# Chapter 8
## Ecology

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Technical Appendix 8.3: Fish Habitat Assessment Report

Technical Appendix 8.4: Freshwater Pearl Mussel Survey Report

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# Chapter 8
# Ecology

## 8.1 Executive summary

1. The potential effects of the proposed Development on habitats and non-avian animal species during the construction and operation have been assessed.

2. Information relating to protected and notable species and habitats in the vicinity of the Site, and designated nature conservation sites is provided. A radius of 10 km was applied for records of bats and for Statutory Designated Sites, and 2 km for non-statutory sites and for recent records of legally protected or otherwise notable species.

3. Most baseline surveys were conducted during the period October 2019, and May/June and October 2020. Surveys undertaken included surveys for a range of terrestrial mammal species and freshwater pearl mussel, vegetation surveys and fish habitat assessment surveys. Bat surveys were undertaken during 2018 and 2019.

4. There are ten Statutory Designated Sites within a 10 km radius of the Site, two Special Areas of Conservation (SAC), one Special Protection Area (SPA) and seven Sites of Special Scientific Interest (SSSI). However, there is no potential for significant ecological effects upon any of these sites due to distance (the closest of these sites (designated for ecological reasons) is located 4.93 km from the Site boundary) and lack of hydrological connections or other pathways for effects.

5. There are two Local Wildlife Sites (LWS) within 2 km of the proposed Development. Glenmaddie Wood LWS was scoped out due to distance and lack of hydrological pathways; however, Afton Uplands Provisional LWS was assessed as it overlaps the proposed Access Route A and will be affected by habitat loss in this area. The closest area of Ancient Woodland is located 132 m from the Site and was scoped out of assessment due to lack of pathways to impact.

6. The Site is predominantly characterised by commercial forestry, with open areas dominated by acid grassland, dry and wet heath, marshy grassland, blanket bog and modified bog. Smaller areas of flush and spring habitats including basic flushes, calcareous grassland, broad leaved woodland, neutral grassland and improved grassland were present. Some habitats including those that may be partially lost due to construction were identified as being potentially groundwater dependent. A detailed assessment, presented in **Chapter 10: Hydrology, Hydrogeology, Geology and Soils - Technical Appendix: 10.3**, confirmed that these most of these habitats were sustained by incidental rainfall and surface water rather than groundwater, with the exception of a number of groundwater springs recorded near proposed Borrow Pit BP07 which are Groundwater Dependent Terrestrial Ecosystems (GWDTE).

7. The proposed Development has been designed to minimise the loss of more sensitive natural habitats where possible including blanket bog and flush/ spring habitats. The proposals would result in the direct loss, and indirect/temporary loss, of up to 9.79 ha of locally-regionally important blanket bog (typically degraded, see **Technical Appendix 8.2: Phase 1 Habitat and National Vegetation Classification (NVC) Survey Report**), and up to 3.24 ha of locally important modified bog habitat. The loss will be compensated for through measures aimed at restoring up to 23 ha of peatland habitat via tree clearance and subsequent mechanical bog restoration, which would be delivered via a Habitat Management Plan (see **Technical Appendix 8.8: Habitat Management Plan**).

8. No plant species listed on Schedule 8 of the Wildlife and Countryside Act were identified within the Site. Scottish Biodiversity List species mossy saxifrage was recorded at multiple locations along the proposed Access Route A between Hare Hill and Euchanhead, typically in association with habitat classification M32; mitigation to protect GWDTE should prevent impacts to this species. A stand of the Schedule 9 invasive non-native species Himalayan Balsam was identified near Shinnelhead; however, following a reduction of the site boundary this is now outwith the proposed Development area and will not be affected.

9. There is potential for the non-native American Signal Crayfish to be present onsite and pre-construction surveys for this species will be carried out to inform mitigation. Mitigation to prevent spread from the Dee / Ken catchment into the Nith catchment will be particularly important where watercourses from both these catchments are in close proximity in the Polskeoch area.

10. The Polvaddoch Burn, Scaur Water, Rashy Grain and Shinnel/ Fingland provide good habitat for fish and are considered to be of Regional value. All other watercourses within the study area of good or above habitat quality for fish were considered of Local value. Except for watercourse crossings, suitable buffer distances have been maintained between all infrastructure and watercourses. Following the implementation of good practice pollution prevention measures (see **Chapter 3, Appendix 3.1 Draft CEMP** and **Chapter 10: Hydrology, Hydrogeology, Geology and Soils**), the likelihood of a pollution event within downstream watercourses is considered low, and therefore no significant effects upon salmonids are considered likely. However, as a precaution, pre, during and post construction fish monitoring would be carried out. In addition, all new and upgraded culverts will be designed to allow fish passage and subject to agreement with the landowner, SPR would also provide support to Nith District Salmon Fisheries Board and Galloway Fisheries Trust to improve the suitability of other watercourse crossings within the Site for fish passage, even where not directly affected by the proposed Development.

11. There would be a small loss of habitat which could be used by otters and water vole due to the creation and upgrading of watercourse crossings for the proposed Development. This is not considered to lead to significant effects. Following the implementation of good practice measures, no significant effects upon otter or water vole are likely.

12. Evidence of pine marten and red squirrel presence was recorded, and one potential pine marten den was identified. There would be a loss of suitable habitat for these species although similar habitat is available in the surrounding area. Following the implementation of good practice measures, no significant effects upon pine marten or red squirrel are likely.

13. Bat surveys, undertaken during 2018 and 2019, identified at least six bat species within the Site. Two structures used by *Pipistrellus* bats for roosting were identified, one of which, the Bothy, supported a soprano pipistrelle maternity roost. Neither structure will be directly affected by the proposed Development, although the maternity roost lies close to an existing access track which may require upgrading. The existing access track is a main forestry haul road so the bats must be habituated to regular movements by heavy goods vehicles and are therefore unlikely to be affected by the usage of the track during construction. In addition, as a precaution if the roost is occupied, any works to upgrade the track within 100 m of the Bothy will not take place during the maternity period (June to August inclusive), when the risk of disturbance affecting bats is greatest. Disturbance to the roost will be avoided and no significant effects on bats during construction are therefore likely.

14. The assessment of impacts on bats during operation was carried out in accordance with current guidance and found that the proposed Development poses a medium risk to *Nyctalus* and *Pipistrellus* bat species and fatality rates have the potential to be high for both species groups. Embedded mitigation will take the form of creating a stand-off of 50 m or more between linear features and turbine blade tips, however due to the predicted risk level additional mitigation is also proposed, which is described in **Technical Appendix 8.10: Bat Mitigation and Monitoring Plan.**

15. No significant effects are predicted for any other protected or notable animal species, and no potential significant cumulative impacts were identified.

# 8.2 Introduction

16. This Chapter describes and evaluates the current nature conservation interest of the Site and surrounding area. It goes on to assess the potential effects of the proposed Development on important habitats and species and, where necessary, to describe proposed mitigation, compensation and enhancement measures. This Chapter considers habitats and non-avian animal species. Potential effects on birds are considered separately in **Chapter 9: Ornithology**. Together **Chapters 8 and 9** provide an assessment of the potential effects of the proposed Development on biodiversity.

17. The assessment of impacts has been made on the basis of the proposed turbine and infrastructure layout as fully described in **Chapter 3: Description of the proposed Development.**

18. This Chapter is supported by a number of Technical Appendices, as listed below:

- Technical Appendix 8.1: Desk Study Report;
- Technical Appendix 8.2: Phase 1 Habitat and National Vegetation Classification (NVC) Survey Report;
- Technical Appendix 8.3: Fish Habitat Assessment Report;
- Technical Appendix 8.4: Freshwater Pearl Mussel Survey Report;
- Technical Appendix 8.5: Mammal Survey Report;
- Technical Appendix 8.6: Bat Survey Report 2018;
- Technical Appendix 8.7: Bat Survey Report 2019;
- Technical Appendix 8.8: Draft Habitat Management Plan (HMP);
- Technical Appendix 8.9: Ecobat Output for the 2018 Bat Survey; and
- Technical Appendix 8.10 Bat Mitigation and Monitoring Plan.

# 8.3 Legislation, planning policy and guidance

### 8.3.1 Legislation

19. The ecological assessment has been undertaken with reference to the following legislation:

- the EC Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora);
- the Wildlife and Countryside Act 1981 (as amended in Scotland);
- the Wildlife and Natural Environment (Scotland) Act 2011;
- the Nature Conservation (Scotland) Act 2004;
- the Conservation (Natural Habitats, &c.) Regulations 1994 (the Habitats Regulations) (as amended in Scotland);
- the Protection of Badgers Act 1992 (as amended by the Nature Conservation (Scotland) Act 2004); and
- the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003.

### 8.3.2 Policy

20. Planning policies relevant to non-avian ecology are summarised below.

21. Scottish Planning Policy (SPP) identifies that biodiversity is important because it provides natural services and products which we rely on, that it is an important element of sustainable development and makes an essential contribution to the economy and cultural heritage of Scotland. All Public Bodies in Scotland, including planning authorities, have a duty to '*further the conservation of biodiversity*' under the Nature Conservation (Scotland) Act 2004 and the SPP highlights that this should be reflected in development plans and development management decisions.

22. The Dumfries and Galloway Local Development Plan 2 (LDP2), was formally adopted in October 2019 by Dumfries & Galloway Council (DGC). It provides the planning framework for Dumfries and Galloway. It contains a number of policies relating to development and land use in Dumfries and Galloway. Those relevant to this assessment include the overarching policies:

- OP1 - Development Considerations;
- OP2 - Design Quality and Placemaking; and
- OP3 - Developer Contributions.

23. Relevant LDP2 policies relating directly to the natural environment include:

- NE1: National Scenic Areas
- NE2: Regional Scenic Areas
- NE3: Areas of Wild Land
- NE4: Sites of International Importance for Biodiversity
- NE5: Species of International Importance
- NE6: Sites of National Importance for Biodiversity and Geodiversity

- NE7: Forestry and Woodland
- NE8: Trees and Development
- NE9: Developed and Undeveloped Coast
- NE10: Erosion and Coastal Protection
- NE11: Supporting the Water Environment
- NE12: Protection of Water Margins
- NE13: Agricultural Soil
- NE14: Carbon Rich Soil
- NE15: Protection and Restoration of Peat Deposits as Carbon Sinks

24. Other LDP2 polices of particular relevance to a renewable energy development at the Site include:

- ED11 - Galloway and Southern Ayrshire Biosphere
- IN1 - Renewable Energy
- IN2 - Wind Energy

25. Planning Advice Note (PAN) 60: Planning for Natural Heritage (Scottish Government, 2008) provides details on how development and the planning system can contribute to the conservation, enhancement, enjoyment and understanding of Scotland's natural environment and encourages developers and planning authorities to be positive and creative in addressing natural heritage issues.

### 8.3.3 Guidance

26. Other documents and guidance reviewed and applied in the ecological assessment are outlined below (see also References Section at the end of this Chapter):

- Guidelines for Ecological Impact Assessment (EcIA) in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine Chartered Institute of Ecology and Environmental Management (CIEEM), (CIEEM, 2018);
- Scottish Natural Heritage (SNH[1]) general pre-application/ scoping advice to developers of onshore wind farms (SNH, 2020);
- Bats and onshore wind turbines: survey, assessment and mitigation (Scottish Natural Heritage, et al., 2019);
- Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems (GWDTEs), (SEPA, 2017); and
- Good Practice during Wind Farm Construction (SNH, 2019).

27. The Scottish Biodiversity List (SBL) (Scottish Government, 2013) lists animals, plants and habitats that the Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland. Both scientific and social criteria have been used to define the SBL. Scientific criteria include all Priority Species and Priority Habitats included in the now superseded UK Biodiversity Action Plan (BAP) (UK Biodiversity Partnership, 2007 *et seq*. (Joint Nature Conservation Committee (JNCC), 2016)), which occur in Scotland. Social criteria are based on the results of an omnibus survey of the Scottish public carried out in 2006, so it should, therefore, be noted that not all SBL species and habitats are necessarily rare or protected.

28. The Dumfries and Galloway Local Biodiversity Action Plan (LBAP) lists local priority habitats and species (DGC, 2009). Local priority habitats of most relevance to the Site include river head waters, upland springs and flushes, purple moor grass and rush pastures, blanket bog, acid grassland, montane moss heath, and upland heaths. Local priority species of most relevance to the Site include: mossy saxifrage, marsh stitchwort, Atlantic salmon, red squirrel, water vole, otter, soprano pipistrelle, common pipistrelle, brown long eared bat, noctule bat, Leisler's bat and Daubenton's bat; and a range of invertebrates including pearl bordered fritillary butterfly, small pearl bordered fritillary, azure hawker dragonfly, and freshwater pearl mussel.

[1] SNH were renamed to NatureScot on 24 August 2020.

# 8.4 Scope and consultation

### 8.4.1 Consultation and Scoping Responses

29. SPR undertook direct scoping with relevant stakeholders in February 2020. Scoping responses containing comments relating to non-avian ecology were obtained from the following organisations:

- East Ayrshire Council (EAC);
- SNH;
- SEPA;
- Marine Scotland (MS);
- Nith District Salmon Fisheries Board (NDSFB);
- Galloway Fisheries Trust (GFT); and
- Royal Society for the Protection of Birds (RSPB).

30. A request for scoping comments was also sent to DGC but no response was received.

31. A summary of the key points from the relevant scoping responses and consultations, and details of how comments have been addressed in the EIA Report are provided in **Table 8.1**.

Table 8.1: Key issues raised during the scoping process

| Consultee | Summary of Key Issues/ responses to consultees | Where addressed in Chapter |
|---|---|---|
| East Ayrshire Council | The council is broadly content that Muirkirk and North Lowther Uplands SPA and North Lowther Uplands SSSI will be scoped out from the terrestrial ecology assessment, and with the conclusions of the ecology desk study. | Section 8.6.1<br>**Appendix 8.1: Desk Study** |
| Galloway Fisheries Trust | GFT asked for confirmation that watercourses within the Water of Ken catchment on the Site had been included in fish habitat surveys and if this information was used to inform site layout. *We confirmed that it had and provided GFT with a copy of the data.*<br><br>GFT raised that fisheries surveys including electrofishing should be undertaken pre-construction. *We confirmed that we would include recommendations for a fish monitoring program in the EIA, which would include baseline fish surveys post-consent/ pre-construction and that GFT should be consulted during the preparation of this plan.*<br><br>GFT recommended traditional surveys for freshwater pearl mussel rather than eDNA. *We agreed to this approach.*<br><br>GFT raised that there are vulnerable populations of brown trout in the watercourses on the Site that are within the Water of Ken Catchment that cannot be replenished by sea trout progeny due to the absence of a fish pass at the Kendoon Dam. *We have taken this into account in our assessment.* | **Appendices 8.3: Fish Habitat Survey and 8.4: Fresh Water Pearl Mussel (FWPM) surveys**<br><br>Paragraph 156 - fish monitoring plan<br><br>**Appendix 8.4: FWPM Survey Results**<br><br>Paragraph 174- Fisheries impact assessment |
| Marine Scotland | Recommend that we consult their generic scoping guidelines (https://www2.gov.scot/Topics/marine/Salmon-Trout-Coarse/Freshwater/Research/onshoreren) which outline the potential impacts on fish and fisheries associated with wind farm developments. | Paragraph 174- Fisheries impact assessment |
| Scottish Natural Heritage | The level of survey effort indicated here is appropriate as long as the otter and water vole surveys are rerun in more suitable conditions, as proposed. *Otter and water vole survey were repeated in May/ June 2020.*<br><br>We can accept the pre-2019 guidance bat survey data for the Euchanhead area from 2018 if the EIA is to be presented in 2020. If the EIA is not submitted this year, then the 2018 data will be out of date. Following the covid-19 pandemic SNH subsequently confirmed that: due to these unpredictable | **Appendix 8.5: Mammal Survey Report**<br><br>**Appendix 8.6 and 8.7- Bat Survey Reports** |

| Consultee | Summary of Key Issues/ responses to consultees | Where addressed in Chapter |
|---|---|---|
| | times that they would accept the 2018 bat data if there was a delay in our submission due to Covid-19.<br><br>SNH are not aware of a recognised eDNA technique that we can be confident will work with freshwater pearl mussel. A traditional survey was be recommended at present. *Traditional FWMP surveys were undertaken.* | **Appendix 8.4: FWPM Survey Results** |
| Royal Society for the Protection of Birds | RSPB note that there will need to be felling and permanent tree removal as part of the proposed Development. When considering any restocking plans, priority should be given to planting broadleaved species that would benefit species like black grouse, and these tree species should include birch, rowan, aspen, willow, alder and scots pine. Every effort should be made to ensure that this planting takes place within currently existing forestry footprints or suitable areas, avoiding any current open hill ground which could be sensitive for foraging raptors or other open ground species. RSPB would welcome the opportunity to input on any forest designs, particularly as part of a wider habitat mitigation plan. | **Appendix 8.8: Draft HMP** |
| Scottish Environmental Protection Agency | SEPA raised that they consider it essential that Ground Water Dependant Terrestrial Ecosystems and their buffers are mapped as part of the EIA process.<br><br>In addition, they stated: We note that a National Vegetation Classification (NVC) survey has been undertaken and that blanket bog, wet and dry modified bog, and marshy grassland habitats have all been found onsite. We therefore require that GWDTEs are scoped into the Environmental Report. | **Appendix 8.2: Phase 1 Habitat & NVC Surveys Report Report**<br><br>**Chapter 10: Hydrology**, **Appendix 10.3: GWDTE Assessment** |
| Nith District Salmon Fisheries Board | NDSFB raised that the comments and recommendations they have on the Euchanhead development are already contained in the fish habitat survey report that they produced. This included for a fish monitoring program post consent. | **Appendix 8.3: Fish Habitat Survey and 8.4: Fresh Water Pearl Mussel (FWPM) surveys**<br><br>Paragraph 156 - fish monitoring plan |

### 8.4.2 Effects scoped out

32. The assessment concentrates on the effects of construction and operation of the proposed Development upon ecological features. Ecological features have been scoped out of further assessment where there is no potential for significant effects upon the ecological feature, or where the ecological feature is not considered important at a local level or above (**Table 8.3** and **Table 8.6**), is not a GWDTE or not subject to legal protection.

33. As outlined during the scoping stage, impacts upon statutory designated sites for nature conservation and ancient woodland have been scoped out in respect of non-avian ecology, due to the distance and lack of connectivity between the Site and any designated sites/ ancient woodland (see **Technical Appendix 8.1: Desk Study Report**). All statutory designated sites that are designated for their ecological interest are located over 4 km from the proposed Development. The Muirkirk and North Lowther Uplands SPA is designated only for its ornithological interest and therefore is not relevant in terms of non-avian ecology; Mennock Water SSSI is designated for wetland habitat associated with riparian zones however this site is upstream of the Euchanhead so there is no hydrological connectivity with the Site. Other designated sites within 10 km (Upper Nithsdale Woods SAC, Tynron Juniper Wood SAC/ SSSI, Back Wood SSSI, Stenhouse Wood SSSI, North Lowther Uplands SSSI, Chanlockfoot SSSI, Muirkirk Uplands SSSI) are designated either for their ornithology interest (which is not relevant to non-avian ecology or terrestrial habitats (woodland, juniper and upland habitats), which given the intervening distances are not likely to be affected by the proposed Development.

34. There is no ancient woodland onsite, the closest is 132 m from the Site boundary. As ancient woodland is a terrestrial habitat, ancient woodland outwith the application boundary is not considered to be ecologically connected with the Site and is therefore not likely to be affected by the proposed Development.

35. Habitats which are of relatively low ecological value (see **Table 8.3**) have been **scoped out** of detailed assessment. These habitats are as follows:

- Coniferous plantation woodland, recently felled woodland, unimproved acid grassland, neutral grassland semi-improved, improved grassland, marshy grassland (M23), bracken and tall ruderal vegetation, standing water, buildings, tracks, quarries and bare ground assessed as having less than local value.

36. Based on the desk study and consideration of the extent and nature of the proposed Development, effects on the following species or species groups have been scoped out of assessment. For more information on each species/ group, please refer to **Table 8.6**.

