i>Equisetum fluviatile</i> swamp	N/A	N/A
		No NVC	N/A	N/A
Urban	u1b5 Buildings	No NVC	N/A	N/A
	u1b6 Other developed land	No NVC	N/A	N/A
	u1e Built linear features	No NVC	N/A	N/A
Sparsely vegetated land	s1a Inland rock outcrop and scree habitats	No NVC	N/A	N/A
	s1d Other inland rock	No NVC	N/A	N/A
Rivers and lakes	r1 Standing open water and canals	No NVC	SBL	N/A
	r2b Other rivers and streams	No NVC	SBL	N/A

4.2 Protected Species

A total of at least five protected species have been identified within the Site including otter (*Lutra lutra*), badger (*Meles meles*), pine marten (*Martes martes*), red squirrel (*Sciurus vulgaris*) and bats (sp.). Of these otter is the only species listed on Annex II of the Habitats Directive, a summary of otter records is provided below.

No evidence of water vole or beaver was identified during surveys in 2022, 2024, or by the desk study.

4.2.1 Otter

Surveys in 2022 indicated use of the Carron Valley Reservoir south of the Site boundary, use of the watercourse adjacent to the eastern Site boundary and tributaries of the Endrick Water on the north western Site boundary through spraint presence. Four resting locations (couches) were identified, however, none of these are within 30m of proposed infrastructure (taken to be the typical disturbance buffer for non-breeding locations). No holts with potential for breeding were identified within the Site or a 200m buffer (taken to be the typical disturbance buffer for breeding locations). Surveys in 2024 found reduced sprainting activity, however, distribution was broadly similar to that identified in 2022.

4.3 Fish

Habitat assessments determined watercourses to be of mixed quality for fish within the Site. A total of seven watercourses were assessed ranging in suitability from poor (two locations) to moderate (five locations). Watercourses were additionally assessed for salmonid spawning potential, of the locations surveyed three were considered sub-optimal and the rest not suitable. Limitations to suitability included intensive forestry works, lack of riparian vegetation, visible erosion, low flow periods and barriers to movement (i.e. poorly constructed culverts and in-stream barriers).

Fully quantitative electrofishing assessments took place in August 2024; no salmonids or other fish species were recorded.



One impassable natural barrier to migratory fish (the ‘Loup of Fintry’ waterfall) is present 1.75km downstream of the Carron Valley reservoir outlet²⁸; as such this is the furthest extent migratory fish species can access on the mainstem of the Endrick Water. The Loup of Fintry also forms the upstream extent of the Endrick Water SAC, as such it is considered that qualifying interests will not be present outside the SAC in upstream areas of the Endrick Water, this is shown on **Figure 2**. One tributary of the Endrick Water is present within the Site, forming a section of the northern boundary, however this flows into the Endrick Water above the natural impassable barrier and as such is not accessible to migratory fish.

Impassable artificial barriers (waterbody ID: 10153 and 100283) on the Carron Valley reservoir prevent migratory species from accessing the reservoir on both sides of the waterbody, and thus tributaries accessible from the reservoir only are not accessible to migratory fish from the Endrick Water SAC.

4.4 Birds

Flight activity surveys identified a total of 346 flights by 18 target species. The most frequently recorded species was osprey (*Pandion haliaetus*) with a total of 185 flights, followed by greylag goose (*Anser anser*, 83 flights) and curlew (*Numenius arquata*, 16 flights).

Black grouse surveys did not identify the species during 2022 and 2023 surveys and black grouse were not recorded during any other baseline survey.

In 2022, breeding raptor surveys identified one target raptor species (osprey) that was confirmed to have bred within the Breeding Raptor Survey Area. A further three species, goshawk (*Accipiter gentilis*), red kite (*Milvus milvus*) and peregrine (*Falco peregrinus*) may have held territory within the Breeding Raptor Survey Area, although no nests were recorded (further information is available in **Technical Appendix 9.2: Confidential Annex** of the EIA Report).

In 2023, osprey was regularly recorded around historic nest sites during April, and a pair were heard calling to one another in July, although no breeding territories were identified.

Moorland breeding bird surveys identified a total of 67 species, including 44 species of conservation concern. Two wader species (curlew and snipe *Gallinago gallinago*) were considered to have bred or to have held territory within the Survey Area in both survey years. In addition, a further four wader species were considered to have bred or to have held territory in 2022: lapwing (*Vanellus vanellus*), common sandpiper (*Actitis hypoleucos*), redshank (*Tringa totanus*) and oystercatcher (*Haematopus ostralegus*).

²⁸ Scotland's Environment. (2026). Scotland's Environment Map. [Online] Available at: [Home | Scotland's environment web](#)



5.0 Stage 1: Proposed Development Description

5.1 Overview

The Proposed Development comprises four three-bladed horizontal axis wind turbines up to 180m tip height, with a combined rated output in the region of 20 to 30 megawatts (MW). The Proposed Development also includes associated infrastructure including wind turbine foundations, crane hardstandings, new and upgraded access tracks, underground cabling, a substation compound including a control building, one borrow pit, two temporary construction compounds, and a permanent anemometry mast (see **Figure 3.1** of the EIA Report). Further information on the Proposed Development description can be found in **Chapter 3** of the EIA Report: **Description of the Development**.

5.2 Construction

Construction is estimated to last 16 months and will include the following construction/installation activities (in chronological order):

- Activity 1 – access road improvements;
- Activity 2 – site establishment;
- Activity 3 – tree clearance;
- Activity 4 – construction of tracks, crane pads and compounds;
- Activity 5 – turbine foundation construction;
- Activity 6 – substation – civil and electrical works;
- Activity 7 – turbine delivery and erection;
- Activity 8 – cable laying and cable bedding; and
- Activity 9 – site restoration.

Construction will adhere to considerate construction standards (e.g. SEPA pollution prevention guidelines), with works generally occurring between 07:00 to 19:00, Monday through Friday, and from 07:00 to 16:00 on Saturdays. It should be noted that certain activities, such as abnormal load deliveries, concrete deliveries during foundation pours, and the lifting of wind turbine components, may need to take place outside of these specified hours (excluding Sundays). Any works beyond these activities, and outside the stated working hours, would not be undertaken without prior approval from Stirling Council. For further information on the phasing and timings of the Proposed Development, refer to **Technical Appendix 3.1** of the EIA Report: **Outline Construction Environmental Management Plan (CEMP)**.

5.2.1 Pre-construction Forestry Clearance

Keyhole clearance of conifer plantation will be required to provide space for wind turbines, turbine bases and suitable buffer distances from woodland edges. The Proposed Development will utilise the existing transport infrastructure within the Site boundary where possible (forestry tracks), however, in some cases these will need to be widened and/or improved. New sections of tracks are also proposed to access the turbines from the existing forestry tracks.

5.2.2 Lighting

Artificial lighting may be required during the construction phase to ensure safe working conditions, during periods of limited natural light. Examples include vehicle and plant



headlights, construction compound lighting, floodlights and mobile lighting units, to be used around specific construction activities. It is intended that the type of lighting would be non-intrusive (e.g. directed towards works activity and away from the application boundary), to minimise impact on nearby properties and any other environmental considerations.

5.3 Operation

The Proposed Development is expected to operate for up to 40 years. Once operational the Proposed Development would largely be controlled and managed remotely, however, there would be technicians on Site regularly and it would be maintained throughout its operational life via servicing at regular intervals. It is anticipated that there would be approximately four annual service visits per wind turbine by a service team of up to three people. Inspections of high-voltage equipment and general site safety are expected to be carried out monthly. Faults would be responded to as required, most likely by a team of two technicians

5.4 Decommissioning

The Proposed Development would be designed with an operational life of 40 years. At the end of its operational life the Proposed Development would then be decommissioned in accordance with a Decommissioning and Restoration Plan (DRP) which would be submitted to Stirling Council for approval not later than 12 months prior to the start of decommissioning. Alternatively, a new application could be made to extend its operational life.

Decommissioning will involve similar, or less than, levels of activity and disturbance as the construction phase with minor exceptions such as the cables being left in place to avoid unnecessary ground disturbance.