- invertebrates: (SNH, 2020) general pre-application/ scoping advice to developers of onshore windfarms states that: "*there are some species, that with standard mitigation, are unlikely to experience a significant environmental effect during construction/ operation of onshore wind farms (e.g. moths and other invertebrates, reptiles, amphibians, etc.). Such species do not require surveys to inform the EIA*". Therefore, invertebrates have been scoped out of further assessment;
- amphibian and reptile surveys have been scoped out, in line with (SNH, 2020) guidance and instead a habitat-based assessment has been undertaken to inform the assessment of potential impacts and the need for mitigation measures during construction. Following the habitat-based assessment, significant effects on amphibians are not considered likely and amphibians have been scoped out of further assessment, although potential effects on reptiles have been assessed;
- hedgehog records have been provided for the 5 km search area; however, due to the suboptimal habitat for this species on the Site, and the occurrence of more suitable habitat within the surrounding landscape, it is considered unlikely to be significantly affected and detailed assessment of effects on this species have been scoped out; and
- brown hare records have been provided for the 5 km search area; however, due to the suboptimal habitat for this species on the Site, and the occurrence of more suitable habitat within the surrounding landscape, it is considered unlikely to be significantly affected and detailed assessment of effects on this species have been scoped out.

# 8.5 Approach and methods

37. This Chapter takes an appropriate and topic-specific approach to assessment of the proposed Development within the parameters identified in **Chapter 3: Description of the proposed Development**. This Chapter provides a worst-case assessment for non-avian ecology and aims to present enough information for consultees and the decision makers to comment on and determine the application within the parameters of the proposed Development.

### 8.5.1 Study area

38. The study area used for EIA varies according to the ecological feature in question, based on relevant good practice guidance. The entire application Site, excluding the part of Access Route A in which no new infrastructure is proposed and Access Route B which is not expected to require any significant engineering work, was surveyed. Survey of the proposed Access Route A was restricted to those areas where new or up-graded infrastructure are planned, this lies predominantly between Hare Hill Windfarm and Euchanhead. With the exception of a few bends in the existing track that need widening to accommodate transport of turbines, the majority of the existing access track for Hare Hill Windfarm was not surveyed as no modifications are anticipated in this area. From here on references to the proposed Access Route A reflect the surveyed area of Access Route A rather than its entire length.

39. The study area used for habitats and vegetation is shown in **Figures 8.2 and 8.3** (with further detail provided in **Technical Appendix 8.2: Phase 1 Habitat and NVC Survey**) and includes all areas within the Site, as well as some land beyond the Site to ensure coverage of wetland habitats within 100 m to 250 m of the proposed Development infrastructure as appropriate. SEPA guidelines (SEPA, 2017) stipulate survey of a 250 m buffer from excavations deeper than 1 m, and a 100 m buffer for excavations less than 1 m. The area surveyed, therefore, complied with SEPA guidelines.

40. The study areas for relevant faunal species are summarised in the Field Survey Methodology Section below and are described in more detail in Section 8.5.3 and within **Technical Appendices 8.3-8.7**.

### 8.5.2 Information and data sources

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

- The South West Scotland Environmental Information Centre (SWSEIC);
- EIA reports and any post consent/construction information for windfarms and other developments within 2 km of the Site (where available), including:
  - SPEN. 2007. South West Scotland Renewables Connection Project Environmental Statement: http://swsproject.com/SWS_ES.php (runs through the Site);
  - E.ON. 2004. Afton Wind Farm Proposal: Environmental Statement: non-technical summary: https://www.eonenergy.com/~/media/PDFs/Generation/wind/onshore/afton/Afton_NTS_-_Final_Oct04.pdf (2 km east of Euchanhead);
  - SSE. 2015. Construction Environmental Management Plan (CEMP) and Construction Method Statement: Whiteside Hill Wind Farm (Project Ref. LN000048) (c. 1 km south of Euchanhead);
  - Community Wind Power. 2019. Sanquhar II Community Wind Farm: EIA Report (adjacent to the west of the Euchanhead area, between the Euchanhead and Polskeoch areas and adjacent to the east of the Polskeoch area); and
  - Amec. 2015. Lorg Wind Farm: Environmental Statement. Volume 1: Main report (adjacent to the west of the Polskeoch area).
- Historical ecological survey reports for the Site:
  - Arcus. 2013. Protected species survey overview: Euchanhead Wind Farm; and
  - MacArthur Green. 2012. Euchanhead Wind Farm: Extended Phase 1 Habitat Survey Report.

42. Searches for protected and notable species data from SWSEIC were limited to:

- data from all years;
- from within 10 km of the Site for all bat species; and
- from within 2 km of the Site for all other species.

43. Information regarding designated sites in the area surrounding Euchanhead was obtained from SWSEIC, the MAGIC online GIS tool[2] and the Scottish Natural Heritage (SNH) Sitelink website[3]. Sites designated for their ecological interests were searched for within 10 km for statutory designated sites, and up to 2 km for locally designated sites. Designation types searched for included:

- Special Areas of Conservation (SACs);
- Special Protection Areas (SPAs);
- Ramsar sites;
- Sites of Special Scientific Interest (SSSIs);
- Locally designated sites such as Local Nature Conservation Sites (LNCS) or Local Wildlife Sites (LWS); and
- Local Nature Reserves (LNR), National Nature Reserves (NNR) and RSPB and Wildlife Trust Reserves.

44. In addition, the search included woodlands listed on the Ancient Woodland Inventory within 10 km.

45. Relevant historical fisheries data/ information were referenced by NDSFB and GFT, in their survey reports and correspondence.

### 8.5.3 Field study

46. Phase 1 Habitat surveys, an NVC survey, fish habitat survey and protected mammals survey were undertaken in October 2019 of areas within the Site boundary (at the time)[4] and a 250 m buffer where access was permitted.

[2] https://magic.defra.gov.uk/
[3] https://sitelink.nature.scot/home
[4] Note that the Site boundary has changed since surveys were completed and now excludes a large area that was surveyed to the south of Polskeoch.

47. In May/June 2020 additional surveys were undertaken including:

- follow-up surveys for otter and water vole within 250 m of proposed water course crossing locations (new and to be upgraded), within the Site boundary;
- Mammal, Phase 1 Habitat and NVC surveys of proposed Access Route A and a 100-250 m buffer:
  - *Proposed Access Route A had not been determined in 2019, it utilises the access route for Hare Hill Wind Farm and Extension before crossing open moorland to Euchanhead. Only those areas of the route where new/ up-graded track are proposed were surveyed the majority of which lies between Hare Hill Wind Farm and Euchanhead* ***(Figure 8.2****).*
- Fish habitat surveys 100 m up stream and 500 m down stream of proposed water crossing on the proposed Access Route A;
- Mammal, Phase 1 Habitat and NVC surveys of extensions to the survey area into areas of the 250 m buffer around the Site where access was not permitted in 2019 to provide appropriate survey buffers of the proposed infrastructure layout;
- FWPM surveys 100 m up-stream to 500 m downstream of proposed water crossings within the Site and along the proposed Access Route A; and

48. In October 2020 further surveys were undertaken including:

- Phase 1 habitat, NVC and mammal surveys were completed in areas within 100 m (extending to 250 m along watercourses for otter signs) of a short section of the proposed Access Route A, which had been refined and was not covered by survey data collected in May/June 2020;
- Phase 1 habitat, NVC and mammal surveys to the north of proposed Borrow Pit 7 to extend the survey buffer to 250 m for NVC data and 100 m for mammals. This was required as following the May/June 2020 surveys, proposed Borrow Pit 7 was moved slightly north to avoid direct impacts on an area of M10 base-rich flush vegetation, such that the survey buffer around it to the north extended to less than 250 m.

49. Bat surveys were completed in 2018 and 2019 based on the current guidance at that time.

50. The scope of the surveys was agreed with SNH as part of the scoping process. The methodology for the survey work is briefly outlined in the next section. For the full methodologies please refer to the relevant **Technical Appendices 8.2-8.7**.

### Vegetation surveys

#### *Extended Phase 1 Habitat Survey*

51. An Extended Phase I Habitat Survey was undertaken in October 2019, and May, June and October 2020, which covered the Site, as well as offsite areas (where accessible) to provide coverage of areas within 250 m from proposed turbine locations/ borrow pits and 100 m from other proposed infrastructure. The survey was based on the standard methodology (JNCC, 2010).

#### *National Vegetation Classification (NVC) Survey*

52. An NVC survey of open habitats was undertaken simultaneously with the Phase 1 survey covering the same study area (but excluding areas of coniferous plantation and other habitats of low nature conservation value, e.g. bracken and poor semi-improved grassland). The surveys followed the methodology set out in the NVC survey guidelines (JNCC, 2006) (see **Technical Appendix 8.2**).

#### *Groundwater Dependent Terrestrial Ecosystems (GWDTE)*

53. Following the NVC survey, potential GWDTEs were identified in terms of their high, moderate or low potential groundwater dependence, based on (SEPA, 2017) (**Figure 8.4**). A more detailed assessment of the likely groundwater dependence of these communities was then undertaken as part of the hydrogeology assessment (**Chapter 10: Hydrology, Hydrogeology, Geology and Soils, Technical Appendix 10.3).**

### Fish habitat assessment

54. A fish habitat assessment was undertaken in October 2019 and May 2020 (see **Technical Appendix 8.3**), to assess the potential for fish species of conservation concern (e.g. salmonids, lamprey and European eel (*Anguilla anguilla*)) to be present in watercourses within the study area. The survey included all watercourses within the Site, including 100 m upstream and 500 m downstream of all watercourse crossings proposed at that time along the proposed Access Route A (**Figure 8.5**). A walkover survey of each watercourse was undertaken and data on physical characteristics were collected at

different locations along each watercourse in accordance with Scottish Fisheries Coordination Centre (SFCC) guidance (SFCC, 2007). Any potential blockages to fish migration were also noted.

### Fresh water pearl mussel surveys

55. Fresh Water Pearl Mussel (FWPM) surveys were undertaken in May 2020 (see **Technical Appendix 8.4**), to identify if FWPM were present near to proposed water crossing locations. The surveys covered 100 m upstream and 500 m downstream of all watercourse crossings proposed at that time within the Site including along the proposed Access Route A (**Figure 8.5**). Methodology followed SNH guidance for site-specific projects (SNH, 2004).

### Mammal surveys

56. A survey for protected species of terrestrial mammals, excluding bats, was undertaken in October 2019, with follow up otter and water vole surveys, and mammal surveys of the proposed Access Route A and extensions to the original survey area due to changes in the proposed Site layout undertaken in May/ June and October 2020 (see **Technical Appendix 8.5**). The species specifically targeted were based on the likelihood of occurrence of each species, ascertained from known species distribution and habitat suitability. The mammal surveys particularly focussed on pine marten, otter, red squirrel, water vole and badger, although the survey recorded evidence of all protected or notable mammal species.

57. Surveys for ground-based mammals followed standard methodologies in place at the time of survey, see **Technical Appendix 8.5** for further details of the methodologies followed. The study area for ground-based mammals encompassed all potentially suitable habitats within the Site including along the proposed Access Route A, and a 100-250 m buffer (access permitting) in line with relevant guidance, e.g. (SNH, 2016a).

### Bat surveys

58. Bat surveys were undertaken in the Euchanhead forest block (see **Technical Appendix 8.6**) by Echoes Ecology in 2018 and bat surveys in the Polskeoch & Shinnelhead (from herein referred to as the Polskeoch forest block) forest block were undertaken in 2019 by RPS (see **Technical Appendix 8.7**). The methodologies differed slightly between years and have been summarised separately below.

#### *Euchanhead Forest Block 2018*

59. The 2018 survey was undertaken following the guidance set out in (Hundt, 2012), (Collins, 2016) and (Natural England, 2014), which represented best practice guidance in place at that time. A ground-based habitat assessment was undertaken in April 2018, following which nine static bat detector (Anabat Express) recording locations were identified (see **Figure 8.7**). Each location was chosen as it represented an area within proximity to the proposed turbine locations under consideration at that time. The static detectors were placed in the field for approximately 30 nights per season (spring: April 30$^{th}$ to 3$^{rd}$ June, summer: 4$^{th}$ July to 2$^{nd}$ August and autumn: 3$^{rd}$ September to 1$^{st}$ October) representing up to 91 nights of recording at each location.

60. The bat data recorded were analysed using AnalookW software. All calls were analysed individually, and no auto-identification software was used during the analysis. The output was processed through Echoes' in house excel spreadsheet (EchoCollation) to present the results with graphs and tables.

#### *Polskeoch & Shinnelhead Forest Block 2019*

61. The 2019 surveys were undertaken following current guidance (Collins, 2016) (Scottish Natural Heritage, et al., 2019). A daytime habitat assessment was carried out in May 2019 to determine if any potential roosting habitat was located within the survey area. Four structures were subsequently identified (see **Figure 8.7**) and subject to dusk/dawn surveys in August and September 2019 to assess bat roost present or likely absence. In addition, in line with current guidance (Scottish Natural Heritage, et al., 2019), ground level static detector surveys were also undertaken. 13 static detector locations, 11 within the Polskeoch forest block and two located on open ground to the northwest of the Euchanhead forest block (see **Figure 8.7**), were monitored for a minimum of ten nights during spring, summer and autumn. Due to the number of static detectors required, RPS agreed with SNH (see **Technical Appendix 8.7**) that a split deployment method could be used, i.e. ten consecutive days recording at locations 2, 4, 5, 7, 10, 11 and 13, then the detectors are moved to locations 1, 3, 6, 8, 9 and 12 for the following ten consecutive nights with a detector deployed at location 5 throughout as a control. Both Song Meter SM2BAT and Anabat Express detectors were used in the field, which was also agreed with SNH (see **Technical Appendix 8.7**). Daily weather (wind and temperature) data for the static recording deployment periods were taken from the SPR onsite met mast. Daily rainfall data were taken from data collected by SEPA at the Eliock weather station (approximately 4.5 km west of the Site).

62. The recordings from the static detectors were analysed using AnalookW and/or Kaleidoscope Pro software. As automated identification software was used to analyse the data (Kaleidoscope Pro), a manual check of 10% of calls was also undertaken to check accuracy. Following the call identification, bat activity indices were derived: the number of files recorded each night, which contained bat calls at each detector location were assumed to equate to one bat pass. Using this assumption, a measure of activity 'bat passes per night' was calculated per location and per species.

#### Great crested newt

63. A great crested newt (GCN) habitat assessment was undertaken for any standing waterbodies encountered within the habitat survey areas (See **Figure 8.2**). GCN habitat suitability assessment followed standard guidance (Arg UK, 2010). This method, water quality, waterfowl, fish, ranks habitat against ten criteria including: geographical location, pond size, water permanence pond count within 1 km, terrestrial habitats, and freshwater macrophyte abundance.

#### Incidental sightings

64. During all ecological surveys, incidental sightings of other notable fauna were also recorded.

### 8.5.4 Assessment methods

65. The CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018) (henceforth referred to as the CIEEM guidelines) form the basis of the impact assessment presented in this Chapter. The CIEEM guidelines have been endorsed by SNH. The assessment of potential impacts on bats has been carried out based on (Scottish Natural Heritage, et al., 2019) guidelines.

#### Sensitivity of receptor

66. In accordance with the CIEEM guidelines only ecological receptors (habitats, species, ecosystems and their functions/ processes) which are considered to be important and potentially affected by the proposed Development should be subject to detailed assessment. It is not necessary to carry out detailed assessment of receptors that are sufficiently widespread, unthreatened and resilient to impacts from the proposed Development and will remain viable and sustainable.

67. Ecological receptors should be considered within a defined geographical context. For this assessment the following geographic frame of reference has been used:

- International;
- National (i.e. Scotland);
- Regional (i.e. Dumfries & Galloway, East Ayrshire);
- Local (i.e. within circa (c.) 10 km); and
- Less than local.

68. Detailed assessment has only been undertaken for receptors of local importance or greater and/or which are subject to legal protection or for which assessment has been specifically requested by consultees, e.g. GWDTEs.

69. For designated sites, importance should reflect the geographical context of the designation. For example, a SSSI would normally be considered nationally important (UK).

70. In accordance with CIEEM guidelines, the value of habitats has been measured against published selection criteria and other relevant data where available. Examples of relevant criteria include Annex 1 of the Habitats Directive, the SBL and the Dumfries and Galloway LBAP.

71. In assigning a level of value to a species, it is necessary to consider its distribution and status, including a consideration of trends based on available historical records. Therefore, reference has been made to published lists and criteria where available. Examples of relevant lists and criteria include: species of European conservation importance (as listed on Annexes II, IV and V of the Habitats Directive), species considered to be of principal importance for biodiversity in Scotland as listed on the SBL, and priority species listed on the Dumfries and Galloway LBAP.

#### Impact assessment

72. The impact assessment process involves the following steps:

- identifying and characterising impacts;

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

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

- positive or negative;
- extent;
- magnitude;
- duration;
- timing;
- frequency; and
- reversibility.

74. Both direct and indirect impacts are considered: direct ecological impacts are changes that are directly attributable to a defined action, e.g. the physical loss of habitat during construction. Indirect ecological impacts are attributable to an action, but which affect ecological resources through effects on an intermediary ecosystem, process or receptor, e.g. the creation of access tracks which cause hydrological changes, which, in the absence of mitigation, could lead to the drying out of adjacent peatland habitats.

75. For the purposes of this assessment, in accordance with CIEEM guidelines, a 'significant effect' is defined as an effect that either supports or undermines biodiversity conservation objectives for 'important ecological receptors' or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/ local nature conservation policy). Effects can be considered significant at a wide range of scales from international to local. For example, a significant effect on a SSSI is likely to be of national significance whilst a significant effect on a regionally important population of a species is likely to be of regional significance. The CIEEM guidelines do not prescribe the geographical level of importance at which effects should be considered significant 'in EIA terms', rather effects are either significant or they are not. However, to provide consistency with other EIA topics, for the purposes of this assessment it is assumed that significant effects on receptors of local or greater importance may be considered significant 'in EIA terms'.

76. Consideration of conservation status is important for evaluating the effects of impacts on individual habitats and species and assessing their significance:

- habitats – conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and its typical species within a given geographical area.
- species – conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area.

### Avoidance, mitigation, compensation and enhancement

77. A sequential process has been adopted to avoid, mitigate and compensate for ecological impacts. This is often referred to as the 'mitigation hierarchy'.

78. It is important for the EIA to clearly differentiate between avoidance, mitigation, compensation and enhancement and these terms are defined here as follows:

- avoidance is used where an impact has been avoided e.g. through changes in scheme design;
- mitigation is used to refer to measures to reduce or remedy a specific negative impact *in situ*;
- compensation describes measures taken to offset residual effects, i.e. where mitigation *in situ* is not possible; and
- enhancement is the provision of new benefits for biodiversity that are additional to those provided as part of mitigation or compensation measures, although they can be complementary.

### Cumulative effects assessment

79. Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a particular location.

80. For aquatic features potential cumulative effects are only likely to be significant for other developments located relatively close by (i.e. within 2 km) and within the same hydrological sub-catchments. For (non-avian) terrestrial features potential cumulative effects are only likely where other developments are located within the regular range of more mobile species, e.g. bats. As such, the cumulative assessment has been restricted to windfarms within 10 km. The assessment includes operational projects; projects under construction; consented projects which are not yet under construction and projects for which planning applications have been submitted.

### Assumptions, limitations and confidence

81. Presented here is a summary of limitations detected during the surveys, further details are presented in the **Technical Appendices 8.2-8.7**. It should be noted that none of these limitations are considered likely to significantly affect the assessment.

#### *Mammal surveys*

82. During the mammal surveys in October 2019, water levels within all watercourses within the survey area were very high at the time of survey and it is therefore possible that some otter and water vole signs may have been submerged or washed away. In addition, it was slightly later in the year than the peak activity period for water vole (mid-April to September (Mammal Society, 2016)) and therefore there may have been fewer signs, if the species were present, than in the summer. Therefore, a second survey for otter and water vole was undertaken within 250 m of proposed watercourse crossing locations in May / June 2020. In May / June 2020, water levels within all watercourses were at optimal levels for otter and water vole surveys, and weather conditions were generally fine and dry (other than periods of rain on 4$^{th}$ and 10$^{th}$ June). It is therefore considered that there were no limitations within this round of otter and water vole surveys or the other mammal survey undertaken during the same period.

83. Watercourses along the altered section of the proposed Access Route A, surveyed in October 2020, were only surveyed once for water vole, whereas the Water Vole Mitigation Handbook recommends that up to two field survey visits are undertaken, although one survey visit may be sufficient in certain circumstances. As noted above, survey for water vole in October is also slightly later in the year than the peak activity period for water vole (mid-April to September) (Mammal Society, 2016), and therefore there may have been fewer signs, if the species were present, than in the summer. However, the weather was still generally mild at the time of survey and therefore water voles would be expected to still be active. In this case, given the low suitability of many watercourses and given that a precautionary approach has been taken in the EIA (i.e. assuming possible presence in potentially suitable habitat and undertaking further surveys pre-construction) the timing of the survey and lack of a second survey visit in these areas is not considered to represent a significant limitation.

#### *Vegetation surveys*

84. The time of year in which the 2019 and October 2020 surveys were undertaken was considered to be relatively late in the season for vegetation surveys. However, given the upland moorland species present the season was still suitable for undertaking Phase 1 and NVC surveys as most species were still readily identifiable. It should however be noted that such surveys are only a snapshot and cannot preclude other species being more easily detectable at other times of year. This is not considered to be a serious limitation due to the experience of the botanical surveyors and the types of vegetation being surveyed.

85. There was no frost or snow cover at the time of survey, and therefore all vegetation types were clearly visible.

86. Survey was not undertaken within the grounds of occupied residential properties located within the 250 m survey buffer, although where practical these areas were surveyed visually from the property boundaries. This is also not considered to be a limitation to the findings of this Chapter.

#### *Fish habitat and freshwater pearl mussel surveys*

87. The methodology for surveying for the presence of FWPM is a visual process. It involves visual inspection and, where appropriate, requires that the surveyors enter the water and use a bathyscope for clearer inspection of the substrate on the riverbed of a given section of watercourse. Therefore, survey feasibility and efficiency are improved greatly if conducted during the summer months when flows are low. Many of the watercourses surveyed during the fish habitat walkover survey in 2019 typically had a peaty colouration to the water at that time. However, during the survey for FWPM in May/ June 2020, southwest Scotland was experiencing a prolonged severe drought which dictated that all watercourses were low and very clear, all of which made for optimum aquatic surveying conditions.

88. Following the May 2020 fish habitat and FWPM surveys, two watercourse crossing locations were added along the proposed Access Route A (WX27 and WX29) and a further two were moved less than 100m down slope (WX26 and WX28). No further fish or FWPM surveys were undertaken to cover these new/ amended locations. The new watercourse crossing locations are both on minor unnamed tributaries of the Kello Water neither of which were surveyed in May 2020, and therefore no fisheries data are available at or upstream of these locations or downstream until their confluence with the Kello Water (c. 200m distant). Where watercourse crossing locations WX26 and WX28 have been moved downstream, fisheries data are available at these locations and >100m upstream of them; however, data extend only c. 400m downstream rather than the full 500m recommended in FWPM survey guidance. Additional survey requirements were discussed with NDSFB and it was agreed that existing data were adequate for the proposes of the EIA so long as a precautionary approach was taken, with any appropriate pre-construction surveys for these new locations to be included in the fish monitoring plan.

89. The impact assessment has therefore been carried out on a precautionary basis assuming that conditions for fish/ FWPM in un-surveyed areas are similar to those in the main channel of the headwaters of the Kello Water (good fish habitat). The new/ amended watercourse crossing locations and associated watercourses will be included in the fish monitoring plan (Paragraph 156) which will be produced in liaison with the relevant fisheries boards and include provision for appropriate pre-construction, construction and post-construction monitoring.

***Bat surveys***

90. The bat surveys were undertaken over two years, with the Euchanhead forest block surveyed in 2018 and the Polskeoch forest block surveyed in 2019. Between the two years the number of locations at which data were recorded is compliant with current guidance (Scottish Natural Heritage, et al., 2019). Ideally the surveys would have been undertaken simultaneously to allow direct comparison of bat activity data between locations and species. However, as the survey methodologies used in each year were broadly comparable, and the resulting data appear also to be broadly similar, this is not considered to represent a significant limitation.

91. The 2018 surveys were completed before the publication of current guidance (Scottish Natural Heritage, et al., 2019) was issued. However, with the exception of the detector type used (zero crossing rather than full spectrum) and the collection of weather data, the surveys were largely compliant with the current guidance. In addition, detectors were set to record for three times as many nights are recommended in the 2019 guidance (30 nights per season rather than 10 nights per season) so survey effort was substantially greater than that required under current guidance. The 2018 survey data are therefore considered to be suitable for use in the EIA.

92. During the analysis of the bat survey data, many calls have only been recorded to genus level. This is not considered to present a significant constraint to this assessment however, as bat genus alone can be used to represent risk levels. For example, all species in the genus *Nyctalus* are considered to be of high risk of turbine related mortality, therefore separating them to individual species level is largely academic. The genus *Myotis* contains a range of species, however for Scotland, the species that would likely be present are all considered to be low risk of turbine related mortality, therefore treating them as a genus is considered acceptable.

93. Static detector surveys in both years were subject to a certain degree of data loss due to equipment failure (see **Technical Appendices 8.6 and 8.7** for further details). Data losses in 2018 represented about 3% of data and are not considered significant. Data losses in 2019 were greater, although it is considered that sufficient data were collected from neighbouring detectors to represent the level of bat activity at detectors which failed. Some data loss during surveys of this type is inevitable and the scale of losses experienced here is not considered to significantly affect the conclusions of the assessment.

94. Under current guidance (Scottish Natural Heritage, et al., 2019) surveys should aim to capture a sufficient number of nights with appropriate weather for bat activity. In 2019 surveys were carried out in three nights of suitable weather in spring, nine in summer and seven in autumn (see **Technical Appendix 8.7**). It is possible that this is partly due to the weather data being collected at 40 m height, at which temperatures will be lower and wind speed will be higher, and given the activity levels recorded weather conditions are not likely to have significantly affected the conclusions of the assessment. As noted above, weather data were not recorded in 2018 but given the longer duration of the recording periods it is considered likely that recording captured a sufficient number of nights with appropriate weather conditions.

# 8.6 Baseline conditions

### 8.6.1 Desk study

#### Statutory designated sites

95. Statutory designated sites within 10 km of the Site are illustrated on **Figure 8.1** and listed in **Table 8.2** (note that **Table 8.2** only includes sites designated for ecological features – geological sites are covered separately in **Chapter 10: Hydrology, Hydrogeology, Geology and Soils**. There are no statutory designated sites within the Site boundary, the nearest sites designated for ecological reasons are 4.93 km away. The Muirkirk and North Lowther Uplands SPA is designated only for its ornithological interest and therefore is not relevant in terms of non-avian ecology (see **Chapter 9: Ornithology** for ornithological assessment). Mennock Water SSSI is designated for wetland habitat associated with riparian zones, however this site is upstream of the Euchan Water so there is no hydrological connectivity with the Site. The remainder of the sites are designated for woodland, juniper and upland habitats and given the intervening distances are therefore unlikely to be ecologically connected to the Site.

Table 8.2: Statutory designated sites

| Name | Designation | Distance to Site (km) | Direction from Site | Qualifying Features Summary |
|---|---|---|---|---|
| Muirkirk and North Lowther Uplands | SPA | 6.38 | NE | Golden plover, hen harrier, merlin, peregrine and short-eared owl. |
| | | 8.27 | N | |
| Upper Nithsdale Woods | SAC | 4.93 | E | Mixed woodland on base-rich soils associated with rocky slopes. |
| | | 5.13 | E | |
| | | 6.78 | SE | |
| | | 7.33 | NE | |
| | | 8.08 | NE | |
| Tynron Juniper Wood | SAC | 9.66 | SE | Juniper on heaths or calcareous grasslands. |
| Chanlockfoot | SSSI | 4.93 | E | Mixed woodland on base-rich soils associated with rocky slopes |
| | | 5.13 | E | |
| North Lowther Uplands | SSSI | 6.38 | NE | Breeding bird assemblage, hen harrier and upland habitats. |
| Stenhouse Wood | SSSI | 6.78 | SE | Upland mixed ash woodland |
| Back Wood | SSSI | 7.33 | NE | Upland oak woodland |
| Mennock Water | SSSI | 8.08 | NE | Fen meadow and Upland oak woodland |
| Muirkirk Uplands | SSSI | 8.27 | N | Blanket bog, breeding bird assemblages, hen harrier, short eared owl and upland habitats. |
| Tynron Juniper Wood | SSSI | 9.66 | SE | Juniper scrub |

96. None of the statutory designated sites within 10 km that are designated for non-avian ecological features are likely to be impacted by the proposed Development due to the intervening distance and/or the lack of connective pathways that could lead to impacts on features for which the sites are designated. Impacts upon statutory designated sites are, therefore, **scoped out** from detailed assessment. This approach has been agreed with SNH as part of the scoping process.

#### Non-statutory sites

97. Two Local Wildlife Sites, Glenmaddie Wood LWS and Afton Uplands Provisional LWS are within 2 km of the Site, with the proposed Access Route A passing through part of the Afton Uplands Provisional LWS. For full details of these sites see **Technical Appendix 8.1**. Both these sites are considered of **local value**.

98. In addition, the Site and 2 km buffer area is entirely overlapped by the transition zone of the Galloway and Southern Ayrshire Biosphere reserve. Given the low sensitivity of the transition zone of the Galloway and Southern Ayrshire Biosphere reserve it is considered to be of no more than **local value**.

99. All of the woodlands within the Site and within 2 km of the Site are former red squirrel priority woodlands, as assessed and identified using the (Reynolds, 2001) selection criteria for priority woodland for red squirrel conservation. Whilst these areas have now been superseded in terms of strategic priorities by the red squirrel strongholds (none of which are present within the study area), the former designation indicates habitats of potential local importance for red squirrels. Survey results for red squirrel indicate that the coniferous plantation on the Site is supporting only a low density of squirrels and due to its abundance in the wider area, coniferous plantation is considered of less than local value and is therefore is scoped out from detailed assessment.

#### Ancient woodland

100. There are a number of areas of woodland in the area surrounding the Site that are listed on the Ancient Woodland Inventory (AWI), the closest is within 132 m of the Site; however, none are within the Site boundaries (**Figure 8.1** and **Technical Appendix 8.1**). These areas are not likely to be impacted by the proposed Development due to intervening distance and/or lack of connective pathways. Therefore, ancient woodland is **scoped out** from detailed assessment. This approach has been agreed with SNH as part of the scoping process.

#### Existing records of protected and notable species

101. A summary of the results of the protected and notable species search (excluding marine and avian species) from other sources and through review of ESs for nearby windfarms are provided in Section 8.6.4. Further details are provided in **Technical Appendix 8.1**.

### 8.6.2 Vegetation baseline

#### Evaluation of floral receptors

102. Phase 1 habitats and NVC communities within the study area are shown in **Table 8.3** with more detailed habitat descriptions and quadrat data provided in **Technical Appendix 8.2: Phase 1 Habitat & NVC Surveys Report**. The mapped results are shown on **Figures 8.2** and **8.3**.

103. **Table 8.3** also summarises the conservation status for each habitat / community and evaluates the importance of each habitat / community within the Site.

104. No plant species listed on Schedule 8 of the Wildlife and Countryside Act 1981 (as amended in Scotland) were recorded, and it is considered unlikely that any Schedule 8 plant species are present within the study area.

105. The SBL species mossy saxifrage was recorded on the Site. Mossy saxifrage was associated with M32 springs along the proposed Access Route A and is listed on the SBL as requiring conservation action.

106. One invasive non-native species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended in Scotland), Himalayan balsam, was found to be present at the Shinnelhead Farm steading. This location is outside the Site boundary and this species is not considered further in the assessment.

Table 8.3: Evaluation of Phase 1 Habitats (in bold) and NVC communities recorded within the Survey Area (GWDTE potential is indicated as: High or Moderate, where applicable)

| Community or Habitat Code | Community or Habitat Name | Conservation Status | Area (Ha)[5] | Reason for Evaluation | Evaluation |
|---|---|---|---|---|---|
| **A1.1.1** | **Broadleaved woodland semi-natural** | LBAP (birch, ash and oak woods only) | **1.69** | Broadleaved woodland forms only a small portion of land cover on the Site. It is typically mixed species with frequent birch and grey willow. Broadleaved woodland on the Site is generally associated with linear features (watercourses and track edges) providing corridors of connectivity within the Site and to the surrounding landscape. Although not large enough in area to be consider of regional importance broad leaved woodland is considered to be of local value. | Local value |
| **A1.1.2** | **Broadleaved woodland plantation** | | **7.32** | Broadleaved woodland forms only a small portion of land cover on the Site. Plantation woodland is typically mixed species with including non-native species such as Chinese crab apple, red oak and Chinese rowan. These species are however still of ecological value providing shelter, fruit and blossom. Broadleaved plantation woodland on the Site generally occurs in patches along linear features (watercourses and track edges) helping to providing corridors of connectivity within the Site and to the surrounding landscape. Although not large enough in area or of a species composition to be consider of regional importance plantation broad leaved woodland is considered to be of local value. | Local value |
| **A1.2.2** | **Coniferous Woodland Plantation (including newly planted Coniferous Woodland Plantation)** | | **1489.10** | The majority of the Site support blocks of coniferous plantation, predominately densely planted Sitka spruce (*Picea sitchensis*). Although some of these will have been planted over blanket bog/wet heath few species typical of these habitats remain.<br><br>Due to the abundance of coniferous woodland plantation in the wider area and that as a rule they have only low species richness they are considered to be of less than local value. | Less than local value |
| **A3** | **Parkland and scattered trees** | | **29.41*** ** | Scattered trees form only a small portion of land cover on the Site usually along valley bottoms in associated with marsh grassland and other open | Local value |

[5] The NVC communities listed under each Phase 1 habitat type only include those that make the most significant contributions to the area (ha) of that Phase 1 habitat. NVC communities that contribute only a small percentage of the total area of the Phase 1 habitat e.g. because they occur as a small percentage in NVC mosaic polygons are not listed. Where two area figures are provided for NVC communities, the first figure refers to the area of that community within the relevant Phase 1 habitat type. The second figure (following the '/') represents the area of each NVC community within the survey area as a whole, including contributions to mosaics, e.g. (3 ha in relevant Phase 1 community/ 5 ha within the survey area as a whole).

| Community or Habitat Code | Community or Habitat Name | Conservation Status | Area (Ha)[5] | Reason for Evaluation | Evaluation |
|---|---|---|---|---|---|
| | | | | habitats. It is typically mixed species with frequent birch and grey willow and rowan. These scattered trees contribute to the corridors of broadleaved woodland onsite which is generally associated with linear features (watercourses and track edges) providing connectivity within the Site and to the surrounding landscape. Scattered trees are therefore considered to be of local value. | |
| **A4.2** | **Recently-felled Coniferous Woodland** | | **515.75** | Within and adjacent to the stands of coniferous woodland plantation are areas of recently felled coniferous plantation. In some cases, grassland species have begun to colonise. See above A1.1.2 Coniferous woodland plantation for reasons for its evaluation. | Less than local value |
| **B1.** | **Unimproved Acid Grassland** | LBAP | **266.05** | Acid grassland habitats are of a limited extent in the study area and are restricted to areas on the open hill typically around the upper limits of the forestry and along the proposed Access Route A. Acid grassland increased in extent by 8% in Scotland between 1998 and 2007 covering approximately 12% of Scotland (Countryside Survey, 2007a). Unimproved acid grassland is very common throughout Scotland and is an SBL priority habitat. Where it is present onsite with the exception of U5c, it lacks the species assemblages associated with the Annex 1 forms of these habitats. Unimproved acid grassland is not considered to exist in sufficient extent or botanical interest to be of regional or local value and is therefore considered to be of less than local value. | Less than local value |
| U2 | *Deschampsia flexuosa* grassland | Not Annex 1 | 0.99 / 1.31 | See above consideration of acid grassland | Less than local value |
| U4 | *Festuca ovina-Agrostis capillaris-Galium saxatile* grassland community | Not Annex 1 except where species rich U4c (no U4c was recorded) | 80.02/ 86.28 | See above consideration of acid grassland | Less than local value |
| U5 | *Nardus stricta-Galium saxatile* grassland | SBL, Not Annex 1 except where species rich U5c. U5c is H6230: Species-rich Nardus grassland, on | 105.80/ 124.77 | See above consideration of acid grassland | U5= Less than local value<br>U5c local = value |

| Community or Habitat Code | Community or Habitat Name | Conservation Status | Area (Ha)[5] | Reason for Evaluation | Evaluation |
|---|---|---|---|---|---|
| | | siliceous substrates in mountain areas (and submountain areas in continental Europe) * (U5c was recorded near flushed areas) | | | |
| U6 | *Juncus squarrosus-Festuca ovina* grassland community | SBL, Not Annex 1. | 55.70/ 62.56 | See above consideration of acid grassland | Local value |
| **B2.2** | **Neutral Grassland – Semi-improved** | | **14.02** | | |
| MG9 | *Holcus lanatus – Deschampsia cespitosa* grassland | Not Annex 1. | 7.75/ 9.39 | Neutral grassland habitats are of a limited extent in the study area and are restricted mainly to areas that are modified by forestry e.g. via shading or nutrient enrichment.<br>Neutral grassland habitats occupy approximately one third of the total area of semi-natural grassland in Scotland, with approximately 6% of Scotland covered by this (Countryside Survey, 2007a). The habitats present on the Site are small in area and are relatively common in the surrounding area, therefore, they are considered to be of less than local value. | Less than local value |
| MG10 | *Holcus lanatus-Juncus 19ffuses* rush pasture community | SBL, Not Annex 1. | 4.53/ 6.03 | See above consideration of MG9 grassland. | Less than local value |
| **B3.1** | **Calcareous grassland-unimproved** | LBAP | **0.47** | | |
| CG10 | *Festuca ovina- Agrostis capillaris- Thymus polytrichus* grassland | SBL, Annex 1: H6230 Species-rich Nardus grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe) * | NA/ 0.03 (all in mosaics) | CG10 is the most widespread of the NVC grassland communities that contribute to upland calcareous grassland in the Scotland. At the Site it does not occur in areas large enough to be considered of regional importance, and therefore due to its conservation status and rarity on the Site it is considered to be of local importance. | Local value |

| Community or Habitat Code | Community or Habitat Name | Conservation Status | Area (Ha)[5] | Reason for Evaluation | Evaluation |
|---|---|---|---|---|---|
| U5c | *Nardus stricta-Galium saxatile* grassland: | SBL, Annex 1: H6230 Species-rich Nardus grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe) * | NA/0.44 (all in mosaics) | U5 is ubiquitous in the British uplands. U5c however is restricted to more base rich flushed areas and makes up an important element of upland calcareous grassland in the Scotland.<br>This species does not occur in areas large enough to be considered of regional importance, and therefore due to its conservation status and rarity on the Site it is considered to be of local importance. | Local value |
| **B4** | **Improved grassland** | None | **1.44** | Improved grassland is common throughout Scotland and has limited conservation value. It forms only a small proportion of the habitats at the Site and is considered of less than local value. | Less than local value |
| **B5** | **Marsh/Marshy Grassland** | LBAP | **96.55** | | |
| M23 | *Juncus effusus/Juncus acutiflorus-Galium palustre* rush pasture community | SBL, Not Annex 1. | 35.45/ 36.49 | Marshy grassland is present in small areas across much of the Site particularly adjacent to the edge of the coniferous plantation near watercourses and in forest rides. Where present it is generally dominated by *Juncus effuses or Juncus acutiflorus* and is species-poor.<br>This habitat is common and widespread (Rodwell, 1991) community of gently sloping ground and is typically found at the margins of soligenous flushes. Given the species poor nature of this habitat at the Site and the fact it was generally associated with areas subject to management (i.e. grazing or coniferous plantation) it is assessed as being of less than local value.<br>Its potential groundwater dependence is assessed in **Chapter 10: Hydrology, hydrogeology, geology and soils**. | Less than local value |
| M25* | *Molinia caerulea-Potentilla erecta* mire community | Only SBL or Annex 1 where associated with blanket bog (peat >50cm). | 34.28/ 42.98 | M25 is common across the Site in open areas typically where bog has been modified by drainage. It is dominated by *Molinia caerulea*. Whilst, it is still considered possible that some of this area could be restored to blanket bog, due to the extent of modification and the shallowness / variable depth of peat many locations it is not currently considered to be of regional value and has therefore been valued as having local importance. | Local value |