6.0 Stage 3: Identification of Likely Significant Effects (Screening)

6.1 Ecological and Environmental Connectivity

A screening parameter of 10km has been applied to sites with hydrological connectivity. Potential effects of dust pollution during the construction phase are considered within 50m of the Site boundary and 250m from the Site entrance³⁷. Potential effects on sites designated for ornithological qualifying features have been considered within 10km (all species), extended to 20km for sites with geese as qualifying features, in line with relevant NatureScot guidance²³. Four European sites are within sufficient distances of the Site, or have sufficient connectivity to the Site to be considered:

- Endrick Water SAC (Atlantic salmon, *Salmo salar*; river lamprey, *Lampetra fluviatilis*; and brook lamprey, *Lampetra planeri*); and
- Flanders Mosses SAC (active raised bog and degraded raised bog);
- Firth of Forth SPA and Ramsar Site (pink-footed goose, *Anser brachyrhynchus* only); and
- Slamannan Plateau SPA (Taiga bean goose, *Anser fabalis fabalis*).

Locations of European sites in relation to the Proposed Development, and connectivity for sites with aquatic designations is provided in **Figure 2**.



6.2 Step 1: Source of Impact

Potential sources of impact with the potential to arise from the Proposed Development are listed below in relation to different phases over the development lifetime (construction, operation, decommissioning) alone or in combination with other plans/projects. Note that for the purposes of this assessment, it has been determined that decommissioning phase effects will be less than, or equal to effects caused by the construction phase and construction and decommissioning have thus been considered in tandem.

Construction and Decommissioning:

- Factor 1: Direct or indirect habitat loss
- Factor 2: Changes in surface water quality or hydrological regime
- Factor 3: Disturbance of species due to construction (noise, light, vibration, construction worker presence)
- Factor 4: Direct or indirect injury and/or mortality of species
- Factor 5: Direct or indirect injury and/or mortality of prey species
- Factor 6: Spread of invasive non-native species (INNS)
- Factor 7: Direct and indirect disturbance of predatory species

Operation:

- Factor 8: Disturbance resulting from turbine operation, light, noise and maintenance
- Factor 9: Catastrophic failure event
- Factor 10: Changes in surface water quality or hydrological regime
- Factor 11: Mortality due to interaction with operating turbines (birds and bats only)

6.3 Step 2: Initial Consideration of Relevant European Sites

Four European sites are located within 10km or 20km (sites including geese as qualifying features) or have sufficient connectivity to be considered. Summary information for the European sites is provided in **Table 6-1** and illustrated in **Figure 1**. The table details qualifying interests, conservation objectives, condition, distance and orientation from the Site, as detailed in the relevant Conservation Advice Packages and documentation relating to Conservation Objectives (refer to **Appendix B**) and any connection to the Site.



Table 6-1 European sites considered for Source - Pathway - Receptor Links

European Site and Site Codes	Relevant Qualifying Interest / Latest Assessed Condition and Conservation Objectives	Distance from Project	Source – Pathway – Receptor Links
Endrick Water SAC NatureScot Site Code: 8252 EU Site Code: UK009840	Atlantic salmon (<i>Salmo salar</i>), Unfavourable recovering [Last Assessed Feb 2015] River lamprey (<i>Lampetra fluviatilis</i>), Favourable maintained [Last Assessed Aug 2024] Brook lamprey (<i>Lampetra planeri</i>), Favourable maintained [Last Assessed Aug 2024] <u>Conservation Objectives</u> To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and To ensure for the qualifying species that the following are maintained in the long term: ➤ Population of the species, including range of genetic types for salmon, as a viable component of the site; ➤ Distribution of the species within site; ➤ Distribution and extent of habitats supporting the species; ➤ Structure, function and supporting processes of habitats supporting the species; and ➤ No significant disturbance of the species.	2.07km W	The Endrick Water SAC lies outside the Site boundary, however, one tributary of the Endrick Water makes up a section of the northern Site boundary. Moreover, watercourses in the southern sections of the Site flow into the Carron Valley Reservoir, which in turn flows into the mainstem of the Endrick Water upstream of the SAC. As such there is hydrological connectivity. The SAC is not considered to have airborne connection to the Site at a distance of 2.07 km. At this distance it is considered that any dust pollution generated during the construction phase would have dispersed beyond discernible effect.
Flanders Mosses SAC NatureScot Site Code: 8258	Active raised bog (H7110), Unfavourable recovering [Last Assessed Mar 2015] Degraded raised bog (H7120), Unfavourable recovering [Last Assessed Mar 2015]	9.7km NW	The SAC is not hydrologically connected to the Site. The SAC is not considered to have airborne connection to the site at a distance of 9.7km.



European Site and Site Codes	Relevant Qualifying Interest / Latest Assessed Condition and Conservation Objectives	Distance from Project	Source – Pathway – Receptor Links
EU Site Code: UK0012902	<u>Conservation Objectives</u> 1. To ensure that the qualifying features of Flanders Mosses SAC are in favourable condition and make an appropriate contribution to achieving favourable conservation status. 2. To ensure that the integrity of Flanders Mosses SAC is restored by meeting objectives 2a, 2b and 2c. 2a. Maintain the extent and distribution of the habitat within the site; 2b. Restore the structure, function and supporting processes of the habitat; and 2c. Restore the distribution and viability of typical species of the habitat.		At this distance it is considered that any dust pollution generated during the construction phase would have dispersed beyond discernible effect.
Firth of Forth SPA NatureScot Site Code: 8499 EU Site Code: UK9004411	Pink-footed goose (<i>Anser brachyrhynchus</i>), Favourable maintained [Last Assessed Jun 2018] <u>Conservation Objectives</u> To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species that the following are maintained in the long term: ➤ Population of the species as a viable component of the site; ➤ Distribution of the species within site; ➤ Distribution and extent of habitats supporting the species; ➤ Structure, function and supporting processes of habitats supporting the species; and No significant disturbance of the species. * Pink-footed goose is also a qualifying species for the Firth of Forth Ramsar Site.	17.2km NW	The SPA is not hydrologically connected to the Site. The SPA itself is not likely to be affected by disturbance effects at a distance of 17.2km. The foraging range of pink-footed goose from night roosts during winter season is taken to be a maximum 15-20km¹¹, as such the Proposed Development lies within this. However, given that the dominant habitat within the Site is commercial conifer plantation it is not considered suitable to be support foraging habitat for the species, which prefer lowland grasslands and agricultural areas. As such habitat losses of goose foraging habitat would not occur and the species is considered unlikely to be affected by disturbance given the lack of attraction to the Site for foraging.



European Site and Site Codes	Relevant Qualifying Interest / Latest Assessed Condition and Conservation Objectives	Distance from Project	Source – Pathway – Receptor Links
			The only records of pink-footed geese during ornithological surveys at the Site were of birds flying over the Site. Nine flights were recorded over two years of survey, consisting of flocks of between 12-75 birds (see EIA Report Chapter 9: Ornithology for further details). Collision risk modelling (see EIA Report Chapter 9) identified a collision risk of 0.005 birds per year, equating to 209.8 years per collision. Collision risk for pink-footed geese is therefore negligible. The Firth of Forth SPA has been scoped out of further assessment due to the lack of pathways for significant effects relating to loss of foraging habitat, disturbance or collision mortality.
Slamannan Plateau SPA NatureScot Site Code: 9184 EU Site Code: UK9004441	Taiga bean goose (<i>Anser fabalis fabalis</i>), Favourable maintained [Last Assessed Mar 2018] <u>Conservation Objectives</u> To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species that the following are maintained in the long term: ➤ Population of the species as a viable component of the site; ➤ Distribution of the species within site; ➤ Distribution and extent of habitats supporting the species;	12.95km	The SPA is not hydrologically connected to the Site. The SPA itself is not likely to be affected by disturbance effects at a distance of 12.95km. At this distance it is considered that any dust pollution generated during the construction phase would have dispersed beyond discernible effect. The foraging range of the Taiga bean goose from night roosts during winter season is not documented in NatureScot guidance, however, this is taken to be a maximum 15-



European Site and Site Codes	Relevant Qualifying Interest / Latest Assessed Condition and Conservation Objectives	Distance from Project	Source – Pathway – Receptor Links
	➤ Structure, function and supporting processes of habitats supporting the species; and No significant disturbance of the species		20km¹¹ in line with typical connectivity distances of other geese species. Whilst the Proposed Development is within this distance, the habitats within the Site are not considered to be preferential for the species which prefer lowland grasslands. As such habitat losses of goose foraging habitat would not occur and the species is considered unlikely to be affected by disturbance given the lack of attraction to the Site for foraging. No Taiga bean geese were identified in ornithological surveys within the Site and therefore collision risk is nil. The Slamannan Plateau SPA has been scoped out of further assessment due to the lack of pathways for significant effects relating to loss of foraging habitat, disturbance or collision mortality.