| Community or Habitat Code | Community or Habitat Name | Conservation Status | Area (Ha)[5] | Reason for Evaluation | Evaluation |
|---|---|---|---|---|---|
| **C1.1** | **Tall Herb and Fern Continuous – Bracken** | | **14.29** | | |
| U20 | *Pteridium aquilium-Galium saxatile* community | Not Annex 1. | 14.19/ 16.04 | Dense stands of bracken were present and are restricted to a few areas around the forest edge. Bracken extended its area between 1998 and 2007 by 27% (Countryside Survey, 2007b) and represents 1.6% of Scotland. Bracken is, therefore, a widespread and abundant habitat and the small area present within the study area is not significant and, therefore, is considered to be of less than local value. | Less than local value |
| **C3.1** | **Other tall herb and fern- tall ruderal** | | **0.51** | Areas of tall ruderal vegetation are not common on the Site and are typically associated with disturbed ground due to recent construction-project (Glenglass sub-station). They are not a priority habitat and are not considered to make an important contribution to the ecology interests of the Site. Therefore, they are considered of less than local value. | Less than local value |
| **D1.1** | **Dry dwarf shrub heath** | LBAP | **12.05** | | |
| H12 | *Calluna vulgaris -Vaccinium myrtillus* heath | SBL & Annex 1: H4030, European dry heath (most non-montane stands) | 1.18/ 4.43 | Upland heath is one of the most extensive of all the upland habitats in the UK and is widespread in Dumfries and Galloway. Although not extensive enough onsite to be considered of regional value it is considered to form an important element of the open habitats on the Site and is therefore considered to be of local value. | Local value |
| H18 | *Vaccinium myrtillus-Deschampsia flexuosa* heath | SBL & Annex 1: H4030, European dry heath (most non-montane stands) | 7.81/ 29.71 | As above for H12 | Local value |
| H21 | *Calluna vulgaris -Vaccinium myrtillus – Spagnum capillifolum* heath | SBL & Annex 1: H4030, European dry heath (most non-montane stands) | 0.61/ 0.74 | As above for H12 | Local value |
| **D2** | **Wet dwarf shrub heath** | LBAP | **15.26** | | |
| M15* | *Scirpus cespitosus-Erica tetralix* wet heath community | SBL & Annex 1: H4010 – Northern Atlantic wet | 9.45/ 34.05 | As above for H12 | Local value |

| Community or Habitat Code | Community or Habitat Name | Conservation Status | Area (Ha)[5] | Reason for Evaluation | Evaluation |
|---|---|---|---|---|---|
| | | heaths with Erica tetralix, wet heath stands (<50 cm peat, majority of stands) or Annex 1 H7130 – Blanket Bog where associated with blanket bog (peat >50cm). | | | |
| **D5** | **Dry heath/ acid grassland** | See constituent habitats | **42.68** | Due to the element of dry heath this habitat is considered of local value- see above for H12 for more detail. | Local value |
| H12 | *Calluna vulgaris -Vaccinium myrtillus* heath | SBL & Annex 1: H4030, European dry heath (most non-montane stands) | 1.22/ 4.43 | See above for dry heath | |
| H18 | *Vaccinium myrtillus-Deschampsia flexuosa* heath | SBL & Annex 1: H4030, European dry heath (most non-montane stands) | 15.39/ 29.71 | See above for dry heath | |
| U2 | *Deschampsia flexuosa* grassland | Not Annex 1 | 0.32/ 1.31 | See above for acid grassland | |
| U4 | *Festuca ovina-Agrostis capillaris-Galium saxatile* grassland community | Not Annex 1 except where species rich U4c (no U4c was recorded) | 4.44/ 86.28 | See above for acid grassland | |
| U5 | *Nardus stricta-Galium saxatile* grassland | SBL, Not Annex 1 except where species rich U5c (U5c was recorded near flushed areas) | 14.09/ 124.77 | See above for acid grassland | |
| U6 | *Juncus squarrosus-Festuca ovina* grassland community | SBL, Not Annex 1. | 0.92/ 62.56 | See above for acid grassland | |

| Community or Habitat Code | Community or Habitat Name | Conservation Status | Area (Ha)[5] | Reason for Evaluation | Evaluation |
|---|---|---|---|---|---|
| **D6** | **Wet heath/ acid grassland** | See constituent habitats | **10.00** | Due to the element of wet heath this habitat is considered of local value- see above for H12 for more detail. | Local value |
| M15* | *Scirpus cespitosus-Erica tetralix* wet heath community | SBL & Annex 1: H4010 – Northern Atlantic wet heaths with *Erica tetralix, wet heath stands (<50 cm peat, majority of stands)* | 3.05/ 34.05 | See above for wet heath | |
| U5 | *Nardus stricta-Galium saxatile* grassland | SBL, Not Annex 1 except where species rich U5c (U5c was recorded near flushed areas) | 1.81/ 124.77 | See above for acid grassland | |
| U6 | *Juncus squarrosus-Festuca ovina* grassland community | SBL, Not Annex 1. | 3.57/ 62.56 | See above for acid grassland | |
| **E1.6.1** | **Blanket Bog** | LBAP | **116.33** | There is an estimated 2.2 million ha of blanket bog in the UK (BARS, 2012), and 1.8 million in Scotland, representing an estimated 23% of the Scottish land area (Bruneau and Johnson, 2014). Blanket bog is a rare habitat globally, and Scotland holds a significant proportion of the world resource (Bruneau, P. M. C. & Johnson, S. M. , 2014) . | |
| M3 | *Eriophorum angustifolium* bog pool community | SBL & Annex 1: | 0.41/ 0.71 | Blanket bog is one of the dominant habitat types within the Site, however M3 is rare on the Site compared to other blanket bog habitats. Areas of M3 are assessed as being too small to be of Regional value and are therefore considered to be locally important. | Local value |
| M15* | *Scirpus cespitosus-Erica tetralix* wet heath community | SBL & Annex 1 H7130 – Blanket Bog where associated with blanket bog (peat >50cm). | 5.04/ 34.05 | Blanket bog is one of the dominant habitat types within the Site. The M15 habitats within the Site are widespread in open areas and typically show evidence of drainage and modification from grazing. M15 blanket bog habitats are assessed as being too small to be of National value and in typically too poor a condition to be of regional value and are therefore considered to be locally important. | Local value |

| Community or Habitat Code | Community or Habitat Name | Conservation Status | Area (Ha)[5] | Reason for Evaluation | Evaluation |
|---|---|---|---|---|---|
| M17 | *Scirpus cespitosus – Eriophorum vaginatum* blanket mire community | H7130 – Blanket Bog | 16.69/ 21.25 | Blanket bog is one of the dominant habitat types within the Site. The M20 habitats within the Site are widespread in open areas and typically show evidence of drainage and modification from grazing. M20 blanket bog habitats are assessed as being too small to be of National value and in typically too poor a condition to be of regional value and are therefore considered to be locally important. | Local value |
| M18 | *Erica tetralix – Spagnum papillosum* raised and blanked mire | SBL & Annex 1: | 0.81/ 0.81 | Blanket bog is one of the dominant habitat types within the Site, however M18 is rare on the Site compared to other blanket bog habitats. Areas of M18 assessed as being too small to be of National value and are therefore considered to be regionally important. | Regional value |
| M19 | *Calluna vulgaris – Eriophorum vaginatum* blanket mire | H7130 – Blanket Bog | 37.53/ 46.25 | Blanket bog is one of the dominant habitat types within the Site, however M19 is rare on the Site and typically in better condition compared to other blanket bog habitats (M20 and M17). Areas of M19 are assessed as being too small to be of National value and are therefore considered to be regionally important. | Regional value |
| M20 | *Eriophorum vaginatum* blanket & raised mire | LBAP, SBL & Annex 1: | 52.54/ 94.88 | Blanket bog is one of the dominant habitat types within the Site. The M20 habitats within the Site are widespread in open areas and typically show evidence of drainage and modification from grazing. M20 blanket bog habitats are assessed as being too small to be of National value and in typically too poor a condition to be of regional value and are therefore considered to be locally important. | Local value |
| **E1.7** | **Wet Modified Bog** | H7130 – Blanket Bog (all stands on blanket bog) | **33.45** | | |
| M3 | *Eriophorum angustifolium* bog pool community | SBL & Annex 1: H7130 – Blanket Bog | 0.21/ 0.71 | As above for Blanket bog | Local value |
| M15* | *Scirpus cespitosus-Erica tetralix* wet heath community | SBL & Annex 1: H4010 – Northern Atlantic wet heaths with *Erica tetralix, wet heath stands (<50 cm peat,* | 5.37/ 34.05 | As above for Blanket bog | Local value |

| Community or Habitat Code | Community or Habitat Name | Conservation Status | Area (Ha)[5] | Reason for Evaluation | Evaluation |
|---|---|---|---|---|---|
| | | *majority of stands) or* Annex 1 H7130 – Blanket Bog where associated with blanket bog (peat >50cm). | | | |
| M20 | *Eriophorum vaginatum* blanket & raised mire | Only SBL or Annex 1 where associated with blanket bog. | 15.14/ 94.88 | Where peat is shallower or bog is substantially modified, predominately by drainage, M20 does not fit the criteria for blanket bog. While important to the Phase 1 definition of blanket bog, the depth of peat does not necessarily impact the ecological value of the vegetation which can be identical on peat over and under 0.5 m. It is therefore considered that M20 on shallower peat has the same ecological value of M20 blanket bog, this is not present in sufficient quality or extent to be of to be of regional value and has therefore be valued as having local importance. | Local value |
| M25* | *Molinia caerulea-Potentilla erecta* mire community | SBL & Annex 1: | 7.12/ 42.98 | M25 is common across the Site in open areas typically where bog has been modified by drainage. It is dominated by *Molinia caerulea*. Whilst it is still considered possible that some of this area could be restored to blanket bog, due to the extent of modification and the shallowness / variable depth of peat many locations it is not currently considered to be of regional value and has therefore been valued as having local importance. | Local value |
| M17** | *Scirpus cespitosus – Eriophorum vaginatum* blanket mire community | H7130 – Blanket Bog | 1.74/ 21.25 | Where peat is shallower or bog is substantially modified, predominately by drainage, M17 does not fit the criteria for blanket bog. Whilst it is still considered possible that some of this area could be restored to vegetation more typical of good condition blanket bog in some places, due to the extent of modification and shallow peat it is not currently considered to be of regional value and has therefore be valued as having local importance. | Local value |
| **E1.8** | **Dry modified bog** | Only SBL or Annex 1 where associated with blanket bog. | **31.19** | | |
| M19** | *Calluna vulgaris – Eriophorum vaginatum* blanket mire | | 2.37/ 46.25 | Where peat is shallower and bog is substantially modified, predominately by drainage and grazing, M19 does not fit the criteria for blanket bog. Whilst it is still considered possible that some of this area could be | Local value |

| Community or Habitat Code | Community or Habitat Name | Conservation Status | Area (Ha)[5] | Reason for Evaluation | Evaluation |
|---|---|---|---|---|---|
| | | | | restored to vegetation more typical of good condition blanket bog in some places, due to the extent of modification and shallow peat it is not currently considered to be of regional value and has therefore be valued as having local importance. | |
| M20** | *Eriophorum vaginatum* blanket & raised mire | Only SBL or Annex 1 where associated with blanket bog (peat >50cm). | 21.32/ 94.88 | Where peat is shallower and bog is substantially modified, predominately by drainage and grazing, M20 does not fit the criteria for blanket bog. Whilst it is still considered possible that some of this area could be restored to vegetation more typical of good condition blanket bog in some places, due to the extent of modification and shallow peat it is not currently considered to be of regional value and has therefore be valued as having local importance. | Local value |
| **E2.1** | **Flushes and springs - Acid/ neutral flush** | LBAP, SBL & Annex 1: | **3.33** | | |
| M6 | *Carex echinata-Sphagnum fallax/denticulatum* mire | SBL, Not Annex 1. | 2.42/ 7.21 | M6 is a common flush community in upland areas throughout most of the UK including Scotland. It is a forms part of the SBL priority habitat Upland Flushes Fens and Swamps. As one of the commoner, less species rich NVC communities contributing to this priority habitat and due to its limited extent on the Site, M6 is not considered to be of regional value but it is considered to contribute an important element to the wider habitat mosaic and is therefore of local value. | Local value |
| **E2.2** | **Flushes and springs - Basic flush** | LBAP | **0.05** | | |
| M10 | *Carex dioica – Pinguicula vulgaris* mire | SBL, Annex 1: H7230 Alkaline fens | 0.05/ 0.26 | M10 mires occur throughout the uplands of Scotland although not to the same extent as M6. On the Site they form small areas of flushed base rich habitat within the wider typically more acidic habitat mosaic. Such small areas of base rich habitat can contribute significantly to the botanical interest of an area. Therefore, despite the small extent of this habitat, it is considered to be of regional value. | Regional value |
| **E2.3** | **Flushes and springs - Acid/ neutral flush- bryophyte dominated spring** | LBAP | **0.70** | | |

| Community or Habitat Code | Community or Habitat Name | Conservation Status | Area (Ha)[5] | Reason for Evaluation | Evaluation |
|---|---|---|---|---|---|
| M31 | *Anthelia julacea – Spagnum denticulatum* spring | SBL, Not Annex 1 | <0.01 | Within the UK this habitat is restricted mainly to the Scottish Highlands and a few areas in south-west Scotland and north Wales. On the Site it forms small areas of flushed base rich habitat within the wider typically more acidic habitat mosaic. Such small areas of base rich habitat can contribute significantly to the botanical interest of an area. Therefore, despite the small extent of this habitat, it is considered to be of regional value. | Regional value |
| M32 | *Philonotis fontana – Saxifraga stellaris* spring | SBL, Not Annex 1 | 0.70/0.74 | Within the UK this habitat is restricted mainly to the Scottish Highlands and a few areas in south-west Scotland and north Wales. On the Site it forms small areas of flushed base rich habitat within the wider typically more acidic habitat mosaic often supporting SBL species mossy saxifrage. Such small areas of base rich habitat can contribute significantly to the botanical interest of an area. Therefore, despite the small extent of this habitat, it is considered to be of regional value. | Regional value |
| **G1** | **Standing water** | SBL | **0.06** | The waterbodies present are typically very small and form part of track drainage infrastructure. While they likely to be of some value to amphibians, they are unlikely to be key breeding sites. In a few locations standing water is found in association with bog pools- please see valuation for bog habitats in relation to these-area.<br>Standing water associated with artificial pools is considered to be of less than local value. | Less than local value |
| **I2.1** | **Quarry** | None | **3.79** | Negligible ecological value | Less than local value |
| **J3.6** | **Buildings** | None | **0.50** | Negligible ecological value | Less than local value |
| **J3.7** | **Track** | None | **14.65** | Negligible ecological value | Less than local value |
| **J4** | **Bare ground** | None | **2.52** | Negligible ecological value | Less than local value |
| Total | | | 2,765.25 | | |

| Community or Habitat Code | Community or Habitat Name | Conservation Status | Area (Ha)[5] | Reason for Evaluation | Evaluation |
|---|---|---|---|---|---|
| *M15 and M25 can be associated with the Phase 1 habitats marshy grassland or wet modified bog depending on peat depth. Peat is believed to be shallow <50 cm over most of the Site based on the Scottish soils map[6]. M25 has been assigned to marshy grassland under the Phase 1 classification over most of the Site except where peat probing during the Phase 1 survey indicate it is modified bog (i.e. located on peat >50 cm deep). Whilst these classifications are considered likely to be correct across much of the Site, peat depth data is interpolated and it is possible that some areas would be reclassified based on more detailed peat depth information.<br><br>**Some bog communities have been classed as blanket bog, wet-modified bog and dry-modified bog depending on ground/ habitat conditions. To avoid unnecessary repetition, these NVC communities are only described under one of the corresponding Phase 1 sub-headings below, with notes indicating why this is considered the most appropriate category for the majority of that community and to which other Phase 1 habitats some polygons of the community have been assigned to (where appropriate). In addition, it is made clear via the Phase 1 mapping which category each polygon of these habitats was assigned to during the survey.<br><br>*** Note that the area of scattered trees overlies areas of other habitats and therefore is additional to the total area of survey area. | | | | | |

[6] http://map.environment.gov.scot/Soil_maps/?layer=10

### 8.6.3 Faunal baseline

107. A summary of the protected or otherwise notable fauna recorded within the relevant study areas during the various ecological surveys and/ or for which records were obtained during the desk study is provided in the following sections. Further details are provided in **Technical Appendices 8.1–8.7**.

#### Invertebrates

108. Records of twenty-one species of invertebrates included on the Dumfries and Galloway LBAP and SBL, in particular species reliant on wetland and heath habitats, were obtained during the desk study (**Technical Appendix 8.1**). None of these species are likely to be significantly affected by the proposed Development however (see paragraph 36) and therefore, these invertebrates have been **scoped out** of further assessment.

109. Habitat within watercourses was considered to be suitable for FWPM, however no FWPM were recorded during field surveys undertaken at watercourse crossing locations (see **Technical Appendices 8.3 & 8.4**). Therefore, there is unlikely to be a direct impact on FWPM; however, indirect impacts are possible on any populations outwith the survey areas via any impact on salmonid populations.

#### Fish

110. All watercourses within the Site and a 250 m buffer (access permitting) as well as 100 m upstream and up to 500 m downstream of proposed new watercourse crossings on the proposed Access Route A were surveyed for fish habitat, see **Technical Appendix 8.3**.

111. **Table 8.4** summarises the fish habitat quality of the watercourses on the Site. The majority of watercourses within the Site had suitable habitat for salmonids ranging from excellent (four water courses: Polvaddoch Burn, Scaur Water, Rashy Grain and Shinnel/ Fingland), to poor (13 watercourses). Only two watercourses, an unnamed tributary of the Big Tory Burn and the Poljorg Burn, on the proposed Access Route A had no potential for fish at the location surveyed, although conditions did improve downstream of the surveyed locations.

112. Salmon are likely to be present in some of the watercourses surveyed within the Nith catchment in particular the Scaur Water. Other watercourses have barriers that may partially or completely prevent the up-stream migration of adult salmon or sea trout to spawn, in particular within the Water of Ken Catchment, as the Kendoon Dam does not have a fish pass.

113. In addition, within the survey area are inappropriately seated culverts under forestry tracks on the following watercourses:

- the unnamed tributaries entering the Euchan Water above the water works;
- the Dalmet Burn; the Magheuchan Burn; the Greystone Burn; the Polvaddoch Burn, Pillosh Sikes; and
- the Rashy Grain Burn; and Lamgarroch Strand.

114. These will prevent or restrict the up-stream movement of fish. Barriers to up-steam movement of fish mean that populations, typically of brown trout, above these barriers cannot be replenished by sea trout progeny and are therefore particularly vulnerable.

115. Desk study data (see **Table 8.4**) included records of salmon and sea trout from within 2 km of the Site and historical fisheries data provided by NDSFB and GFT confirmed the presence of fish in some of the watercourses surveyed for fish habitat.