Based on the information summarised in Table 6-1, the Endrick Water SAC is the only European site to have connectivity to the Proposed Development and which requires further consideration in the screening assessment.

Flanders Mosses SAC, Firth of Forth SPA/Ramsar Site and Slamannan Plateau SPA do not have connectivity and have been screened out of further assessment, both for the project alone and in-combination with other developments.

6.4 Assessment of Likely Significant Effects (ALSE) on Endrick Water SAC

This section identifies the potential effect pathways through which the Proposed Development could impact the qualifying features of the Endrick Water SAC. Specifically, the aim is to establish if a particular potential impact is likely to have a significant effect and may undermine conservation objectives.

6.4.1 For the Project Alone

6.4.1.1 Construction and Decommissioning

- Factor 1: Direct or indirect habitat loss.

There will be no direct loss of watercourse or riparian habitat associated with the Endrick Water SAC, or supporting the qualifying features for the SAC. No new watercourse crossings are required to establish the Proposed Development, however, upgrades to six existing watercourse crossings are likely to be required (refer to **Technical Appendix 10.3** of the EIA Report). Habitat loss would not occur on connective tributaries of the Endrick Water SAC.

Indirect habitat loss and degradation is considered separately for Factor 2.

- Factor 2: Changes in surface water quality or hydrological regime.

Construction activities hold the potential to result in a deterioration of water quality where activities occur in close proximity to watercourses. Water quality parameters that can be affected include suspended solids/turbidity, reduced dissolved oxygen, pH, temperature, toxic chemicals, spillage of fuel or other contaminants. Additionally, any felling works to clear areas for infrastructure has the potential to mobilise nitrogen and phosphorous compounds (e.g. NO₃ and PO₄) which may persist for years after construction. The Endrick Water mainstem would not be directly affected by potential water quality deterioration as this lies fully outwith the Site, however, a tributary running across the northern Site boundary has the potential to mobilise pollutants carrying these downstream into the SAC.

Five tributaries are present within the southern areas of the site and feed into the Carron Valley Reservoir. The reservoir has two outlets, one of which feeds into the mainstem of the Endrick Water, approximately 1.8km above the SAC, and the other into the River Carron (River Forth Catchment). Considering the volume of water within the reservoir, it is considered that any pollution generated by the Proposed Development would be diluted beyond discernible effect. Therefore, there is not considered to be a pathway for effect to the Endrick Water SAC via the Carron Valley Reservoir. Moreover, infrastructure has all been sited in excess of 50m from all watercourses, with the exception of watercourse crossing locations, as such the pathway for pollution in any watercourse is minimised. Hydrological connectivity to the SAC is illustrated in **Figure 2**.

An unnamed tributary of the Endrick Water runs west along the northern Site boundary, however, it is approximately 200m from the nearest infrastructure (an existing forestry access track). The relevant access track would be subject to upgrades and felling of adjacent commercial forestry plantation to widen it in areas. Although there are no mapped watercourses (visible on the 1:25,000 OS Map scale) connecting the closest infrastructure to



the tributary it is anticipated that drainage ditches, surface run off and airborne dust may still act as viable pathways to this tributary. However, when considering at its closest point the tributary is approximately 3.5km upstream of the Endrick Water SAC it is unlikely that water quality would deteriorate to a level capable of causing injury and/or mortality to Atlantic salmon or lamprey (sp.).

Although increases in permanent hardstanding / sealed ground would result in increased surface run-off and reduction in ground permeability this is considered unlikely to significantly affect water volumes or velocities locally, or within the Endrick Water SAC. Due to the large areas of vegetation surrounding areas of permanent hardstanding, primarily turbine bases and access tracks, any excess water is considered likely to be intercepted and infiltrated before reaching watercourses with connectivity to the SAC, and therefore would not affect either surface water quality or hydrological regime.

- Factor 3: Disturbance of species due to construction (noise, light, vibration, construction worker presence).

Fish species have the potential to be impacted during the construction phase due to a number of activities including site clearance, watercourse crossing upgrades/construction, construction worker presence and ground investigation works. Due to the presence of an impassable barriers on the Endrick Water, the Loup of Fintry, no fish associated with the SAC would be present within 3.5km of the nearest construction activities. As such Atlantic salmon and lamprey would not be present within distances that could potentially be subject to disturbance. Moreover, natural screening from thick stands of commercial forestry and the natural topography of Cairnoch Hill are likely to further mitigate any noise/vibration/visual disturbances.

Depending on the time of year and the stage of the construction programme, temporary lighting may be required at the temporary compounds and at work areas during working hours. The illumination of infrastructure and Site compounds during working hours is not considered to present a risk of disturbance to fish forming part of the Endrick Water SAC populations given the distance (2.35km straight line distance between the SAC boundary and the nearest infrastructure) and natural screening from retained commercial forestry and topography of Cairnoch Hill.

- Factor 4: Direct or indirect injury and/or mortality of species.

Atlantic salmon and lamprey (sp.) are not considered to be at risk of direct injury or mortality, e.g. through instream works, as no works will occur within the Endrick Water SAC and barriers will prevent fish being present upstream of the SAC.

- Factor 5: Direct or indirect injury and/or mortality of prey species.

Some prey species of Atlantic salmon, namely macroinvertebrates within the Endrick Water are highly sensitive to pollution with low levels of pollution capable of resulting in injury/or mortality²⁹. Pollution levels could be insufficient to kill Atlantic salmon but sufficient to cause mortality to prey species, and thus still have a deleterious effect on Atlantic salmon. Additionally, any changes to water quality, e.g. temperature, that could affect prey species may also affect rates of food intake in Atlantic salmon parr³⁰. Areas upstream of the SAC, and closer to the Proposed Development are unlikely to support a significant population of prey species that supplements the SAC as they are moved downstream. This is due to upland catchments typically supporting reduced macroinvertebrate populations with increased

²⁹ Benhadji, N., Kurniawan, S. B. and Imron, M. F. (2025). Review of mayflies (Insecta Ephemeroptera) as a bioindicator of heavy metals and microplastics in freshwater. *Science of the Total Environment*. 958.

³⁰ Simpson, A. L., Metcalfe, N. B., Huntingford, F. A. and Thorpe, J. E. (1996). Pronounced seasonal differences in appetite of Atlantic salmon parr, *Salmo salar*: effects of nutritional state and life-history strategy. *British Ecological Society*. 10(6): 760-767.



altitude³¹. When combined with weak pathways to the tributary north of the Site for water quality, significant effects on prey species are unlikely.

Brook lamprey and juvenile river lamprey passively feed on algae, bacteria and detritus and as such prey species will not be affected. Similarly, adult river lamprey will move into Loch Lomond to feed on fish species outwith the range of potential effect considered for the Proposed Development (10km maximum for aquatic features).

➤ Factor 6: Spread of invasive non-native species (INNS)

A screening parameter of the footprint of the Site plus 10km buffer was considered when assessing potential pathway of effect of INNS via hydrological spread and a maximum of 250m overland to account for potential dust pollution from vehicle/plant movements in the absence of mitigation.