Table 8.4: Fish habitat suitability of watercourses (See Technical Appendices 8.3 and 8.4)

| Watercourse | Fish habitat Survey Site Code | Fish Habitat | Watercourse Crossing *, ** | Inappropriately seated existing culvert(s) |
|---|---|---|---|---|
| Euchan – Lower section | EU01 | Good | WX01* | |
| Euchan – Mid section | EU02 | Good | | |
| Euchan – Upper section | EU03 | Good | WX07, WX08*, WX14, WX13*, WX12* | |
| Un-named tributary | EU04a | *Poor* | | Yes |
| Un-named tributary | EU04b | *Poor* | | Yes |

| Watercourse | Fish habitat Survey Site Code | Fish Habitat | Watercourse Crossing *, ** | Inappropriately seated existing culvert(s) |
|---|---|---|---|---|
| Poltallan Burn | EU05 | Good | WX02 | |
| Slot Burn | EU06 | Good | WX03 | Yes |
| Dalmet Burn | EU07 | Good | WX04 | Yes |
| Magheuchan Burn | EU08 | Good | WX05, WX10 | Yes – WX05 |
| Graystone Burn | EU09 | Moderate | WX06 | Yes |
| Rye Grain Burn | EU10 | Good | WX09* | |
| Mid Grain Burn | EU11 | Good | WX15, WX17 & WX16* | |
| Polvaddoch Burn/ Upper Water of Ken | KE01 | **Excellent** | WX18 & WX20 | Yes |
| Polmulloch Burn | KE02 | Good | | |
| Unnamed tributary | KE03 | *Poor* | | |
| Fortypenny Burn | KE04 | Moderate | WX21 | |
| Pullosh Sikes | KE05 | *Poor* | | Yes |
| Unnamed tributary | KE06 | *Poor* | | |
| Pot Burn | KE07 | Moderate | | |
| Scaur Water | SC01 | **Excellent** | WX19* | |
| Rashy Grain | SC02 | **Excellent** | | Yes |
| Black Burn | SC03 | *Poor* | | |
| Unnamed Tributary | SC04 | *Poor* | | |
| Polskeoch Burn | SC05 | Good | | |
| Corse Cleuch | SC06 | *Poor* | | |
| Shinnel/Fingland | SH01 | **Excellent** | WX22, WX23*, WX24 | |
| Unnamed Tributary | SH02 | *Poor* | | |
| Lamgarroch Strand | SH03 | Good | | Yes |
| White Burn | SH04 | *Poor* | | |
| Grain Burn | SH05 | Moderate | | |
| Lockerty Burn | SH06 | Moderate | | |
| Big Tory Burn | WX14 | Moderate | WX11 | |
| Unnamed tributary of the Big Tory Burn | WX28 | *None* | WX25 | |
| Unnamed tributary of the Upper Kello Water | WX29 | Moderate | WX26 | |
| Upper Kello Water | WX30 | Good | WX28 | |
| Earl Seat Burn | WX31 | Moderate | WX30 | |
| Little Poljorg Burn | WX32 | *Poor* | WX31 | |
| Poljorg Burn | WX33 | *None* | WX32 | |
| Bottom Burn | WX34 | *Poor* | WX33 | |
| Unnamed tributary of the Bottom Burn | WX35 | *Poor* | WX34 | |

*Crossing is on a tributary of the named watercourse not on the main channel

** *Note that some WX numbers have changed since those shown in **Technical Appendix 8.3**, which refer to a previous iteration of the proposed Development layout. WX numbers used here are those shown on **Figure 8.4**.*

### Amphibians and reptiles

116. The Site contains multiple small pools, the majority of which are associated with drainage infrastructure for forest tracks. They vary in habitat quality for amphibians although it is likely that at least some are used for breeding by common frog and palmate newt. One frog was seen during the mammal walkover survey in May 2020. No records of amphibians were found in the desk study data.

117. Great crested newt habitat suitability calculations were made for ten waterbodies on the Site and all had poor habitat suitability for this species. Great crested newt are therefore considered unlikely to be present and have therefore been **scoped out** of further assessment.

118. Desk study data returned records for adder, common lizard and slow-worm from within 2 km of the Site. There are suitable habitats on the Site for all three species particularly in un-forested areas. One common lizard was noted at NS 66695 04671 alongside an unnamed watercourse within a forest ride north of Midgrain Rig. Potential extensive reptile habitat was recorded along the proposed Access Route A at Quintin Knowe (NS 656 079).

### Mammals

119. The Site offers suitable habitat for a range of protected mammal species including otter, water vole, badger, red squirrel and pine marten (**See Figure 8.6 and Technical Appendix 8.5 for more details**).

#### *Pine marten*

120. Records of pine marten from within the Site were included in the desk study data. During field surveys, evidence of pine marten activity was widespread within the survey area, including thirteen potential pine marten scats and one probable pine marten den, a potential den or resting site.

#### *Red squirrel*

121. Records of red squirrel from within the Site were included in the desk study data. During field surveys, the majority of squirrel evidence was observed within the Polskeoch area. In 2019 squirrel feeding signs were found in eight locations, two in the south of the Euchanhead Forest and six in the south of the Polskeoch Forest. The cone crop in this area of mature Sitka spruce *Picea sitchensis* appeared to be poor possibly explaining why evidence of squirrel activity was not higher. No dreys were observed. In May and June 2020, two additional locations with feeding signs were noted in Euchanhead Forest.

122. All signs of squirrel have been assumed to be of red squirrel as they are known to occur in the wider area and as coniferous plantation is less favoured by grey squirrels compared to broadleaved woodland[7]. However red and grey squirrel feeding signs cannot be reliably distinguished from one another.

#### *Otter*

123. Records of otter from within the Site were included in the desk study data. In addition. evidence of otter activity including spraints and potential holts/ couches were recorded on most of the watercourses surveyed indicating that otter activity is widespread along suitable watercourses in this area. In 2019, signs of otter including spraint, tracks and a slide were recorded in five locations, in 2020 signs of otter including spraints and tracks were recorded in an additional 20 locations including five potential resting sites.

#### *Water vole*

124. Records of water vole from within the Site were included in the desk study data. No signs of water vole were found during the 2019 surveys although some sections of the Shinnel Water were considered suitable for water vole due to the presence of muddy banks. In 2020, one brief sighting of water vole was made adjacent to the Big Torry Burn, with the animal disappearing into a burrow at close range to the observer at NS 66781 05663. In addition, potential water vole habitat was noted at other locations along the proposed Access Route A, and adjacent to the Fortypenny Burn south of Polskeoch.

#### *Badger*

125. Records of badger from within 2 km of the Site were included in the desk study data. No signs of badger were recorded during the surveys, but these results do not necessarily preclude the possibility of this species being present within the Site. Badger, if present, may be at very low density or only use the Site occasionally.

[7] https://www.britishredsquirrel.org/red-squirrels/red-squirrel-conservation/

### *Mountain hare*

126. Records of mountain hare from within 2 km of the Site were included in the desk study data. Habitat on open moorland was suitable for mountain hare[8] although no evidence of them was observed during surveys. Mountain hare, if present, may be at very low density or only use the Site occasionally.

### *Brown hare*

127. Records of brown hare from within 2 km of the Site were included in the desk study data. Habitat for brown hare, which typically prefers lower lying open ground was limited[9], although a brown hare was observed incidentally during surveys. Brown hare are considered unlikely to be present on the Site in high numbers and are likely to only use small areas of suitable habitat on the Site occasionally.

### *Hedgehog*

128. Records of hedgehog from within 2 km of the Site were included in the desk study data. Habitat in small areas of deciduous woodland was suitable for hedgehog although no evidence of them was observed during surveys. Hedgehog, if present, may be present at very low density.

### *Incidental records*

129. No field signs of other protected mammal species were found during the surveys. Red deer, roe deer, brown hare, and weasel, were encountered while undertaking searches for protected mammals. There were abundant sightings and signs of field vole and bank vole. Roe deer and fox were also sighted during the habitat surveys (see **Technical Appendix 8.2**).

## Bats

130. The desk study data included records for at least eight species of bat within 10 km of the Site including Natterer's bat *Myotis nattereri*, common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, whiskered/ Brandt's *Myotis mystachinus or M. brandtii*, brown long eared bat *Plecotus auritus*, Daubenton's bat *Myotis daubentonii*, Leisler's bat *Nyctalus leisleri*, and Noctule *Nyctalus noctula*. A number of records were only recorded to genus level e.g. *Myotis, Nyctalus* or *Pipistrellus*.

131. The 2019 potential roost assessment and dusk/dawn surveys confirmed the presence of soprano pipistrelle roosting within the Bothy and the Farmhouse within the Polskeoch forest block (**Figure 8.7)**. The southeast aspect of the Bothy was found to support a maternity roost for soprano pipistrelle with a peak count of 83. The northwest aspect of the Bothy was found to provide a small number of individual non-breeding summer roost locations. The Farmhouse was found to support a small number of individual non-breeding summer roost locations. Two other buildings within the Polskeoch forest block were identified as having bat roost potential but no evidence of roosting was recorded during surveys. No suitable roosting locations were identified within the Euchanhead forest block during the 2018 survey.

132. Activity surveys undertaken across the Site during 2018 and 2019 recorded six species of bat, but as some bat calls were only identified to genus level, more than six species may have been recorded, e.g. more than one *Myotis* species may have been present:

- *Pipistrellus* genus (2018 and 2019);
- Soprano pipistrelle (2018 and 2019);
- Common pipistrelle (2018 and 2019);
- *Myotis* genus (2018 and 2019);
- Daubenton's bat (2019);
- *Nyctalus* genus (2018 and 2019);
- Leisler's (2019);
- Noctule (2019); and
- Brown long-eared bat (2018 and 2019).

133. The most commonly recorded species in 2018 were soprano pipistrelle and common pipistrelle, with the two species combined accounting for 92.5% of all bat records. Pipistrelle species were also most the commonly recorded species / species group in 2019. Allowing for differences in the way data were analysed and presented in each year, e.g. whether

[8] https://scottishwildlifetrust.org.uk/species/mountain-hare/
[9] https://scottishwildlifetrust.org.uk/species/brown-hare/

*Nyctalus* and *Myotis* were identified to species level, the species composition was similar in each year and similar across the two forest blocks (Euchanhead and Polskeoch).

134. A brief overview of survey results for Euchanhead 2018 and Polskeoch 2019 is provided below (see **Technical Appendices 8.6 and 8.7** for full details). Due to the differences in the way that the data in 2018 and 2019 were recorded and presented within the respective baseline reports, undertaking a direct comparison of all results is not possible. One comparison that is possible, is the average number of bat passes per night, for all species combined, during each recording season (spring, summer and autumn), as shown in **Table 8.5**. Caution must be applied however when comparing numbers between years as the results in each season are likely to be affected by differences in weather conditions between survey periods.

Table 8.5 Average bat passes per night (all species combined) by location and season

| Survey Area | Survey Year | Survey Season | Average Bat Pass per Night |
|---|---|---|---|
| Euchanhead Forest Block | 2018 | Spring | 0.88 |
| Polskeoch Forest Block | 2019 | Spring | 4.52 |
| Euchanhead Forest Block | 2018 | Summer | 14.23 |
| Polskeoch Forest Block | 2019 | Summer | 7.81 |
| Euchanhead Forest Block | 2018 | Autumn | 0.17 |
| Polskeoch Forest Block | 2019 | Autumn | 27.08 |

135. During the 2018 surveys the highest average for bat passes per night (85.66) was encountered during the summer at Location 2 (**Figure 8.7**), with much lower levels of activity recorded at all other recording locations. Location 2 is described as the edge of a small burn (water/edge habitat). During the 2019 survey the highest average per night was encountered during the autumn at Location 10, with the next highest averages recorded at Locations 4 and 5, also in autumn (**Figure 8.7**). Location 10 is described as being 10 m away from a track, on the edge of a clear-felled area, Locations 4 and 5 were both located on large forest rides with Location 4 being located at the intersection of large rides.

136. During both years of survey, some locations did not register any bat passes during whole recording periods, e.g. Locations 7 and 8 in 2018. This was especially true of recording locations which were within the conifer woodland, described as closed habitat, i.e. not near rides, water courses or edge habitat. This indicates that bats are preferentially using forest rides and edge habitat for foraging, rather than the densely forested areas.

### Non-native invasive species

#### *American signal crayfish*

137. No signs of American signal crayfish were found during the fish habitat or FWPM surveys. American signal crayfish are, however, present in the Dee-Ken catchment, part of which was subject to survey. American signal crayfish have the ability to cross land to get to adjoining aquatic habitats so could be present at low densities within both the Dee-Ken watercourses on the Site and watercourses in the Nith catchment which came very close to these in the Polskeoch area.

### Evaluation of faunal receptors

138. An evaluation of the non-avian faunal ecological receptors, which are either known to be present or considered likely to be present within the study area, is provided in **Table 8.6.**

Table 8.6: Summary of faunal receptor value

| Receptor | Legal/ Conservation Status* | Reason for Evaluation | Evaluation |
|---|---|---|---|
| Freshwater pearl mussel | HR Sch2, WCA Sch5, SBL, LBAP | Habitat within watercourses was considered to be suitable for FWPM, and although no FWPM were recorded during field surveys undertaken at watercourse crossing locations FWPM do occur in the wider catchment. As FWPM are a European protected species despite not occurring on the Site, given the potential for them to be present further downstream the | Local value |

| Receptor | Legal/ Conservation Status* | Reason for Evaluation | Evaluation |
|---|---|---|---|
| | | watercourses on the Site are considered to be of local value to FWPM. | |
| Other invertebrates | SBL, LBAP | No protected insects were observed on the Site although habitats that may support some species were recorded. However, given the abundance of similar habitat within the surrounding area the Site is assessed as being of less than local value. | Less than local value |
| Fish: brown trout, Atlantic salmon, river lamprey, brook lamprey, rainbow trout and European Eel | SBL, LBAP, SFF | Many of the watercourses on the Site were considered to have good or above habitat suitability for fish, four water courses had excellent habitat: Polvaddoch Burn, Scaur Water, Rashy Grain and Shinnel/ Fingland. Only some of the watercourses on the Site are accessible to Atlantic salmon and sea trout due to barriers downstream; however, this makes resident populations of brown trout particularly vulnerable as immigration is limited. All watercourses on the Site with good or above fish habitat are considered to be of local value. Those with excellent fish habitat are considered to be of regional value. Those with poor or no fish habitat are considered of less than local value. | Polvaddoch Burn, Scaur Water, Rashy Grain and Shinnel/ Fingland – Regional value<br>Water courses with good or moderate habitat- Local value |
| Great crested newt | HR Sch2, WCA Sch5, SBL, LBAP | None of the water bodies on the Site were considered to provide good potential habitat for great created newt and no local records of great created newt were found in the desk study data. They are therefore considered likely to be absent from the Site. The Site is considered to be of less than local value to great crested newt. | Less than local value |
| Other amphibians | | Common frog was observed on the Site and habitats that may support some species were recorded. However, given the abundance of similar habitat within the surrounding area the Site is assessed as being of less than local value. | Less than local value |
| Reptiles | WCA Sch5, SBL | A common lizard and some suitable habitat for reptiles was recorded on the Site. Common lizard is described as being widespread throughout Scotland (SNH, 2016 d). Therefore, as common lizard are relatively common and widespread and given the abundance of similar habitat in the surrounding area, the Site is not assessed as being of higher than local value.<br>Slow worm is described as being fairly common across Scotland. Limited suitable habitat is present within the Site but similar habitat is widespread in the wider area. Therefore, given suitable habitat is in the surrounding area even if present the Site is assessed as being of no more than local value for this species.<br>Adder is described as widespread across the Scottish mainland (SNH, 2016 e). There is suitable habitat on the Site and in the surrounding area for this species. Therefore, the study area is considered to be of no more than local value to adders. | Local value |
| Pine Marten | HR Sch2, WCA Sch5, SBL | Pine martens are widely distributed throughout the Scottish mainland, being mainly found in woodlands including conifer plantations (SNH, n.d-a). Evidence of likely use of the study area by pine marten was recorded. However, given the | Local value |

| Receptor | Legal/ Conservation Status* | Reason for Evaluation | Evaluation |
|---|---|---|---|
| | | abundance of similar habitat within the surrounding area the Site is assessed as being of no more than local value. | |
| Otter | HR Sch2, WCA Sch5, SBL and LBAP | Otters are described as occurring throughout Scotland, they can be found within 200 m of suitable watercourses or wetlands (SNH, 2007). Otter signs were observed within the study area during surveys in 2019 and 2020. The watercourses within the Site are considered to be suitable for commuting and foraging. Otters have been widely recorded at other nearby sites and given the abundance of suitable habitat in the surrounding area, the Site is assessed as being of no more than local value. | Local value |
| Badger | Protection of Badgers Act, 1992 | No evidence of badgers was identified within the study area. The study area is considered to offer limited suitable habitat for foraging badger. If present, the Site is assessed as being of less than local value to badgers. | Less than local value |
| Water vole | WCA Sch5, SBL, LBAP | Evidence of water vole occupation was found during the surveys in 2020 near the proposed Access Route A and other watercourse had suitable habitat for water vole. The Site is considered to be of local value to water voles. | Local value |
| Red Squirrel | WCA Sch5, SBL, LBAP | Some evidence of red squirrels was recorded within the study area during surveys in 2019 and 2020. The majority of the Site is commercial forestry which is suitable habitat for this species. Although present, the paucity of sings indicates that the population on the Site is low, the Site is therefore considered to be of local value to red squirrel. | Local value |
| Mountain hare | SBL, LBAP | No evidence of mountain hare was identified within the study area. The study area is considered to offer suitable habitat for mountain hare. If present, the Site is assessed as being of less than local value to mountain hare. | Less than local value |
| Brown hare | SBL, LBAP | No evidence of brown hare was identified within the study area. The study area is considered to offer limited suitable habitat for brown hare. If present, the Site is assessed as being of less than local value to brown hare. | Less than local value |
| Hedgehog | SBL, LBAP | No evidence of hedgehog was identified within the study area. The study area is considered to offer limited suitable habitat for hedgehog. If present, the Site is assessed as being of less than local value to hedgehog. | Less than local value |
| Bats | HR Sch2, WCA Sch5, SBL, LBAP[10] | Two structures used by roosting pipistrelle bats were identified within the Site, including a soprano pipistrelle maternity roost. Common and soprano pipistrelle bats are common and widespread within the region and the roosts are considered to be no more than locally important.<br><br>The Site comprises a range of habitats but is dominated by conifer plantation with limited roosting opportunities and relatively low value to foraging bats. On this basis and given the levels of activity and range of species recorded, the habitats within the Site are considered to be no more than locally important for foraging bats. An assessment of risk to bat species is presented in Section 8.7. | Local |

[10] Soprano pipistrelle, brown long-eared bat and noctule bat only.

| Receptor | Legal/ Conservation Status* | Reason for Evaluation | Evaluation |
|---|---|---|---|
| * A key to abbreviations is provided in **Technical Appendix 8.1** | | | |

### 8.6.4 Cumulative situation

139. When undertaking the cumulative effects assessment, it is important to consider only those projects which could potentially contribute to significant cumulative effects with the proposed Development. For this assessment, potential cumulative effects have been assessed for the following receptors and developments:

- cumulative effects on aquatic receptors within the same sub-catchments; and
- cumulative effects on bat populations, which are possible in combination with windfarms within a 10 km radius.

140. Other projects for which data were searched for to inform the cumulative effects assessment are detailed in **Table 8.7.** These include all windfarms within the relevant areas which are either operational, under construction, consented or for which a planning application has been submitted. Note, however, that the relevant information was not accessible for all of these as some were too old and the information no-longer held in publicly accessible location or still in the early stages of planning with information not yet publicly available. Those projects for which relevant ecological information was available are presented in **bold**.

Table 8.7: Other projects within 10 km (those with accessible relevant data considered in cumulative effects assessment are presented in **bold**.

| Project | Status | Number of turbines | Distance from Site | Suitable ecology data available for cumulative assessment |
|---|---|---|---|---|
| **Operational, Under Construction and Consented** | | | | |
| Sanquhar<br>**Sanquhar 6** | Operational<br>Consented | 9<br>6 | adjacent | No<br>Yes |
| **Lorg** | Consented | 9 | adjacent | Yes |
| **Harehill and Ext** | Operational | 20+39 | 2.0 km | Yes |
| Afton | Operational | 25 | 2.8 km | No |
| Whiteside Hill | Operational | 10 | 2.8 km | No |
| **Sandy Knowe** | Consented | 24 | 3.4 km | Yes |
| Windy Standard 1, 2 (extension) and 3 | Operational (1 & 2)<br>Consented (3) | 36+30<br>20 | 4.1 km | No<br>No |
| **Windy Rig** | Under Construction | 12 | 4.5 km | Yes |
| Wetherhill | Operational | 14 | 4.9 km | No |
| **Pencloe** | Consented | 19 | 5.3 km | Yes |
| Twentyshilling | Under Construction | 9 | 8.3 km | No |
| **Glenmuckloch** | Consented | 8 | 9.0 km | Yes |
| **Lethans (2019)** | Consented | 22 | 9.4 km | Yes |
| Sunnyside | Operational | 2 | 10 km | No |
| **Proposals (with submitted/validated Planning Applications or at Appeal)** | | | | |
| **Sanquhar II** | Proposed | 50 | adjacent | Yes |
| Lorg Increased Tip Height | Proposed | 9 | adjacent | No |
| **Cornharrow** | Proposed | 8 | 4.3 km | Yes |
| Pencloe (2019 variation application) | Proposed | 19 | 5.3 km | No |
| **Shepherds Rig** | Proposed | 17 | 7.6 km | Yes |

### 8.6.5 Future baseline

141. In the absence of the proposed Development, the Site is likely to remain as predominantly commercial forestry with areas of moorland on higher ground and along/ watercourses/ forest rides (with blanket bog, modified bog, acid grassland and marshy grassland habitats), and small areas of deciduous woodland particularly along watercourses, with open habitats grazed predominantly by sheep.