Introduction of INNS via construction vehicles (e.g. tyre treads, dirty equipment) has been a historical source of establishment within Scotland. However, stringent biosecurity measures have reduced this significantly. Contractors are required to adhere to standard operational biosecurity measures underpinned by legal responsibilities in dealing with non-native species under the Wildlife and Countryside Act 1981 making it an offence to plant or otherwise cause to grow in the wild any non-native plant. Risk of INNS transfer is highest along the access track to the north of the Site where this lies approximately 200m from a tributary of the Endrick Water. However, at this distance and considering a thick stand of commercially planted coniferous woodland is situated between the track and the tributary there is no likely pathway for spread. Habitat assessments identified a small stand of giant hogweed (*Heracleum mantegazzianum*) immediately outwith the Site boundary, approximately 100m from the Site entry off the B818 road. Considering no works will occur within 100m of the stand of giant hogweed, there is considered to be no realistic pathway for introduction.

➤ Factor 7: Direct and indirect disturbance of predatory species

Terrestrial and avian predators of fish, e.g. otter and osprey, could be disturbed by the aforementioned stimuli and pressures, causing changes to core foraging ranges of species. Displacement of predators within the Site could result in temporary concentrations of predators increasing the predation burden on specific areas, such as within the Endrick Water. This has the potential to upset the predator – prey balance and may negatively affect aquatic prey species such as Atlantic salmon and/or lamprey (sp.) due to increased predation and/or create localised Site avoidance behaviour in response. However, when considering the availability of watercourses and waterbodies in the wider landscape outwith the SAC, including upstream areas of the Endrick Water, the Carron Valley Reservoir (which is a stocked fishery³²), the River Forth and Loch Lomond, there are sufficient resources that would not result in a disproportionate pressure within the SAC.

6.4.1.2 Operation

➤ Factor 8: Disturbance resulting from turbine operation, light, noise and maintenance

The operational phase requires all wind turbines will be fitted with medium intensity steady red lights on their highest practicable point. Given the distance of turbines from watercourses, the height of the lights and the use of red light that is less disturbing to species, it is unlikely that this will have an effect on qualifying species. Additionally, it is not anticipated that any

³¹ Powell, K. E., Oliver, T. H., Johns, T., Gonzalez-Suarez, M., England, J. and Roy, D. B. (2022). Abundance trends for river macroinvertebrates vary across taxa, trophic group and river typology. *Global Change Biology*.

³² Carron Valley Fishery. (2026). Guided Fishing. [Online] Available at: [Carron Valley Fishery | Trout Fishing Members' Club](#)



additional artificial lighting will be required, and it is unlikely that any significant effect to qualifying species will occur.

Noise may arise from a number of sources during operation including blade and gearbox noise. Offshore studies on the impacts of noise on fish found that fish only displayed strong responses to noise in the immediate vicinity of turbines, within a radius of no more than several hundred metres³³. Considering the distance between the nearest turbine and the SAC, qualifying fish species are unlikely to be affected.

Maintenance during the operational phase would be minimal with the Proposed Development largely controlled and managed remotely, however, personnel would still be required to service turbines. This is anticipated to be four annual visits by a team of up to three people. This is considered to be a low disturbance activity and considering current forestry operations ongoing within the Site, less disturbing than baseline conditions. Moreover, considering the distance between the turbines and the SAC, likely impacts from maintenance at the operational phase have been screened out and will not require further assessment.

➤ Factor 9: Catastrophic failure event

Catastrophic failure of turbine blades and/or full turbines has the potential to affect habitats and species during all phases of the Proposed Development through direct contact with falling debris, obstruction of watercourses from debris, disruption to soil contributing to increased soil erosion and/or surface run-off and localised air pollution from fires. Catastrophic failure is widely documented, but very rare, due to stringent health and safety standards developments must comply with. The likelihood of catastrophic failure is therefore very low.

Even in the unlikely event of catastrophic failure the distance between the SAC and nearest turbine, 3.03km, is not considered sufficient to incur adverse effect. Only one turbine, T1, has the potential to result in run off affecting the tributary to the north of the Site, however, this is c. 380m away and separated by dense commercial forestry plantation, as such it is unlikely that there would be a sufficient pathway to transfer pollutants to the SAC. All other turbines are located a minimum distance of 160m from watercourses, however, these drain into the Carron Valley Reservoir which is considered to dilute any pollutants beyond discernible limits.

➤ Factor 10: Changes in surface water quality or hydrological regime

Due to the limited occurrence and works that would be conducted by maintenance workers during the operational phase there is considered to be a limited pathway for the introduction of pollutants during operation of the Proposed Development. Introduction of pollutants is only considered likely to arise at watercourse crossings; such crossings are only located on watercourses that drain into the Carron Valley Reservoir which is not a viable pathway for pollutants given the dilution factor from the large volume of receptor water. For the Project In-combination with Other Developments

6.4.1.3 Other Developments included in the In-Combination Assessment

The assessment of potential 'in-combination' effects on the Endrick Water SAC has been informed by a review of available information on other consented and proposed developments within 10km of the Proposed Development.

Relevant data for these projects were accessed via the Stirling Council Planning Portal, the Energy Consents Unit (ECU) portal and relevant project websites. A list of projects considered in the in-combination assessment is provided in **Table 6-2**

³³ Hoffman, E., Astrup, J., Larsen, F. and Much-Petersen, S. (2000). Effects of marine windfarms on the distribution of fish, shellfish and marine mammals in the Horns Rev area. Report to ELSAMPROJEKT A/S. Baggrundsrapport nr. 24.



including their reasoning for being scoped in or out of the in-combination assessment.

Table 6-2 Other Developments considered for In-combination Effects

Project	Status	Distance from Site (km)	River Sub-Catchment (Catchment)	Reason for Scoping in/out of in-combination assessment
Considered in In-combination Assessment				
Earlsburn Wind Farm	Operational	520m N	Endrick Water (River Leven Catchment)	Hydrological connection
Shelloch Wind Farm	Consented	1.6km NW	Endrick Water (River Leven Catchment)	Hydrological connection
Earlsburn North (Kingsburn) Wind Farm	Operational	2.5km N	Endrick Water (River Leven Catchment)	Hydrological connection
Not Considered in In-Combination Assessment				
Craigannet Turbine	Operational	190m E	River Carron (River Forth Catchment)	No hydrological connection.
Craigengelt Wind Farm	Operational	480m NE	River Carron (River Forth Catchment)	No hydrological connection.
Drummarnock Wind Farm	In Planning	1km NE	River Carron (River Forth Catchment)	No hydrological connectivity.
Earlsburn Extension Wind Farm	Consented	2.7km N	Endrick Water (River Leven Catchment) and River Forth	No hydrological connection.

An assessment of the potential for in-combination effects on Endrick Water SAC, for the other plans or projects scoped into the in-combination assessment, is provided in **Table 6-3**.

Sources of impact, likely to result in adverse effect to the qualifying features from in-combination effects are set out in Section 6.2. Mitigation for other developments has not been included in this assessment where impacts prior to mitigation have been clearly outlined in the relevant assessments.



Table 6-3 Screening Assessment for In-combination effects on Endrick Water SAC

Project / Distance from Site (km)	Status	Assessment of Potential for In-Combination Effects
Earlsburn Wind Farm 520m N	Operational	Earlsburn Wind Farm is located wholly within the Endrick Water catchment. The wind farm is located on Cringate Law Hill with watercourses draining directly into the upper reaches of the Endrick Water. The furthest downstream point on the Endrick Water potentially at risk of surface run-off from turbines is approximately 4.35km upstream of the SAC and 1.65km upstream of the closest confluence with tributaries originating within the site. Similar to the Proposed Development it is assumed that migratory fish will be unable to access the site given the presence of downstream impassable barriers. Given the site has been operational for 19 years (2007), any pollution generated during the construction phase (both water and airborne) would have dissipated beyond detectable limits. Therefore, there is a very limited pathway for cumulative effect on water quality within the Endrick Water SAC. Due to works and presence within the site during the operational phase being limited to ad hoc visits by maintenance vehicles, there is not considered to be a sufficient pathway for significant in-combination effects. The wind farm lies fully outwith the SAC/Ramsar as such it is assumed there was no loss of qualifying habitats or associated species. It is concluded there the Proposed Development is unlikely to result in significant in-combination effects on the Endrick Water SAC.
Shelloch Wind Farm 1.6km NW	Consented	Shelloch Wind Farm is located wholly within the Endrick Water catchment. The Wind Farm has a number of unnamed watercourses draining into the Backside Burn, a major tributary in the Endrick Water catchment. The furthest downstream point on the Endrick Water potentially at risk of surface run-off from turbines is approximately 4.8km upstream of the SAC and 2.1km upstream of the closest confluence with tributaries originating within the Site. Similar to the Proposed Development it is assumed that migratory fish will be unable to access the Site given the presence of downstream impassable barriers. The construction period is predicted to last 12 months³⁴, however, no start/end date is provided in the project description documentation so it has to be assumed that construction could take place at the same time as the Proposed Development. Given the distances upstream and the location of infrastructure sited away from tributaries of the Backside Burn, it is considered that any pollution generated during the construction phase (both water and airborne) would have dissipated

³⁴ LUC. (2020). Shelloch Wind Farm EIAR Chapter 4: Scheme Development. [Online] Available at: [20_00840_FUL-CHAPTER_4_SCHEME_DESCRIPTION-792927.pdf](#)



Project / Distance from Site (km)	Status	Assessment of Potential for In-Combination Effects
		beyond detectable limits.. Therefore, there is a very limited pathway for cumulative effect on water quality within the Endrick Water SAC during construction. Due to works and presence within the Site being limited during the operational phase to ad hoc visits by maintenance vehicles, there is not considered to be a sufficient pathway for significant in-combination effects during operation. The site lies fully out with the SAC/Ramsar as such it is assumed there will be no loss of qualifying habitats or associated species. It is concluded there the Proposed Development is unlikely to result in significant in-combination effects on the Endrick Water SAC.
Earlsburn North (Kingsburn) Wind Farm 2.5km N	Operational	Earlsburn North / Kingsburn Wind Farm is located wholly within the Endrick Water catchment. The wind farm has a number of unnamed watercourses draining into the Backside Burn (adjacent to Shelloch Wind Farm), a major tributary in the Endrick Water catchment. The furthest downstream point on the Endrick Water potentially at risk of surface run-off from turbines is approximately 4.8km upstream of the SAC and 2.1km upstream of the closest confluence with tributaries originating within the Site. Similar to the Proposed Development it is assumed that migratory fish will be unable to access the Site given the presence of downstream impassable barriers. Given the site has been operational for 10 years (2016), any pollution generated during the construction phase (both water and airborne) would have dissipated beyond detectable limited. Therefore, there is a limited pathway for cumulative effect on water quality within the Endrick Water SAC. Due to works and presence within the site during the operational phase being limited to ad hoc visits by maintenance vehicles, there is not considered to be a sufficient pathway for significant in-combination effects. The site lies fully out with the SAC/Ramsar as such it is assumed there was no loss of qualifying habitats or associated species. It is concluded there the Proposed Development is unlikely to result in significant in-combination effects on the Endrick Water SAC.



6.5 Stage 3: Conclusion

This sHRA screening concludes that on the basis of objective evidence and in view of best scientific knowledge, that there will not be any LSE from the construction, operation, or decommissioning activities from the Proposed Development alone, or in combination with other plans or projects, on the following European and Ramsar sites:

- Endrick Water SAC;
- Flanders Mosses SAC;
- Firth of Forth SPA / Ramsar Site; and
- Slamannan Plateau SPA.