142. The coniferous plantation blocks are planned to be felled once the trees reach maturity in line with existing baseline felling plan but it is understood that these areas would likely be replaced with further plantation woodland (predominantly coniferous), , but with some less productive, deeper peat areas left un-planted and an increase in deciduous trees and lower density planting particularly around the forest edge (see **Technical Appendix 3.2: Forestry, Figures 3.2.4 and 3.2.5**).

143. To allow for possible changes in the distribution of protected species, pre-construction surveys for protected mammal species (otter, red squirrel, water vole and pine marten) would be undertaken to ensure legislative compliance during construction, as detailed in paragraph 153.

144. There is no reason to expect the suitability of the watercourses for fish to change significantly in the absence of the proposed Development. Similarly, bats are likely to continue to forage across the Site in similar numbers in future years, in the absence of the proposed Development.

145. It is considered possible that the areas of modified bog will continue to deteriorate in quality as the effects of drainage continue with *Molinia* increasing in its dominance.

146. In summary, in the absence of the proposed Development the ecological condition of the Site is unlikely to change significantly over the next few decades.

## 8.7 Assessment of effects

147. The assessment of effects is based on the information outlined in **Chapter 3: Description of the proposed Development** and adopts a precautionary approach which assumes that proposed Access Route A will be utilised. **Figures 8.2 and 8.3** illustrate the proposed Development infrastructure over the Phase 1 and NVC survey results respectively.

### 8.7.1 Embedded mitigation

148. The proposed Development has been subject to a number of design iterations and evolution in response to constraints identified as part of the baseline studies, intended to reduce environmental effects (see **Chapter 2: Site Description and Design Evolution** for further details). With respect to (non-avian) ecology the following changes have been incorporated to avoid or minimise negative effects:

- it was not possible to completely avoid blanket bog and wet modified bog habitats. However, the area of the Site used for infrastructure (e.g., wind turbines, tracks and substation) in areas of higher quality blanket bog has been minimised and areas of deep peat have been avoided as far as possible, with floating roads proposed where appropriate to minimise impacts to the underlying hydrology;
- a 50 m buffer has been included around all mapped watercourses for turbines and associated access tracks (except for watercourse crossings);
- re-use of existing tracks was maximised and new track length and the number of watercourse crossings were minimised as far as practical to minimise land take;
- in relation to bats, tree clearance would ensure a minimum 50 m buffer between wind turbine blade tips and the closest forest edge (at its nearest point), in accordance with current good practice guidelines (Scottish Natural Heritage, et al., 2019). Proposed turbine dimensions are:
  - height to tip – 230 m
  - hub height – 155 m
  - rotor diameter 150 m (radius 75 m)
- therefore, assuming a maximum canopy height of 25 m at this exposed upland site, blade tips will be at least 55 m higher than the canopy at their lowest point and given a 50 m horizontal separation between the turbine and the forest edge, blade tips will be at least 64 m from the closest forest edge.

### 8.7.2 Good practice measures

#### Mitigation measures

149. Full details of construction mitigation measures would be provided in a Construction Environmental Management Plan (CEMP). An Outline CEMP is included as **Technical Appendix 3.1**. Good practice measures in relation to pollution risk, sediment management and watercourse crossings to be adopted during the construction and operational phases are set out in **Chapter 10: Hydrology, hydrogeology, geology and soils**.

150. During the construction phase, good practice techniques with respect to peatland environments, as contained within SNH (2019), would be implemented. Further details on peat and water management during construction are provided in **Chapter 10: Hydrology, hydrogeology, geology and soils** and **Technical Appendix 3.1: Outline CEMP**.

151. Good practice measures to protect retained habitats during the construction phase would be implemented, including the erection of temporary protective fencing demarcating the working footprint, to be overseen and policed by an Ecological Clerk of Works (ECoW); further details are provided in **Technical Appendix 3.1: Outline CEMP**. Good practice techniques for vegetation and habitat reinstatement would be adopted and implemented on areas subject to disturbance during construction as soon as is practicable.

152. Mitigation to protect GWDTE where there is potential for infrastructure (e.g. Borrow Pit 7 (BP07) and the proposed Access Route A) to intercept groundwater and reduce the flow of the water reaching GWDTE, is outlined in **Chapter 10, Technical Appendix 10.3**. In summary:

- the track would be designed so that it does not impede the existing flow paths to GWDTE habitat; and
- measures would be implemented to ensure shallow groundwater flow paths to springs are maintained. For example, a shallow cut-off drain could be installed on the western boundary of the borrow pit to route shallow groundwater around the borrow pit to the habitat located east of the borrow pit and proposed access track. A diffuse discharge from the drain would need to be maintained to ensure that all the habitat to the east of the borrow pit is sustained. The drainage measures would need to be routinely inspected by the Site ECoW.

#### Pre-construction surveys

153. Due to the time that will have elapsed since the last surveys and the possibility that activity by protected mammal species could have changed in the intervening period, a pre-construction survey for otter, red squirrel, water vole and pine marten would be undertaken prior to tree felling and construction taking place. This would cover all watercourses and other suitable habitat (focussing on forest edges and rides) within 250 m of infrastructure and associated working areas. The results of the pre-construction surveys would inform the need for further mitigation (if required) in respect of working practices or to consult with SNH if required.

154. In addition, pre-felling checks for red squirrel dreys would be undertaken. Further mitigation in respect of working practices would be developed, licences obtained and consultation with SNH undertaken if required.

155. A pre-construction and pre-felling survey would also be undertaken for invasive non-native species, including American signal crayfish, and appropriate mitigation put in place to reduce the risk of transferring this species among watercourse/ catchments (e.g. on vehicle wheels). The nature of this mitigation will depend on the outcome of the surveys and be agreed with SNH, NDFB and GFT.

#### Fish monitoring plan

156. Prior to construction commencing a fish monitoring plan including surveys pre-construction, during construction and post construction would be agreed with NDFB, GFT and SNH. This would likely include electro-fishing surveys to establish and monitor fish population sizes and demography. These data would facilitate identification and mitigation of any impacts to fish that may occur during the construction period.

#### Ecological Clerk of Works

157. A suitably qualified ECoW would be employed for the duration of the construction and reinstatement periods, to oversee the safeguarding of natural heritage interests, although this may not necessarily be a full-time role throughout. The role of the ECoW would include the following tasks:

- give toolbox talks to all staff onsite, e.g. an ecological induction, so staff are aware of the ecological sensitivities on the Site and the legal implications of not complying with agreed working practices;
- agree and monitor measures designed to minimise damage to retained habitats;
- undertake pre-construction surveys and advise on ecological issues where required; and
- pre-construction inspections of areas which require species-specific mitigation and supervision of relevant mitigation measures.

158. The ECoW would also undertake additional roles such as assisting with water quality monitoring and checking for nesting birds (see **Chapter 9: Ornithology** and **Chapter 10: Hydrology, hydrogeology, geology and soils**).

#### Reptiles

159. In order to comply with the Wildlife and Countryside Act 1981 (as amended in Scotland), mitigation would be employed to reduce the chances of inadvertently killing or injuring individual reptiles during construction works. Given the low numbers of reptiles likely to be present, the large areas of suitable habitat that would remain unaffected by the works and given also the large spatial scale of the works, fencing and translocation are not considered appropriate. Proposed mitigation, therefore, would involve vegetation management where appropriate and the identification/ removal of potential refugia and hibernacula if present.

160. Where appropriate and safe to do so, potentially suitable habitats for reptiles located within construction working areas would be cut, under the supervision of the ECoW, prior to construction works commencing in that area, in order to encourage reptiles to leave the area. Where required, suitable habitat within working areas would also be searched by the ECoW prior to construction commencing and any potentially suitable refuges would be removed. These works would take place during the active season for reptiles (typically April to October, although this is dependent upon the nature of weather conditions in any one year).

#### Protected mammals

161. All potentially dangerous substances or materials within the temporary construction compound would be carefully stored to prevent them causing any harm to otters or other mammal species which may enter the compound at night.

162. During construction, all excavations greater than 1 m depth would either be temporarily covered at night or designed to include a ramp to allow otters and other animals a means of escape should they fall in.

#### Bats

163. As a precaution if the maternity roost is confirmed to be occupied, in order to prevent possible disturbance to the soprano pipistrelle maternity roost in The Bothy (**Figure 8.7**), any works to upgrade the access track within 100 m of The Bothy would not take place during the maternity period (June to August inclusive). Occupation of the maternity roost during the construction period would be monitored by the ECoW, or a licensed bat worker reporting to the ECoW.

### 8.7.3 Construction effects

#### Potential effects

164. Potential effects, assuming that the good practice mitigation measures outlined in paragraphs 148 to 163 are implemented, are addressed for each receptor in turn in. Effects have been assessed only for important ecological receptors (i.e. those with a value of Local level or above, potential GWDTEs or legally protected species and those not scoped out of assessment due to there being no potential for significant effects). These comprise:

- non-statutory designated sites (Glenmaddie Wood LWS, Afton Uplands Provisional LWS and Galloway and Southern Ayrshire Biosphere reserve);
- blanket bog, wet modified bog, dry modified bog, wet heath, dry heath, marshy grassland (M25), calcareous grassland, flushes and springs;
- watercourses with good or above fish habitat; and
- otter, pine marten, water vole, red squirrel, reptiles, bats, FWPM and fish.

#### *Designated Sites*

*Glenmaddie Wood LWS*

165. Glenmaddie Wood LWS is partly within 2 km of the Site. It is downstream of the Euchanhead forest block on either side of the Euchan Water, and consists of areas of broad-leaved woodland, scrub, acidic grassland, stands of bracken and riparian

habitats. There is no terrestrial route to impact on habitats on this LWS, and although protected species such as otter, salmonids and pine marten may travel along the river/ river corridor between Glenmaddie Wood and the Site, mitigation on the Site to reduce risk to these species and the freshwater environment means that impacts will be **negligible** and that **no significant effects** from the development either directly or indirectly on Glenmaddie Wood or the biodiversity that it supports are considered likely.

*Afton Uplands Provisional LWS*

166. Proposed Access Route A passes through part of the Afton Uplands Provisional LWS. This site is important for its range of upland mire, montane heath and grassland habitats. There will be direct (ground clearance) and indirect (e.g. de-watering) impacts on some of these habitats due to the construction of the access road and Borrow Pits 06 and 07. Estimated permanent habitat loss within the Afton Uplands Provisional LWS will be 3.02 ha (direct loss) and 12.51 ha (indirect loss), 15.53 ha in total (see paragraphs 169 to 170 for details of habitat loss calculations). This is 0.37% of the total area of the site (4,100 ha). The majority of the habitats in the LWS are widespread and in the local area more sensitive, less widespread habitats including M3, M6, M10, M18, M31 and M32, have been avoided as far as possible. Therefore, impacts on the Afton Uplands Provisional LWS are considered **low** and **not significant**.

167. Impacts on specific habitat types are discussed in more detail in the habitats section below.

*Galloway and Southern Ayrshire Biosphere*

168. The Site is within Galloway and Southern Ayrshire Biosphere reserve. The reserve is split into three areas, the core area which is of greatest importance, the buffer area and a transition zone. The Site is within the transition zone, which is the least sensitive area of the reserve and sustainable economic development is encouraged within the reserve. Due to the Site's location in the transition zone and the predominantly coniferous plantation of the Site, ecological impacts on Galloway and Southern Ayrshire Biosphere reserve as a result of the proposed Development are anticipated to be **negligible** and **no significant effects** are therefore considered likely.

***Habitats***

169. Impacts on habitats are categorised as follows:

- direct habitat loss – this includes habitats present within the footprint of the proposed Development and includes areas which would be subject to cut and fill, grading and cable laying; and
- indirect/ temporary habitat loss – indirect loss has been calculated for wet habitats e.g. blanket bog and wet modified bog, which lie within 10 m of the direct habitat loss areas; the allowance of 10 m is to allow for drying effects and vegetation changes due to construction works[11].

170. For the purposes of assessment, a precautionary approach has been taken which assumes that direct habitat loss (all habitats) and indirect loss of wet, e.g. blanket bog and wet modified bog habitats, represents a permanent, irreversible negative effect, although in practice some areas indirectly affected may be able to be restored, e.g. during reinstatement following construction.

171. The estimated direct and indirect/ temporary habitat loss for habitats with local or greater value, and an assessment of impacts to each habitat/ community, is detailed in **Table 8.8**.

172. In summary no significant impacts are anticipated for any habitats with the exception of M18 Blanket bog, where predicted losses (direct and indirect) to a regionally important habitat would result in a significant negative effect due to the potential loss of up to a quarter of the only area of this habitat on the Site.

[11] This figure is in line with similar assessments for other projects, and although arbitrary, is considered precautionary based on experience at other sites.

Table 8.8: Habitat loss impact assessment

| Community or Habitat Code | Community or Habitat Name | Area (Ha)[12] | Value | Direct loss (ha) | Infrastructure causing Direct Habitat Loss | Indirect loss (ha) | Total loss (ha)* | Assessment |
|---|---|---|---|---|---|---|---|---|
| **A1.1.1** | **Broadleaved woodland semi-natural** | **1.69** | **Local value** | **<0.01** | **Tracks** | **n/a** | **<0.01** | Loss of <0.01 ha of broadleaved woodland is considered to be **negligible** and **not significant**. |
| **A1.1.2** | **Broadleaved woodland plantation** | **7.32** | **Local value** | **0** | **Na** | **n/a** | **0** | **No impact**. |
| **A3** | **Parkland and scattered trees** | **29.41*****| **Local value** | **0.2** | **Compound** | **n/a** | **0.2** | Loss of 0.2 ha of scattered trees is considered to be **negligible** and **not significant** at a local level. |
| **B3.1** | **Calcareous grassland-unimproved** | **0.47** | **Local value** | **0.01 (all in mosaics)** | **See below** | **n/a** | **0.01** | This habitat is rare on the Site and likely to be sparse in the local area due to its dependence on more calcium rich soils. Loss is very small in extent and involves loss of small areas in mosaic habitats which is **not significant**. |
| CG10 | *Festuca ovina-Agrostis capillaris-Thymus polytrichus* grassland | NA/ 0.03 (all in mosaics) | Local value | <0.01 | Tracks | n/a | <0.01 | See above for B3.1 |
| U5c | *Nardus stricta-Galium saxatile* grassland: | NA/0.44 (all in mosaics) | Local value | <0.01 | Tracks | n/a | <0.01 | See above for B3.1 |
| **B5** | **Marsh/Marshy Grassland** | **96.55** | | **0.43** | **See below** | **0.42** | **0.86** | This habitat is frequent on the Site and in the wider area, loss is small compared to the extent on the Site and is considered **negligible** and **not significant**. |

[12] The NVC communities listed under each Phase 1 habitat type only include those that make the most significant contributions to the area (ha) of that Phase 1 habitat. NVC communities that contribute only a small percentage of the total area of the Phase 1 habitat e.g. because the occur as a small percentage in NVC mosaic polygons are not listed.

| Community or Habitat Code | Community or Habitat Name | Area (Ha)[12] | Value | Direct loss (ha) | Infrastructure causing Direct Habitat Loss | Indirect loss (ha) | Total loss (ha)* | Assessment |
|---|---|---|---|---|---|---|---|---|
| M25 | *Molinia caerulea-Potentilla erecta* mire community | 34.28/ 42.98 | Local Value | 0.11 | Tracks | 0.42 | 0.54/ 0.59 | See above for B5 |
| **D1.1** | **Dry dwarf shrub heath** | **12.05** | | **0.07** | **See below** | **n/a** | **0.7** | This habitat is frequent on the Site and in the wider area, loss is small compared to the extent onsite and is considered of **negligible** and **not significant**. |
| H12 | *Calluna vulgaris - Vaccinium myrtillus* heath | 1.18/ 4.43 | Local value | 0.02 | Tracks | n/a | 0.02/ 0.10 | See above for D1.1 |
| H18 | *Vaccinium myrtillus-Deschampsia flexuosa* heath | 7.81/ 29.71 | Local value | 0.00 | Tracks | n/a | 0.00/ 0.52 | See above for D1.1 |
| H21 | *Calluna vulgaris - Vaccinium myrtillus – Spagnum capillifolum* heath | 0.61/ 0.74 | Local value | 0.03 | Tracks | n/a | 0.03/ 0.04 | See above for D1.1 |
| **D2** | **Wet dwarf shrub heath** | **15.26** | | **0.30** | **See below** | **1.09** | **0.35** | This habitat is frequent on the Site and in the wider area, loss is small compared to the extent onsite and is considered of **negligible** and **not significant**. |
| M15 | *Scirpus cespitosus-Erica tetralix* wet heath community | 9.45/ 34.05 | Local value | 0.19 | Tracks | 0.70 | 0.18/ 2.92 | See above for D2 |
| **D5** | **Dry heath/ acid grassland** | **42.68** | **Local value** | **0.55** | **See below** | **n/a** | **0.55** | This habitat is frequent on the Site and in the wider area, loss is small compared to the extent onsite and is considered of **negligible** and **not significant**. |

| Community or Habitat Code | Community or Habitat Name | Area (Ha)[12] | Value | Direct loss (ha) | Infrastructure causing Direct Habitat Loss | Indirect loss (ha) | Total loss (ha)* | Assessment |
|---|---|---|---|---|---|---|---|---|
| H12 | *Calluna vulgaris - Vaccinium myrtillus* heath | 1.22/ 4.43 | | 0.04 | Tracks | n/a | 0.04/ 0.10 | See above for D5 |
| H18 | *Vaccinium myrtillus-Deschampsia flexuosa* heath | 15.39/ 29.71 | | 0.10 | Laydown area, tracks | n/a | 0.10/ 0.52 | See above for D5 |
| U2 | *Deschampsia flexuosa* grassland | 0.32/ 1.31 | | 0 | none | n/a | 0 | **No impact** |
| U4 | *Festuca ovina-Agrostis capillaris-Galium saxatile* grassland community | 4.44/ 86.28 | | 0.01 | Tracks | n/a | 0.01/ 0.91 | See above for D5 |
| U5 | *Nardus stricta-Galium saxatile* grassland | 14.09/ 124.77 | | 0.21 | Tracks | n/a | 0.21/ 4.18 | See above for D5 |
| U6 | *Juncus squarrosus-Festuca ovina* grassland community | 0.92/ 62.56 | | 0.03 | Laydown area | n/a | 0.03/ 2.68 | See above for D5 |
| **D6** | **Wet heath/ acid grassland** | **10.00** | **Local value** | **0.21** | **See below** | **0.26** | **0.47** | This habitat is frequent on the Site and in the wider area, loss is small compared to the extent onsite and is considered of **negligible** and **not significant**. |
| M15 | *Scirpus cespitosus-Erica tetralix* wet heath community | 3.05/ 34.05 | | 0.05 | Tracks | 0.21 | 0.26/ 2.92 | See above for D6 |

| Community or Habitat Code | Community or Habitat Name | Area (Ha)[12] | Value | Direct loss (ha) | Infrastructure causing Direct Habitat Loss | Indirect loss (ha) | Total loss (ha)* | Assessment |
|---|---|---|---|---|---|---|---|---|
| U5 | *Nardus stricta-Galium saxatile* grassland | 1.81/ 124.77 | | 0.03 | Tracks | 0 | 0.03/ 4.18 | See above for D6 |
| U6 | *Juncus squarrosus-Festuca ovina* grassland community | 3.57/ 62.56 | | 0.10 | Tracks | 0 | 0.10/ 2.68 | See above for D6 |
| **E1.6.1** | **Blanket Bog** | **116.33** | | **2.31** | **See below** | **7.48** | **9.79** | |
| M3 | *Eriophorum angustifolium* bog pool community | 0.41/ 0.71 | Local Value | 0 | Tracks | 0.02 | 0.02/ 0.05 | This habitat is infrequent on the Site, anticipated loss is indirect and associated with floating tracks which pose a lower risk of hydrological changes within 10 m of the track than traditional tracks such that in reality habitat loss is likely to be lower than calculated. Therefore, loss is considered **low** and **not significant**. |
| M15 | *Scirpus cespitosus-Erica tetralix* wet heath community | 5.04/ 34.05 | Local Value | 0.08 | Tracks | 0.34 | 0.43/ 2.92 | This habitat is frequent on the Site and in the wider area, loss is small compared to the extent onsite and is considered **low** and **not significant**. |
| M17 | *Scirpus cespitosus – Eriophorum vaginatum* blanket mire community | 16.69/ 21.25 | Local Value | 0.39 | Tracks, crane pads | 1.62 | 2.02/ 2.31 | This habitat is frequent on the Site and in the wider area, loss is small compared to the extent onsite and is considered **low** and **not significant**. |
| M18 | *Erica tetralix – Spagnum papillosum* raised and blanket mire | 0.81/ 0.81 | Regional Value | 0.04 | Tracks | 0.14 | 0.19/ 0.19 | This habitat is found in only one location on the Site, anticipated loss is largely indirect and associated with floating tracks which pose a lower risk of hydrological changes within 10 m of the track than traditional tracks such that in reality habitat loss is likely to be lower than |

| Community or Habitat Code | Community or Habitat Name | Area (Ha)[12] | Value | Direct loss (ha) | Infrastructure causing Direct Habitat Loss | Indirect loss (ha) | Total loss (ha)* | Assessment |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | calculated. However, on a precautionary basis given that loss is equivalent to nearly a quarter of this habitat onsite and its regional importance, loss is considered **moderate** and **significant at a regional level.** |
| M19 | *Calluna vulgaris – Eriophorum vaginatum* blanket mire | 37.53/ 46.25 | Regional Value | 0.45 | Tracks | 1.99 | 2.45/ 3.16 | This habitat is infrequent on the Site and of regional importance, anticipated loss is largely indirect and much of the indirect impact is associated with floating tracks which pose a lower risk of hydrological changes within 10 m of the track than traditional tracks such that in reality habitat loss is likely to be lower than calculated. Loss is relatively small compared to the extent of this habitat onsite and is considered **low** and **not significant.** |
| M20 | *Eriophorum vaginatum* blanket & raised mire | 52.54/ 94.88 | Local Value | 1.28 | Tracks, crane pads, turbines, turning areas | 3.27 | 4.54/ 6.72 | This habitat is fairly common in open areas of the Site and is of local value. Loss of 4.54 ha of this habitat is considered **low** and **not significant**. |
| **E1.7** | **Wet Modified Bog** | **33.45** | | **0.39** | **See below** | **1.41** | **1.80** | See above under E1.6.1 |
| M3 | *Eriophorum angustifolium* bog pool community | 0.21/ 0.71 | Local value | 0 | Tracks | 0.02 | 0.02/ 0.05 | See above under E1.6.1 |
| M15 | *Scirpus cespitosus-Erica tetralix* wet heath community | 5.37/ 34.05 | Local value | 0.08 | Tracks | 0.39 | 0.48/ 2.92 | See above under E1.6.1 |
| M20 | *Eriophorum vaginatum* blanket & raised mire | 15.14/ 94.88 | Local Value | 0.14 | Tracks | 0.48 | 0.63/ 6.58 | See above under E1.6.1 |

| Community or Habitat Code | Community or Habitat Name | Area (Ha)[12] | Value | Direct loss (ha) | Infrastructure causing Direct Habitat Loss | Indirect loss (ha) | Total loss (ha)* | Assessment |
|---|---|---|---|---|---|---|---|---|
| M25 | *Molinia caerulea-Potentilla erecta* mire community | 7.12/ 42.98 | Local Value | 0.01 | Tracks | 0.05 | 0.07/ 0.58 | Loss of 0.07 ha of this common and widespread habitat is considered **negligible** and **not significant**. |
| M17 | *Scirpus cespitosus – Eriophorum vaginatum* blanket mire community | 1.74/ 21.25 | Local Value | 0.02 | Tracks | 0.07 | 0.09/ 2.31 | See above under E1.6.1 |
| **E1.8** | **Dry modified bog** | **31.19** | | **1.20** | **See below** | **0.25** | **1.44** | |
| M19 | *Calluna vulgaris – Eriophorum vaginatum* blanket mire | 2.37/ 46.25 | Local Value | 0 | none | 0 | 0/ 3.16 | **No impact** |
| M20 | *Eriophorum vaginatum* blanket & raised mire | 21.32/ 94.88 | Local value | 0.23 | Crane pads, | 0.84 | 1.06/ 6.58 | Loss is small in extent and is considered **low** and **not significant**. |
| **E2.1** | **Flushes and springs - Acid/ neutral flush** | **3.33** | | **0.05** | **See below** | **0.20** | **0.25** | |
| M6 | *Carex echinata-Sphagnum fallax/denticulatum* mire | 2.42/ 7.21 | Local value | 0.04 | Tracks | 0.18 | 0.25/ 0.52 | Loss is small in extent and is considered **low** and **not significant**. |
| **E2.2** | **Flushes and springs - Basic flush** | **0.05** | | **0** | **none** | **0** | **0** | |
| M10 | *Carex dioica – Pinguicula vulgaris* mire | 0.05/ 0.26 | Regional value | 0 | none | 0 | 0/ 0.02 | This habitat is of regional value and infrequent on the Site. However, loss is restricted to areas where this habitat forms a proportion of mosaic |

| Community or Habitat Code | Community or Habitat Name | Area (Ha)[12] | Value | Direct loss (ha) | Infrastructure causing Direct Habitat Loss | Indirect loss (ha) | Total loss (ha)* | Assessment |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | habitat and is small in extent. Loss is therefore is considered **low** and **not significant**. |
| **E2.3** | **Flushes and springs - Acid/ neutral flush-bryophyte dominated spring** | **0.70** | | **0** | **none** | **0** | **0** | |
| M31 | *Anthelia julacea – Spagnum denticulatum* spring | <0.01 | Regional value | 0 | none | 0 | 0 | **No impact** |
| M32 | *Philonotis fontana – Saxifraga stellaris* spring | 0.70/0.74 | Regional value | 0.0004 | none | 0.003 | 0.0034 | This habitat is of regional value and infrequent on the Site. However, loss is small in extent (0.5% of the habitat onsite). Loss is therefore is considered **low** and **not significant**. |

* Total habitat loss under associated Phase 1 category / Total habitat loss across the Site including minor contributions to Phase 1 habitats of which are not principally associated (see the Phase 1, NVC relationship table, Appendix 8 in the Phase 1 handbook for principally associated habitats).

*GWDTE Communities*

173. An assessment of impacts to GWDTE communities is provided in Chapter 10: Hydrology, hydrogeology, geology and soils, Technical Appendix 10.3.

***Fauna***

*Fish*

174. 35 watercourse crossing points would be created or upgraded within the Site including along those associated with the proposed Access Route A. Apart from these crossings there is a 50 m buffer between wind turbines, their associated infrastructure and watercourses. Only minimal direct loss of natural habitat of migratory fish is anticipated at new watercourse crossings assuming that good practice measures are observed during the installation of any culverts to allow fish to access habitat up-stream.

175. The watercourses Polvaddoch Burn/ Upper Water of Ken, Scaur Water, Rashy Grain and Shinnel / Fingland all have excellent habitat for salmonids and therefore are the most sensitive to pollution/ sedimentation events. The greatest risk of pollution is from work in the river channel such as installation or upgrading of watercourse crossings and run-off from tracks.

- the Polvaddoch Burn / Upper Water of Ken located in northwest Polskeoch Forest is in the Dee/Ken catchment, there are two proposed watercourse crossing point on this watercourse (WX18 & WX20);
- the Scaur Water in the Nith catchment is located in the northeast of Polskeoch Forest is and is fed by the Polskeoch Burn and other tributaries, watercourse crossing WX19 is on one of the un-named tributaries;
- the Rashy Grain Burn is a major tributary of the Scaur Water, no watercourse crossings are proposed along this watercourse; and
- the Shinnel Water/ Fingland Burn run from central Polskeoch Forest through the centre of the Site towards the southeast through Shinnelhead Forest. There are three proposed watercourse crossings on this watercourse (WX22, WX23 and WX24).

176. Given the separation distance between proposed wind turbine infrastructure and watercourses of a minimum of 50 m except for water crossing points and with the implementation of good practice pollution prevention measures (**Chapter 10: Hydrology, hydrogeology, geology and soils**), the likelihood of a major pollution event affecting fish within downstream watercourses is considered to be low. The proposed fish monitoring would also facilitate identification and mitigation of any impacts to fish that may occur during the construction period. However, due to the steep nature of the Site silt control may prove challenging during extreme weather events and minor-moderate siltation events are likely on rare occasions. Therefore, **low** impacts on salmonids or other fish species of conservation concern are possible, although impacts are considered likely to be **not significant**.

*FWPM*

177. As for salmonids, following the implementation of good practice pollution prevention measures and monitoring impacts on FWPM, if present in downstream watercourses, are likely to be **low** and not **significant**.

*Reptiles*

178. Although only common lizard has been recorded on the Site, the Site is also expected to support adder and possibly slow worm, given the suitable habitat present. The construction of the proposed Development would result in the direct loss of potentially suitable habitat for these species. This loss is considered **low** and **not significant**, given the extensive availability of similar suitable habitats within the Site and the wider area. Indirect/ temporary loss of habitat has not been considered here, as it is anticipated that areas subject to drying or other temporary damage would still be used by reptiles for activities such as basking and potentially foraging (following habitat reinstatement).

179. Good practice mitigation measures aimed at reptiles (see paragraphs 159 to 160), would be implemented during the construction phase, to minimise the risk of inadvertent injury or killing of individuals. On the basis that the proposed measures are implemented, **no significant** effects are predicted and no contravention of the relevant legislation is likely.

*Otter*

180. The death or injury of an otter during construction could affect the conservation status of this species locally and could represent an offence under relevant legislation. However, following implementation of the good practice measures outlined in

paragraphs 149 to 162, death or injury to otters during construction is not considered likely. As such, **no significant direct effects** are predicted and no contravention of the relevant legislation is likely.

181. There would be a small loss of running water habitat due to the creation or upgrading of the watercourse crossings for the proposed Development. This scale of habitat loss is **negligible** however in the context of otter home range size and is **not significant**.

182. Construction activities have some potential to cause temporary disturbance to otters that can use the watercourses and water bodies on and around the Site for foraging or commuting; this disturbance would likely be via noise and human presence. No evidence of otter resting places in current use was found during surveys. Pre-construction surveys are proposed and if otter presence was recorded close to working areas mitigation measures would be employed to avoid significant disturbance. Furthermore, otters have large home ranges and are able to adapt to a certain level of human disturbance (Chanin, 2003). As such, the likelihood of disturbance to otter is low, and no significant effects are considered likely.

***Pine marten***

183. The death or injury of a pine marten during construction could affect the conservation status of this species locally and could represent an offence under relevant legislation. However, following implementation of the good practice measures outlined in paragraphs 149 to 162, death or injury to pine martens during construction is not considered likely. In addition, pre-construction surveys are proposed and if pine marten presence was recorded close to working areas, mitigation measures would be employed to avoid significant disturbance. As such, **no significant effects** are predicted and no contravention of the relevant legislation is likely.

184. The likely presence of pine marten was identified in the study area through the presence of potential scats, and a potential den and the habitat mix present is considered to be suitable for the species. There would be a loss of potential suitable habitat for this species within the Site due to the construction of turbines, access roads and other associated infrastructure. However, pine marten will make use of open areas and trackways for commuting and this area of habitat loss makes up only a very small part of the total area of available habitat within the Site and surrounding area. Therefore, it is expected that the loss of habitat for the construction of the proposed Development would have **no significant effect** on pine marten.

***Red squirrel***

185. The death or injury of a red squirrel during construction could affect on the conservation status of this species locally and could represent an offence under relevant legislation. However, following implementation of the good practice measures outlined in paragraphs 149 to 162, death or injury to red squirrel during construction is not considered likely. In addition, pre-construction surveys are proposed and if red squirrel dreys are presence recorded close to working areas, mitigation measures would be employed to avoid significant disturbance. As such, **no significant effects** are predicted and no contravention of the relevant legislation is likely.

186. The likely presence of red squirrel was identified in commercial plantation within the study area through the presence of chewed cones, and the more mature forest habitat was considered to be suitable for the species. There would be a loss of potential suitable habitat for this species within the Site due to the construction of turbines, access tracks and other associated infrastructure. However, this area of habitat loss makes up only a very small part of the total area of available habitat within the Site. While there is extensive similar existing habitat in the surrounding area, this lacks connectivity with the Site except to the south of Polskeoch such that red squirrel may not be able to reach it if displaced from habitat onsite. However, the population density of red squirrel onsite is considered to be currently low and felled areas will be mostly be replanted, generating new suitable habitat for red squirrel as this and younger tree crops already on the Site mature. Therefore, it is expected that the loss of habitat for the construction of the proposed Development would **not have a significant effect** on red squirrel.

***Water vole***

187. The death or injury of a water vole during construction is unlikely to affect the conservation status of this species locally although it could represent an offence under relevant legislation. However, following implementation of the good practice measures outlined in paragraphs 149 to 162, death or injury to water vole during construction is not considered likely. In addition, pre-construction surveys are proposed and if water vole presence was recorded close to working areas, mitigation measures would be employed to avoid significant disturbance. As such, **no significant effects** are predicted and no contravention of the relevant legislation is likely.

188. The presence of water vole was identified at one location near the proposed Access Route A through the observation of a vole entering its burrow. In addition, several areas of riverine habitats were considered to be suitable for the species. There is expected to be only minimal loss of potential suitable habitat for this species within the Site as the only place where suitable habitat has been identified within 10 m of proposed infrastructure is next to the proposed Access Route A near watercourse crossing WX31 (**Figure 8.6**). This loss of habitat is negligible in the context of the availability of similar habitat in the surrounding area and loss of habitat for the construction of the proposed Development would therefore **not have a significant effect** on water vole.

### *Bats*

189. The 2019 surveys confirmed the presence of two structures (The Bothy and The Farmhouse, **Figure 8.7**) which were being used by roosting bats. These two structures will be retained and will remain structurally unaffected during the construction of the proposed Development and therefore there will be no loss of roosting sites. The Bothy lies approximately 11 m from an existing access track, which may be upgraded (if necessary) and could potentially be subject to disturbance during construction works. However, the existing track in question is a main forest haul road so bats roosting at The Bothy must be habituated to regular movements by heavy goods vehicles and are therefore unlikely to be affected by the usage of the track during construction. In addition, as a precaution if the maternity roost is confirmed to be occupied, it is proposed to avoid carrying out any works to upgrade the track within 100 m of The Bothy during the maternity period (June to August inclusive), when the risk of disturbance affecting bats is greatest (see paragraph 163). Disturbance to the roost is therefore unlikely and there would be no significant effects. The Farmhouse is located approximately 200 m away from any infrastructure and there is therefore no potential for disturbance to bats roosting there.

190. The proposed Development will result in the felling of 217.8 ha of conifer plantation and the direct loss of approximately 3.61 ha of other habitats (see **Table 8.8**). None of these habitats are of particular importance for bats and similar habitats are widely available throughout the Site. In addition, the felling of conifer plantation will lead to the creation of new edge habitat as coupes are felled, which may provide better habitat for foraging and commuting. The loss of habitat will therefore not be significant.

191. Construction works would mainly take place during daylight hours during the season when bats are active (April to October, 07:00 to 19:00 hours) with works outside this period limited to abnormal load deliveries and the lifting of the turbine components, which are traffic and weather dependent. Any disturbance to foraging bats during construction is therefore likely to be minimal and not significant.

### *Mitigation, compensation and enhancement*

192. Embedded mitigation and good practice measures are detailed in paragraphs 149 to 162, as well as in the draft CEMP (**Technical Appendix 3.1**) and **Chapter 10: Hydrology, hydrogeology, geology and soils**. This section considers additional mitigation required in order to mitigate specific effects.

193. Habitat loss calculations indicate potential loss of 0.0034 ha of M32 habitat. Although not considered significant, the micrositing allowance (as set out in the CEMP) should be used to avoid this loss, if possible, both to protect a small area of regionally important habitat with high GWDTE potential and to avoid impacts on mossy saxifrage.

194. An HMP would be produced, which would detail measures to compensate for the significant loss of 0.19 ha of M18 blanket bog and the non-significant loss of just under 13 ha of other peatland habitats associated with the proposed Development and provide additional biodiversity enhancement. A Draft HMP is provided in **Technical Appendix 8.8**. The Draft HMP outlines proposals for the restoration of bog habitat within an area of 23 ha of peatland currently situated beneath coniferous plantation forestry.

195. The walkover fisheries survey (see **Technical Appendix 8.3**) highlighted a number of inappropriately seated culverts within the Site that currently act as barriers to fish migration, some of which are located at proposed water crossing locations. It is proposed that all new and upgraded watercourse crossings would be designed to facilitate fish migration. In addition, subject to agreement with the landowner, SPR would provide support to NDSFB and GFT to improve the suitability of other watercourse crossings within the Site for fish passage, even where not directly affected by the proposed Development. This would result in a positive effect on fish in the longer-term.

***Residual effects***

196. During the construction phase, the permanent loss of up to 0.19 ha of M18 blanket bog habitats is considered to constitute a significant negative effect at the regional level.

197. In order to compensate for the habitat loss (including the non-significant loss of other peatland habitats), as outlined previously, a 23 ha area would be targeted for peatland restoration and this would represent a significant positive effect at the regional level, which would offset the predicted loss of habitat and result in a net positive impact and likely net gain in biodiversity in time, once the peatland restoration has succeeded.

198. Assuming the proposed mitigation measures are implemented, no significant residual effects are likely upon other important ecological receptors during the construction phase.

### 8.7.4 Operational effects

***Potential effects***

199. Operational effects have been addressed for relevant receptors. Should any maintenance be required onsite which would require construction type activities, mitigation measures would be adhered to in line with the measures in the CEMP (see **Technical Appendix 3.1)** and the assessment here is made on the basis that these measures are implemented.

*Designated Sites*

200. During the operational phase, **no significant effects** are predicted on the provisional Afton Uplands LWS. Infrastructure would be in place and only occasional service vehicles would be present on the Site, with the potential for incidents and spillages affecting habitats downstream considered to be very low, especially given the small size (water volume) of watercourses in this location. In addition to this, good practice measures would be implemented further reducing the risk of an incident occurring.

*Habitats*

201. During the operational phase, **no significant effects** on retained habitats are predicted. Infrastructure would be in place and only occasional service vehicles would be present on the Site, with the potential for incidents and spillages affecting sensitive habitats considered to be very low. In addition to this good practice measures would be implemented further reducing the risk of an incident occurring.

*Fish and FWPM*

202. During the operational phase, only occasional service vehicles would be present on the Site. No hazardous chemicals would be regularly stored on the Site during the operational phase, other than where safely stored within the Site compound. During major maintenance events, temporary storage of hazardous chemicals could occur onsite, but would be subject to implementation of standard pollution prevention control measures (in line with the CEMP). Once the proposed Development is operational, should it be consented, due to the proposed good practice measures and the separation distance of at least 50 m from wind turbines and associated tracks (except for watercourse crossing points), there would be limited mechanisms present for causing water pollution, and as such **no significant effects** upon fish are predicted.

*Reptiles*

203. Human activity associated with maintenance would be limited to the permanent infrastructure areas and only occasional service vehicles would be present on the Site, which would be restricted to the access tracks and subject to similar speed limits to those in place during construction (as set out in the CEMP). **No significant effects** on reptiles are, therefore, predicted.

*Otter*

204. Human activity associated with maintenance would be limited to the permanent infrastructure areas and only occasional service vehicles would be present, which would be restricted to the access tracks and subject to similar speed limits to those in place during construction. Otter do occur within the Site and they are likely to be present on watercourses and waterbodies all of which (except for watercourse crossing points) are more than 50 m away from wind turbines and associated tracks and, therefore, the potential for otter to be affected during operation is considered to be very low.

205. No hazardous chemicals would be regularly stored on the Site, other than where safely stored within the Site compound, during the operational phase, and activities involving excavations would have ceased. During major maintenance events, temporary storage of hazardous chemicals could occur onsite, but would be subject to implementation of standard pollution

prevention control measures (as set out in the CEMP). As a result, there would be limited mechanisms present for causing water pollution.

206. Based on the above, and assuming that the proposed good practice measures are implemented, **no significant effects** on otter are considered likely during the operational phase.