Appendix A Figures

Cairnoch Hill Wind Farm

Shadow Habitats Regulations Appraisal

Eurowind Energy Limited

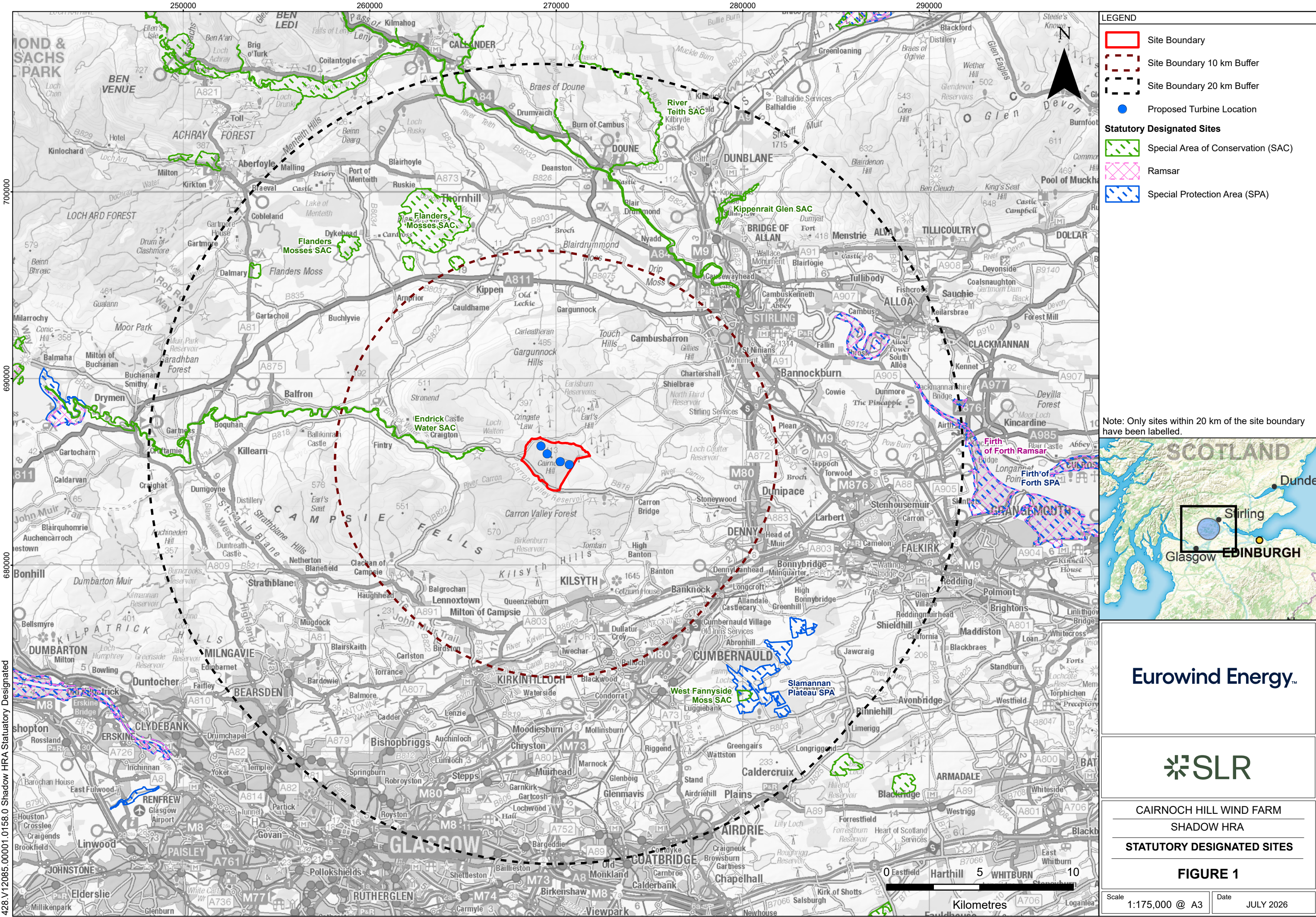
SLR Project No.: 428.V12085.00001

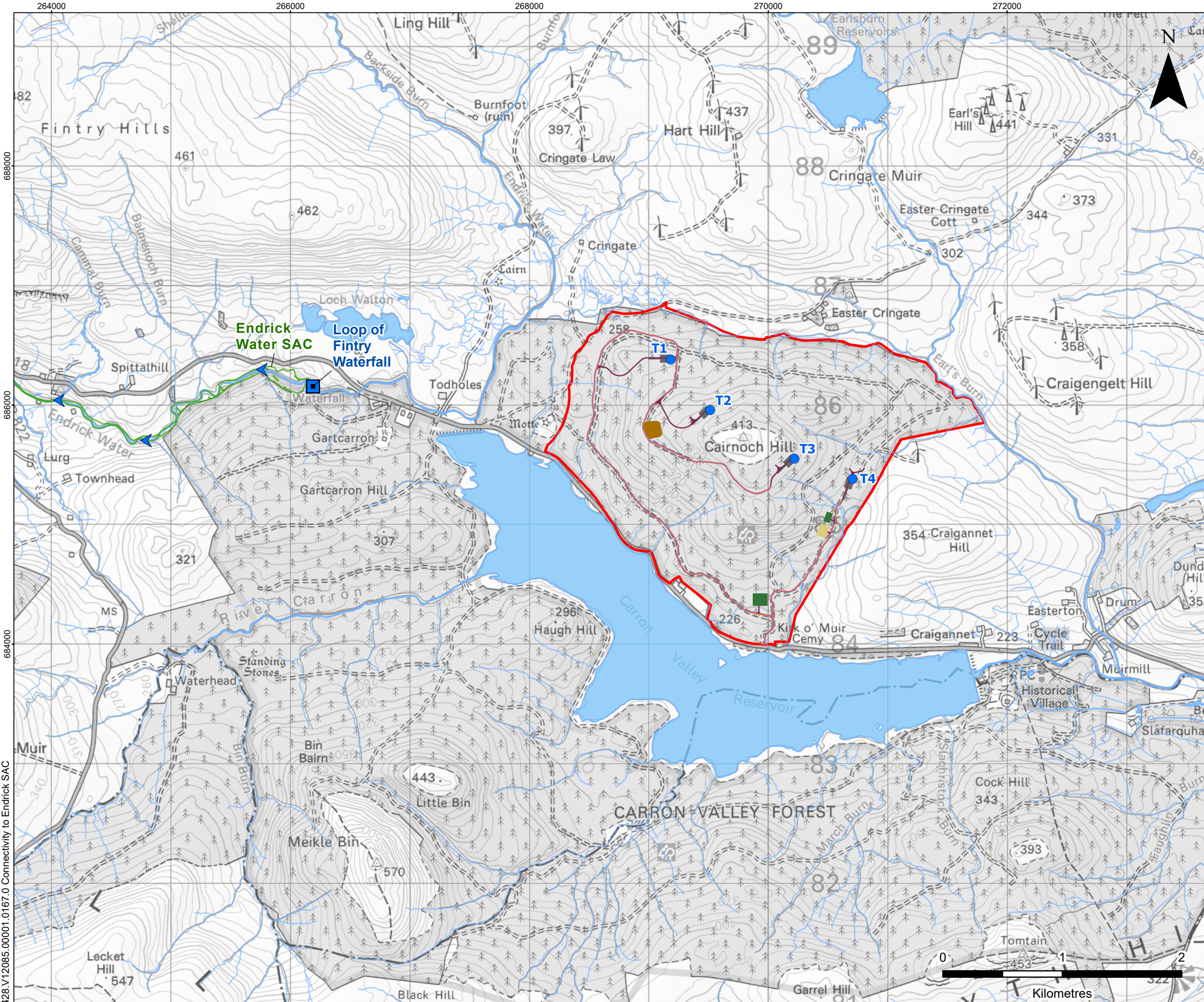
3 August 2026

Figure 1: Statutory Designated Sites

Figure 2: Connectivity to the Endrick Water SAC





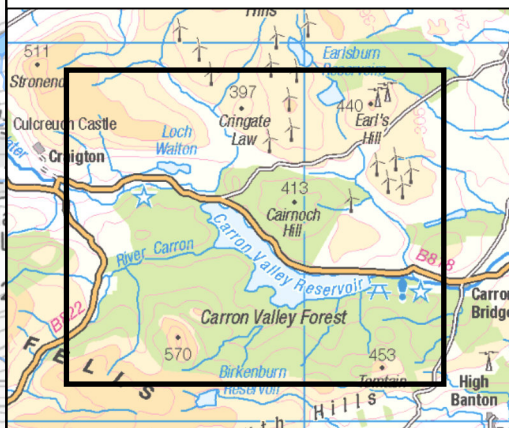


LEGEND

- 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)
- Loop of Fintry Waterfall
- Direction of Water Flow Within Endrick Water SAC

Statutory Designated Sites

- Endrick Water Special Area of Conservation (SAC)



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SLR

CAIRNOCH HILL WIND FARM
SHADOW HRA

CONNECTIVITY TO THE ENDRICK WATER SAC

FIGURE 2

Scale 1:30,000 @ A3 Date JULY 2026

Appendix B Conservation Advice Packages

Cairnoch Hill Wind Farm

Shadow Habitats Regulations Appraisal

Eurowind Energy Limited Limited

SLR Project No.: 428.V12085.00001

3 August 2026

Endrick Water SAC Conservation Advice Package
Flanders Mosses SAC Conservation Advice Package
Firth of Forth SPA Conservation Objectives
Slamannan Plateau SPA Conservation Objectives



Conservation Objectives for Endrick Water Special Area of Conservation

To avoid deterioration of the habitats of the qualifying species (listed below) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and

To ensure for the qualifying species that the following are maintained in the long term:

- **Population of the species, including range of genetic types for salmon, as a viable component of the site**
- **Distribution of the species within site**
- **Distribution and extent of habitats supporting the species**
- **Structure, function and supporting processes of habitats supporting the species**
- **No significant disturbance of the species**

Qualifying Species:

- Atlantic salmon
- Brook lamprey
- River lamprey

The site overlaps with Loch Lomond Special Protection Area

Conservation Objectives for Firth of Forth Special Protection Area

To avoid deterioration of the habitats of the qualifying species (listed below) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and

To ensure for the qualifying species that the following are maintained in the long term:

- Population of the species as a viable component of the site
- Distribution of the species within site
- Distribution and extent of habitats supporting the species
- Structure, function and supporting processes of habitats supporting the species
- No significant disturbance of the species

Qualifying Species:

- Bar-tailed godwit (*Limosa lapponica*)
- Common scoter (*Melanitta nigra*)*
- Cormorant (*Phalacrocorax carbo*)*
- Curlew (*Numenius arquata*)*
- Dunlin (*Calidris alpina alpina*)*
- Eider (*Somateria mollissima*)*
- Golden plover (*Pluvialis apricaria*)
- Goldeneye (*Bucephala clangula*)*
- Great crested grebe (*Podiceps cristatus*)*
- Grey plover (*Pluvialis squatarola*)*
- Knot (*Calidris canutus*)
- Lapwing (*Vanellus vanellus*)*
- Long-tailed duck (*Clangula hyemalis*) *
- Mallard (*Anas platyrhynchos*)*
- Oystercatcher (*Haematopus ostralegus*)*
- Pink-footed goose (*Anser brachyrhynchus*)
- Red-breasted merganser (*Mergus serrator*)*
- Redshank (*Tringa totanus*)
- Red-throated diver (*Gavia stellata*)
- Ringed plover (*Charadrius hiaticula*) *
- Sandwich tern (*Sterna sandvicensis*)
- Scaup (*Aythya marila*) *
- Shelduck (*Tadorna tadorna*)
- Slavonian grebe (*Podiceps auritus*)
- Turnstone (*Arenaria interpres*)
- Velvet scoter (*Melanitta fusca*)*
- Wigeon (*Anas penelope*)*

- Waterfowl assemblage

* indicates assemblage qualifier only

The site overlaps with Forth Islands Special Protection Area

FLANDERS MOSSES SPECIAL AREA OF CONSERVATION (SAC)

CONSERVATION ADVICE PACKAGE



Image: © NatureScot

Site Details

Site name:	Flanders Mosses
Map:	https://sitelink.nature.scot/site/8258
Location:	Eastern Scotland
Site code:	UK0012902
Area (ha):	1,073.33
Date designated:	17 March 2005

Qualifying Features

Qualifying feature	SCM assessed condition	SCM visit date	UK overall Conservation Status
Active raised bog [H7110]*	Unfavourable Recovering	1 July 2014	Unfavourable-Bad
Degraded raised bog [H7120]	Unfavourable Recovering	1 July 2014	Unfavourable-Bad

Notes:

Assessed condition refers to the condition of the SAC feature assessed at a site level as part of NatureScot's [Site Condition Monitoring \(SCM\)](#) programme.

Conservation status is the overall condition of the feature throughout its range within the UK as reported to the European Commission under Article 17 of the Habitats Directive in 2019.

* Habitats Directive priority habitat

Other overlapping Protected Areas

[Flanders Moss Site of Special Scientific Interest \(SSSI\)](#), [Collymoon Moss SSSI](#), [Offerance Moss SSSI](#), [Shirgarton Moss SSSI](#), [Killorn Moss SSSI](#) and [Flanders Moss National Nature Reserve \(NNR\)](#).

Key factors affecting the qualifying features

Active raised bogs

Raised bogs are slow-growing, entirely rain-fed, nutrient-poor ecosystems, raised above the surrounding mineral soil, and formed and maintained by waterlogging of an area.

The bogs survive because water losses are matched or exceeded by regular precipitation inputs, and in good conditions they remain waterlogged despite

sometimes being several metres above the surrounding land. The bog grows over time as vegetation dies off and the remains accumulate but only partially decompose.

Sphagnum mosses are the main bog-forming plant species on most bogs, and they are unable to survive unless they lie close to the water table. This means the living growing surface of the bog is closely tied to the shape of the water table within the bog, and the low levels of nutrients that exist.

These bogs can be very sensitive to any changes in their hydrological conditions. Such changes can include changes to water levels through alterations to drainage and climatic changes; alterations to the acidic conditions (typically a weakening of the acidity) that the vegetation communities need to persist; and physical damage to their structure, especially to their surface layers. The feature has been assessed through NatureScot's site condition monitoring programme as being in unfavourable condition at this SAC due to the cover of non-desirable woody species on the rand and margins of the bog and the frequency of non-desirable woody species on mire being above acceptable thresholds. However there have been a number of management interventions across the SAC to remove trees and block ditches through a combination of Peatland Action funds, SNH (NatureScot) Management Agreements and Agri Environment Climate Scheme Contracts. Therefore the overall assessment is unfavourable recovering.

A fuller account of the habitat can be found [here](#).

Degraded raised bogs

Degraded raised bogs are entirely rain-fed, nutrient-poor ecosystems, raised above the surrounding mineral soil, and formed by waterlogging of an area. They differ from active raised bogs as they are not currently forming peat. They will have also been subject to changes that have caused deterioration to their hydrology, structure and / or vegetation, usually through land management, either on the bog or nearby. Degraded raised bogs selected for designation are those that are capable of regeneration, for example with appropriate rehabilitation management.

The degraded bog on Flanders Mosses SAC is located on the periphery of the Flanders Moss SSSI on the relic gull colony to the east of the Flanders Moss SSSI. There is minimal degraded raised bog habitat also located at Killorn Moss SSSI.

Degraded raised bogs are important in the SAC series, mainly due to the habitat's potential to be restored to active raised bog, and thus contribute to attaining favourable conservation status for raised bogs as a whole.

The feature has been assessed through NatureScot's site condition monitoring programme as being in unfavourable condition at this SAC due to breaching acceptable limits of non-desirable woody species on the rand and margins of the bog, as well as the presence of *Polytrichum* species other than *P. strictum* (*alpestre*),

and *Juncus effusus*. However management measures are in place as described above, to encourage peat to reform and return these areas into active raised bog habitat. Where the relic gull colony (that for many years was situated on the north-east dome of Flanders Moss SSSI, east of the lochan) has impacted the site there is no mechanism to accelerate the recovery to active raised bog other than allowing natural recovery. However, the overall assessment is unfavourable recovering.

A fuller account of the habitat can be found [here](#).

Conservation Priorities

The overall objectives for this SAC are to restore the healthy condition of the areas of active raised bog, and to restore the areas of degraded raised bog to become active raised bog.

Conservation Objectives

Active and degraded raised bogs are considered separate habitat types for the purposes of designating SACs. However as the aim is to restore degraded raised bog habitat to active raised bog, and both are hydrologically linked, they have been considered together within the conservation objectives.

Conservation Objectives for active raised bogs and degraded raised bogs

1. To ensure that the qualifying features of Flanders Mosses SAC are in favourable condition and make an appropriate contribution to achieving favourable conservation status
--

Favourable Conservation Status (FCS) is considered at a European biogeographic level. When determining whether management measures may be required to ensure that the conservation objectives for this site are achieved, the focus should be on maintaining or restoring the contribution that this site makes to FCS.

When carrying out appraisals of plans and projects against these conservation objectives, it is not necessary to understand the status of the feature in other SACs in this biogeographic region. The purpose of the appraisal should be to understand whether the integrity of the site (see objective 2) would be maintained. If this is the case then its contribution to FCS across the Atlantic Biogeographic Region will continue to be met. Further details on how these appraisals should be carried out in relation to maintaining site integrity is provided by objective 2 (including parts a, b and c). If broader information on the feature is available then it should be used to provide context to the site-based appraisal.

Note that “appropriate” within this part of the conservation objectives is included to indicate that the contribution to FCS varies from site to site and feature to feature.

2. To ensure that the integrity of Flanders Mosses SAC is restored by meeting objectives 2a, 2b and 2c

The aim at this SAC is to restore the areas of degraded raised bog habitat to active raised bog, and to restore the active raised bog habitat to favourable condition, as a contribution to wider raised bog conservation status. Therefore any impacts to the objectives shown in 2a, 2b, or 2c below must not persist so that they prevent the achievement of this overall aim.

When carrying out appraisals of plans or projects the focus should be on restoring site integrity, and ensuring that they do not prevent restoration of the raised bog habitat, specifically by meeting the objectives outlined in 2a, 2b and 2c. If these are met then site integrity will be restored. Note that not all of these will be relevant for every activity being considered. Any impacts on the objectives shown in 2a, 2b or 2c below must not persist so that they prevent the restoration of site integrity. Temporary impacts on these objectives resulting from plans or projects can only be permitted where they do not prevent the ability of the feature to recover and there is certainty that the features will be able to quickly recover.

This objective recognises that the qualifying habitat is exposed to a wide range of drivers of change. Some of these are natural and are not a direct result of human influences. Such changes in the habitat's extent, distribution or condition within the site which are brought about by natural processes, directly or indirectly, are normally considered compatible with the site's conservation objectives. An assessment of whether a change is natural or anthropogenic, or a combination of both, will need to be looked at on a case by case basis.

2a. Maintain the extent and distribution of the habitat within the site

There should be no reduction in the extent and distribution of raised bog habitat within the site. The extent of active raised bog should be increased where possible through regeneration and through restoration of the degraded raised bog feature. This will mean areas defined as degraded raised bog will decline in extent over time as active raised bog areas increase. The aim is to increase the extent of active raised bog on the site to at least 966ha.

2b. Restore the structure, function and supporting processes of the habitat

The slow formation of raised bogs, and their typical domed shape, means they rely heavily on specific hydrological conditions. Degraded raised bogs will likely have been subject to some deterioration of these conditions. The natural hydrology of this site should be maintained with no modifications, both within and outwith the site, that may negatively change the hydrology of the site (e.g. by the digging or deepening of ditches, or by excessive vehicle usage).

Historical damage of the interest is primarily through drainage, afforestation and peat cutting for horticulture purposes. Degraded raised bog is located primarily on the Flanders Moss SSSI and NNR, at the periphery of the SSSI but also in the location of the historical black-headed gull colony in the north-east of the Flanders Moss SSSI component of the SAC. There is limited extent of degraded raised bog on the satellite SSSIs. NatureScot, together with other Flanders Moss SSSI owners, have undertaken restoration works covering a significant area of the SAC. This has involved installing dams and removing trees and stumps to prevent water from leaving the site and raising the water table to near surface levels

There are no management prescriptions available to restore the area of the gull colony and it is anticipated that over time the nutrient levels will reduce and active raised bog will return but this is likely to be a slow process and take many years.

Ditch damming and scrub removal has also taken place on Shirgaton Moss, Offerance Moss

and Killorn Moss SSSI's through various funding mechanisms.

Active raised bogs typically display a distinctive micro-topography, with patterns of hummocks and hollows rich in *Sphagnum* mosses and other peat forming species. This habitat structure should also be maintained and where necessary improved. Any increases in drainage can cause deterioration in the bog's mosaic of habitats through drying out and shrinkage of the peat. Burning and vehicle use can also impair the topography, natural functions and processes of the raised bog habitat. Excessive trampling and inappropriate grazing regimes can also contribute to deterioration in the habitat structure.

Overgrazing can cause poaching, damaging and dislodging the surface vegetation of *Sphagnum* mosses and other bog species, resulting in areas of bare peat and erosion. Light grazing with appropriate numbers and types of stock can help to suppress the encroachment of young trees and scrub, and can help to lessen the dominance of *Calluna vulgaris*. This is particularly the case on sites where the hydrology has been modified and water levels are not sufficiently high to suppress tree establishment. Grazing levels should be set with reference to the condition at this site and other land management measures, to ensure the maintenance of the vegetation communities and bog structure and function across the whole of the site. Where possible it is preferable to graze the bog in association with adjacent drier land and, where this is the case, stocking rates should be set to reflect the areas and types of habitats being grazed (bog, lagg fen and adjacent land). Grazing regimes should be sufficiently flexible to take into account variations in water levels and ground conditions within and between years.

Trees and scrub can cause the habitat to dry out through transpiration and should be no more than occasional on the bog, although they can be slightly more frequent on the rand (the sloping bog margin) and lagg (an area of wetland at the edge of the bog). Generally tree cover should not be increasing on site. The likelihood of the establishment of scrub or non-native invasive species on the bog surface is increased where the hydrology has already been compromised by drainage, planting or peat cutting.

The remaining lagg fen is a component of the raised bog. It supports the raised bog, and acts in part as a buffer, and therefore the maintenance of the lagg fen is important in maintaining the structure and function of the raised bog. There are two areas of original lagg fen habitat located on the western boundary of the Flanders Moss SSSI, the satellite SSSI bogs have limited or no lagg fen habitat to any great extent as they have peripheral ditches abutted by either forestry or agricultural land holdings.

Bunding has been constructed along 2.4 km of the northern edge of the Flanders Moss SSSI / NNR boundary so slowing down the flow of water off the peat body, raising the water table with the designated site and creating lagg fen on the edge of that part of the designated site. This is just the start of the restoration process and the impact on the water table in the peat body and the peripheral fen habitat could take a long time to develop.

Burning can destroy areas of habitat leading to drying out, a loss of *Sphagnum*, a loss of diversity of dwarf-shrubs with increasing dominance by *Calluna vulgaris* (heather), exposed peat, possibly encouraging grass species not typical of this habitat, and altering the chemistry in its vicinity. Burning should therefore be avoided.

Nutrient enrichment via aerial deposition of nitrogen may negatively affect the condition of the typical bog species. The critical load for nitrogen for this habitat is 5kg/ha/yr. The characteristic bog species, such as *Sphagnum*, are dependent on low nutrient conditions and, in the long term, nutrient enrichment would favour the growth of dwarf shrub species and grasses over the bog-building *Sphagnum* mosses. There should therefore be no alteration to the acidic conditions needed for the bog species to be maintained, or where

necessary restored. The Air Pollution Information System (www.apis.ac.uk/src1) identified a three year average Nitrogen deposition rate for Flanders Moss SAC of 11.5kg N/ha/yr between 2015-17. The SAC is likely, therefore, to experience some level of eutrophication. Increases in Nitrogen inputs to the site should therefore be avoided. Bogs that have been hydrologically compromised are more sensitive to the effects of Nitrogen deposition and therefore the natural hydrology of this site should be maintained or where appropriate restored.

2c. Restore the distribution and viability of typical species of the habitat

The typical species, and those which are key for the active raised bog, are those that have a role as the main bog-builders. These are mainly *Sphagnum* species, and especially include;

<i>Sphagnum capillifolium</i>	red bog-moss
<i>S. papillosum</i>	papillose bog-moss
<i>S. magellanicum</i>	magellanic bog-moss
<i>S. cuspidatum</i>	feathery bog-moss (in pools)

S. austinii (Austin's Bog-moss) is a locally regionally rare sphagnum but can be found both on Flanders Moss SSSI and Offerance Moss SSSI components of the SAC.

Andromeda polifolia (bog rosemary) and *Rhynchospora alba* (white beak-sedge) have restricted distributions and can also be found at both Flanders Moss and Offerance Moss. New populations of *Sphagnum fuscum* and *Sphagnum beothuk* are also found on Flanders Moss SSSI.

Other characteristic bog species such as cotton grasses (*Eriophorum* species), heather (*Calluna vulgaris*) and other ericaceous plants, and the carnivorous sundews (*Drosera* species) should also be considered typical species.

Flanders Moss is home to the bog sun jumper (*Heliophanis dampfi*) and a wide variety of rare moth species and these invertebrates need a range of vegetation states. Over grazing or scrubbing over of the site will reduce available niches for features of the designated site.

The floral distribution within the raised bog habitat, and its continued viability, relies heavily on the presence of small variations in height above the water table across the hummocks and hollows of the bog. Therefore the hydrology of the site (including water levels and drainage) is crucial to sustain this mosaic and floral distribution.

Excessive trampling, and inappropriate grazing regimes can contribute to deterioration in the habitat structure, having harmful effects on the typical species, and grazing should only be done in a controlled, appropriate manner that does not prevent restoration of the habitat or its continued maintenance.

Areas of the SAC are being damaged by large numbers of deer tracking through active and degraded raised bog habitat. Although not presently contributing to the unfavourable condition, this deer damage is being controlled in the wider Flanders area under a Section 10 agreement due to the combination of damage to agriculture and forestry as well as the natural heritage interests.

Alterations to the acidic conditions through nutrient enrichment should also be avoided.

Conservation Measures

Flanders Mosses SAC is notified as a Site of Special Scientific Interest and management changes described on the list of Operations Requiring Consent must have prior consent from SNH (NatureScot).

Current and recommended management for active and degraded raised bog

Issue	Measure	Responsible party
Herbivore impacts	Maintain grazing on the bog at levels low enough to avoid damage through trampling and overgrazing, but sufficient to maintain an open vegetation structure and prevent encroachment of trees and scrub. Currently about 1/8 of Flanders Moss SSSI is grazed by sheep and cattle with plans to extend this to enable further, very low levels of grazing across the site. Effective, co-ordinated deer control and monitoring of deer damage through regular bare peat surveys.	Land managers, FLS, NatureScot, Deer Management Groups, Lowland Deer Network
Habitat Management	The majority of the Flanders Moss SSSI is also part of the Flanders Moss National Nature Reserve (NNR). These areas are managed in accordance with an approved NNR management plan. The plan sets out conservation measures to be carried out on the NNR.	NatureScot, landowners, land managers.
Excessive water loss	Damming of ditches has taken place across all of the SSSI that are components of the SAC using a variety of techniques, mainly plastic piling and peat dams. These have been funded through Management Agreements, Agri-Environment funds and through Peatland Action and the Eco- Co EU Life project. The maintenance of these dams is imperative to maintain the water to near surface level. Water levels on Flanders Moss are monitored through a comprehensive monitoring system to check the effectiveness of the management measures.	Land owners and land managers
Scrub management	The cover of scrub on the site will continue to be monitored and removal work (co-ordinated by the NNR management team) undertaken	NatureScot

	as necessary. Some scrub is required to support important invertebrate populations	
Research and monitoring	To identify emerging impacts on the habitat and their causes, in order to understand the long term issues, and to inform future management of the habitat across Scotland.	NatureScot, Universities, land managers
Nutrient enrichment from aerial deposition of nitrogen	Bogs that have been hydrologically compromised are more sensitive to the effects of Nitrogen deposition and therefore the natural hydrology of this site should be maintained or where appropriate restored. Increases in Nitrogen inputs to the site should be avoided.	NatureScot, land managers, SEPA

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Approved on 13 February 2020 by:



Conservation Objectives for Slamannan Plateau Special Protection Area

To avoid deterioration of the habitats of the qualifying species (listed below) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and

To ensure for the qualifying species that the following are maintained in the long term:

- **Population of the species as a viable component of the site**
- **Distribution of the species within site**
- **Distribution and extent of habitats supporting the species**
- **Structure, function and supporting processes of habitats supporting the species**
- **No significant disturbance of the species**

Qualifying Species:

- Taiga bean goose (*Anser fabalis fabalis*)

The site overlaps with West Fannyside Moss Special Area of Conservation



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