*Pine marten*

207. Human activity associated with maintenance of the proposed Development would be limited to the permanent infrastructure areas and only occasional service vehicles would be present on the Site, which would be restricted to the access tracks and subject to similar speed limits to those in place during construction. The potential for pine marten to be affected during operation is, therefore, considered to be very low and **no significant effects** are predicted.

*Red squirrel*

208. Human activity associated with maintenance of the proposed Development would be limited to the permanent infrastructure areas and only occasional service vehicles would be present on the Site, which would be restricted to the access tracks and subject to similar speed limits to those in place during construction. In addition, no further tree felling/ loss of squirrel habitat in relation to the proposed Development is anticipated post-construction. The potential for red squirrel to be affected during operation is, therefore, considered to be very low and **no significant effects** are predicted.

*Bats*

209. Operational wind turbines can affect bats in a number of ways, although the main concerns relate to collision mortality, barotrauma (i.e. injury caused by a change in air pressure) and other injuries resulting from collision with, or flying in very close proximity to, moving turbine blades (Scottish Natural Heritage, et al., 2019).

*Assessment Methodology*

210. The assessment of potential impacts on bats resulting from the operation of the proposed wind turbines is based on the methodology set out in the current, industry-standard guidelines (Scottish Natural Heritage, et al., 2019).

211. *Ecobat*, a secure online tool initially designed by the University of Exeter and now hosted and developed by the Mammal Society (Lintott, et al., 2019) was used to assess the relative levels of bat activity at the Site in the context of bat survey information collected from similar areas (within 100 km of the Site) at the same time of year (within 30 days) and in comparable weather conditions. Ecobat generates a percentile rank (and associated confidence limits) for each night where bat activity was recorded against a reference range. For example, data reported as being within the 80th percentile means that 80% of the nights within the reference range have less than or equal to the number of bat passes than the night being analysed. Bat activity levels are then split into activity categories using the percentiles as follows:

- 0 – 20$^{th}$ percentile – low;
- 21$^{st}$ – 40$^{th}$ percentile – low to moderate;
- 41$^{st}$ – 60$^{th}$ percentile – moderate;
- 61$^{st}$ – 80$^{th}$ percentile – moderate to high; and
- 81$^{st}$ – 100$^{th}$ percentile – high.

212. 2018 survey data were uploaded to *Ecobat* in 2020 by SLR. Because the 2018 survey data were collected prior to publication of the current guidelines, a number of conversions needed to be made to get the data into the format required for entry into the *Ecobat* tool. However, these were mostly minor, and none are considered likely to have affected the assessment. The *Ecobat* output for the 2018 survey data is summarised in **Technical Appendix 8.9**. The results from the 2019 static detector surveys were entered in to *EcoBat* by RPS. The *Ecobat* output from the 2019 survey is summarised in **Technical Appendix 8.7**.

213. Estimating the vulnerability of bat populations to wind turbines is based on three factors: relative abundance (nationally); collision risk, based on information provided in current (Scottish Natural Heritage, et al., 2019) guidance; and the relative level of bat activity recorded at the Site. According to current guidance five bat species in Scotland have a high collision risk (noctule, Leisler's bat, Nathusius' pipistrelle *Pipistrellus nathusii*, soprano pipistrelle and common pipistrelle). Of these, three (noctule, Leisler's and Nathusius' pipistrelle) are considered to have high population vulnerability with the other two (soprano and common pipistrelle) having medium population vulnerability.

214. A two-stage process is used for assessing potential risk to bats. Stage 1 gives an indication of potential Site risk based on a consideration of habitat and development-related features. Stage 2 then makes an overall assessment of risk by considering the Site assessment in relation to the bat activity output from *Ecobat* and taking into account the relative vulnerability of each species of bat present, at the population level. In accordance with the guidelines Stage 2 should be carried out separately for all high collision risk species recorded, which at this Site included Leisler's bat, noctule, soprano pipistrelle and common pipistrelle. This process is illustrated in **Box 8.1** and **Box 8.2,** taken from the current (Scottish Natural Heritage, et al., 2019) guidelines.

Box 8.1 The initial Site Risk Assessment (Table 3a in (Scottish Natural Heritage, et al., 2019))

| **Site Risk Level (1-5)*** | | **Project Size** | | |
|---|---|---|---|---|
| | | **Small** | **Medium** | **Large** |
| **Habitat Risk** | **Low** | 1 | 2 | 3 |
| | **Moderate** | 2 | 3 | 4 |
| | **High** | 3 | 4 | 5 |

Key: Green (1-2) - low/lowest site risk; Amber (3) - medium site risk; Red (4-5) - high/highest site risk.

* Some sites could conceivably be assessed as being of no (0) risk to bats. This assessment is only likely to be valid in more extreme environments, such as above the known altitudinal range of bats, or outside the known geographical distribution of any resident British species.

| **Habitat Risk** | **Description** |
|---|---|
| Low | Small number of potential roost features, of low quality.<br>Low quality foraging habitat that could be used by small numbers of foraging bats.<br>Isolated site not connected to the wider landscape by prominent linear features. |
| Moderate | Buildings, trees or other structures with moderate-high potential as roost sites on or near the site.<br>Habitat could be used extensively by foraging bats.<br>Site is connected to the wider landscape by linear features such as scrub, tree lines and streams. |
| High | Numerous suitable buildings, trees (particularly mature ancient woodland) or other structures with moderate-high potential as roost sites on or near the site, and/or confirmed roosts present close to or on the site.<br>Extensive and diverse habitat mosaic of high quality for foraging bats.<br>Site is connected to the wider landscape by a network of strong linear features such as rivers, blocks of woodland and mature hedgerows.<br>At/near edge of range and/or on an important flyway.<br>Close to key roost and/or swarming site. |

| **Project Size** | **Description** |
|---|---|
| Small | Small scale development (≤10 turbines). No other wind energy developments within 10km.<br>Comprising turbines <50m in height. |
| Medium | Larger developments (between 10 and 40 turbines). May have some other wind developments within 5km.<br>Comprising turbines 50-100m in height. |
| Large | Largest developments (>40 turbines) with other wind energy developments within 5km.<br>Comprising turbines >100m in height. |

Box 8.2 Overall Risk Assessment (Table 3b in (Scottish Natural Heritage, et al., 2019))

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

Overall assessment:
Low (green) 0-4
Medium (amber) 5-12
High (red) 15-25

*Relative Levels of Bat Activity*

215. A summary of the output from *Ecobat* is presented in **Technical Appendix 8.9: Ecobat Output** for the 2018 data. This shows that for *Pipistrellus* species (including bats not identified to species) activity levels were high at two of the nine recording locations, moderate to high at two locations and low to moderate at two locations. *Pipistrellus* activity levels at the other three recording locations were low. Activity levels for all other bat species were low at all locations. Note however that *Ecobat* currently only accounts for nights where bat passes have been recorded, which in this instance is less than 30% for any species, at any location. Over the remaining nights bat activity was zero.

216. The results of the Ecobat output for the 2019 survey data are summarised in **Technical Appendix 8.7**. This shows that during the spring surveys, at the 13 locations monitored (a minimum of 100 nights of recording), *Pipistrellus* species totalled 13 nights of high activity, and four nights of moderate/ high activity. *Myotis* species recorded three nights of moderate/ high activity. No bats from the *Nyctalus* genus were recorded during the spring period.

217. During the summer period in 2019 (with a minimum recording period of 130 nights), common pipistrelle activity was recorded as moderate/ high and high on 19 nights, P*ipistrellus* species on 20 nights and soprano pipistrelle on 44 nights. Only on one night was *Nyctalus* bats (Leisler's bat) activity significant, represented by one night of high activity at Location 4.

218. Bat activity levels were generally higher during the 2019 survey during the autumn survey period. During this survey period (minimum of 130 nights) moderate/ high and high activity levels were recorded for a range of species: Leisler's bat – two nights, noctule bat – four nights, *Nyctalus* species – 30 nights (over six locations), *Pipistrelle* species – 42 nights (over eight locations), common pipistrelle - 25 nights and finally soprano pipistrelle – 45 nights (over nine locations).

*High risk species assessment*

219. *Nyctalus* bats are all assessed to be at high risk of collision. During both years of survey Leisler's bat, noctule and unidentified *Nyctalus* bats were recorded across the Site. Over a total recording period of 1387 nights (2018 and 2019 combined), moderate/ high to high activity for *Nyctalus* was recorded on 37 nights, which equates to 2.7% of the nights recorded. Most of the nights where higher *Nyctalus* activity was recorded was during the autumn period in 2019. During 2019 surveys the peaks in *Nyctalus* activity occurred at three Locations 2, 5 and 7; all of which are located in more open areas, close to forest rides, with either clear fell, marshy grassland or new plantation adjacent to the detector location. During the 2018 surveys the *Ecobat* output (**Technical Appendix 8.9**) shows that the *Nyctalus* activity across the Site was low throughout. Overall, based on the *Ecobat* output, compared with other sites in the area, *Nyctalus* activity within this Site is assessed to be moderate to account for the occasional peaks in activity.

220. Common and soprano pipistrelles and unidentified *Pipistrelle* species are all considered to be at high risk of collision, so have been considered as a group in this analysis. Out of the 1,387 nights of recording the *Pipistrelle* activity was high or moderate/high on 303 of the recoding nights, which equates to 21.85% of nights. On the remainder of nights in which activity was recorded activity levels were low or moderate to low whilst there were also a large number of nights in which no bat activity was recorded. During the 2018 surveys, peaks in pipistrelle activity appeared to occur across the survey area, but were most pronounced at Location 2, adjacent to a small burn. During the 2019 surveys, pipistrelle bats were recorded across the Site at all locations. The peak activity during the three seasons also appears to be spread across the Site too. Overall, based on the *Ecobat* output, the pipistrelle activity across the Site, for both years, is assessed to be moderate.

221. The open habitats at the Site are considered to be of low habitat risk for bats and the forest habitats are considered to be of a moderate habitat risk for bats (**Box 8.1**). Very few roost features were identified and most of the Site represents moderate to low quality foraging habitat for bats, particularly the open moorland type, or closed forest habitats with the more open forest rides and forest edge habitats providing the best foraging potential (see **Technical Appendices 8.6 and 8.7**). With regards to habitat connectivity, the Site is connected to the wider landscape via watercourses and other linear habitats such as forest edge, although connections are limited where large areas of open moorland exist, such as to the west and east of the Site. Based on the above and adopting a precautionary approach, the overall Site habitat risk level is assessed to be Moderate.

222. The project is considered to be of medium size (**Box 8.1**), comprising between 10 and 40 turbines. It is noted that the current (Scottish Natural Heritage, et al., 2019) guidelines suggest that sites comprising turbines >100 m in height, as here, represent large developments but on this basis all windfarms currently proposed and under construction would represent large developments, making the project size parameter meaningless. It is therefore considered more appropriate to regard the proposed Development as being of Medium size, based on the number of proposed turbines.

223. Based on the above, the initial Site risk assessment score would be 3 – Medium Site Risk Level. An overall risk assessment (**Box 8.2**) for each species (or species group) considered to be at high collision risk, taking into account the initial Site risk assessment score is provided below:

- *Nyctalus* genus – relative activity levels are moderate and therefore combined with a Site risk score of three, the overall risk is Medium; and
- Common and soprano pipistrelle – relative activity levels are assessed to be moderate across the Site, therefore combined with a Site risk of three, the overall risk is also Medium.

224. In addition to the analysis presented above the 2018 and 2019 bat survey data have been compared with detailed acoustic and fatality monitoring of bats collected by SPR at ten operational windfarms, of which nine are located in southwest Scotland (see **Technical Appendix 8.10: Bat Mitigation and Monitoring Plan**). This dataset provides a reference for new projects by providing a comparison of bat activity within a region in a similar manner to *EcoBat,* but in addition it can benchmark activity rates for new projects against activity rates of sites with a known rate of bat fatality. From this analysis it is predicted that without mitigation, the bat activity recorded at the proposed Development Site would generate fatality rates that have the potential to be high for both *Pipistrellus* and *Nyctalus* bats.

225. Embedded mitigation is proposed, which would ensure buffers of at least 50 m between turbine blades and the closest forest edge (see next section) and is considered by current (Scottish Natural Heritage, et al., 2019) guidance to represent adequate mitigation in most, lower risk situations. However, on the basis of the assessment presented above, additional mitigation is also proposed (see below) to further reduce the level of risk to *Nyctalus* and *Pipistrellus* bats.

### *Mitigation, compensation and enhancement*

#### *Bats*

226. Following the assessment methodology included in current (Scottish Natural Heritage, et al., 2019) guidance the level of risk to *Pipistrellus* and *Nyctalus* bat species is assessed to be medium across the Site. Additional analysis carried out by SPR also predicts that without mitigation there is potential for fatality rates to be high for both *Pipistrellus* and *Nyctalus* bats. Mitigation will therefore be implemented during operation in order to reduce the risk of turbine-related bat mortality. The mitigation measures will comprise curtailment of the operation of all wind turbines during certain weather conditions at certain times of year. A summary of the mitigation is presented below, for more detail, please refer to **Technical Appendix 8.10: Bat Mitigation and Monitoring Plan.**

227. Based on work done at other operational windfarms in upland forested sites in south-west Scotland, 90% of *Pipistrellus* bat activity occurs when wind speeds are below 5.5 m/s and temperatures are above 11$^{o}$C at nacelle height (**Technical Appendix 8.10, Figure 4**). The curtailment will therefore apply between 30 minutes post-sunset and 40 minutes pre-sunrise and will be implemented at each turbine between 1$^{st}$ April – 31$^{st}$ October each year. The mitigation will be implemented for the lifetime of the Development, unless monitoring results necessitate a change in curtailment regime.

228. The implementation of the curtailment will be via software which will automatically send a “pause” command to the relevant turbine, when the parameters are met, initiating a feathering of the blades. This will slow the rotation speed of the blades to below 1 RPM (i.e. slower than the second hand of a clock). This is a tried and tested method, already being successfully applied on another SPR site.

229. Monitoring would comprise measurement of bat activity and fatality rates and would be undertaken annually until validation of the initial curtailment parameters and any amendments are established in consultation with SNH. Bat activity monitoring would comprise the use of static bat detectors (based at ground level) at six randomly selected wind turbines during July – September inclusive which is when most fatalities are found to occur. This represents a precautionary approach, because if bat fatality rates are sufficiently low during this period, they are unlikely to be greater at other times of year - if the mitigation is effective during this period, it will also be effective during periods of lower levels of activity. The use of six turbines is considered to provide a representative sample (29% of turbines to be sampled) and is coincident with the number of turbines which can reliably be searched by a dog team in a single day.

230. Carcass searching would be undertaken within a 50 m radius at the same six turbines every two weeks from 1st July until end of September i.e. seven searches in total. The estimate of two weeks persistence of corpses, and therefore the intervals between search dates will be further confirmed by undertaking a carcass persistence trial at the Site prior to undertaking carcass searching. Carcass searching will be undertaken using dogs, so that an effective observer efficiency rate of 80% or more can be achieved.

231. Following each annual monitoring period, if the number of bat fatalities is less than two bats per turbine per year, the operator shall be entitled to propose amendments to reduce the curtailment parameters. If the number of bat fatalities is greater than two bats per turbine per year, the operator shall be obligated to propose amendments to strengthen the mitigation. Any changes proposed will be consulted on with SNH and implemented the following year with repeated monitoring using the methods described above unless otherwise varied (e.g. to investigate condition in which fatalities are occurring).

***Residual effects***

232. Assuming that the proposed mitigation measures in respect of bats are implemented, no significant residual effects are likely upon bat species during the operational phase.

233. Assuming the proposed mitigation measures are implemented, no significant residual effects are likely upon other important ecological receptors during the construction phase.

### 8.7.5 Cumulative effects during construction and operation

234. Assessment of cumulative effects has been limited to the ecological features of local value or above for which there is low or above impact and a clear route to cumulative impacts including:

- watercourses within the same river catchments (Nith and the Dee/Ken);
- sites over-lapping the same designated area (Provisional Afton Upland LWS); and
- mobile species that are at risk of direct mortality from the proposed Development (bats).

235. For the cumulative effects on aquatic receptors during construction, the only potential for significant cumulative effects would be via the discharge of particulate matter into watercourses, or through a pollution incident. Windfarms which are already operational are not likely to give rise to significant cumulative effects and, therefore, the assessment has been restricted to windfarms within the same catchments which are yet to be constructed.

236. The results of the cumulative assessment are presented in **Table 8.9**. Information in *italics* in Table 8.9 represents direct quotes from the Environmental Statements or other relevant reports for other projects.

Table 8.9: Cumulative effects

| Development (windfarm) | Phase | Impacts to calcareous grassland | Impacts to blanket bog | Impacts to flushes and springs* | Impacts to fish | Impacts to Provisional Afton Upland LWS | Impacts to bats |
|---|---|---|---|---|---|---|---|
| **Whiteside Hill** | Operational | Assessment not practical – EcIA / monitoring documents not available. | Assessment not practical – EcIA / monitoring documents not available. | Assessment not practical – EcIA / monitoring documents not available. | **No cumulative effect** – construction complete. | **No cumulative effect** – not within Provisional Afton LWS. | Cumulative effects are possible, although meaningful assessment is impossible. Following the implementation of the proposed mitigation measures there is no potential for significant residual effects at Euchanhead and therefore the possibility of significant cumulative effects due to Euchanhead is very low. |
| **Sanquhar** | Operational | Assessment not practical – EcIA / monitoring documents not available. | Assessment not practical – EcIA / monitoring documents not available. | Assessment not practical – EcIA / monitoring documents not available. | **No cumulative effect** – construction complete. | **No cumulative effect** – not within Provisional Afton LWS. | As above. |
| **Sanquhar 6** (Community Windpower, 2015) | Consented | **No cumulative effect** - no calcareous grassland recorded at Sanquhar 6. | *Negative impact of low magnitude of low significance. Some positive impacts due to habitat restoration.* Some cumulative effects are likely, it is considered that these will be of **low magnitude not significant.** | | *Potential for fish to be affected due to deterioration of water quality. The placing of water culverts during fish spawning time could mean disturbance to stream bed or impediments to fish movements. The impact is considered to be of low magnitude mainly* | **No cumulative effect** – not within Provisional Afton LWS. | As above. |

| Development (windfarm) | Phase | Impacts to calcareous grassland | Impacts to blanket bog | Impacts to flushes and springs* | Impacts to fish | Impacts to Provisional Afton Upland LWS | Impacts to bats |
|---|---|---|---|---|---|---|---|
| | | | | | *temporary and not significant.*<br><br>Cumulative effects possible if construction periods coincide, following mitigation likely to be **low magnitude** and **not significant.** | | |
| **Hare Hill and Ext** (SPR, 2009, 2017). | Operational | **No cumulative effect** - no calcareous grassland recorded. | *The total blanket bog and wet heath habitat impacted during construction will be 55,719 $m^2$ which is 0.018% (including the cable trenches) of the regional resource and is therefore a minor negative impact and, in light of this, slight adverse and not significant* (SPR, 2007).<br><br>*A total of fifteen M32 groundwater springs have been identified as having a high likelihood of groundwater dependency. Mitigation was recommended to protect and monitor these, expected impacts are not stated* (SPR, 2014).<br><br>Some cumulative effects are likely, it is considered that these will be of **low magnitude not significant**. | | **No cumulative effect** – construction complete. | Hare Hill Windfarm Extension is largely within the Provisional Afton LWS, therefore impacts to habitats will be cumulative. | As above. |
| **Afton** (Red Rock Power, 2018). | Operational | Assessment not practical – EcIA / monitoring documents not available. | Assessment not practical – EcIA / monitoring documents not available. | Assessment not practical – EcIA / monitoring documents not available. | **No cumulative effect** – construction complete. | Afton Wind Farm is within the Provisional Afton LWS, therefore impacts to habitats will be cumulative. | As above. |

| Development (windfarm) | Phase | Impacts to calcareous grassland | Impacts to blanket bog | Impacts to flushes and springs* | Impacts to fish | Impacts to Provisional Afton Upland LWS | Impacts to bats |
|---|---|---|---|---|---|---|---|
| **Windy Standard 1, 2 (extension) and 3** (Fred Olsen, 1996, 2017, 2018). | Operational (1 & 2) Planning (3) | Assessment not practical – EcIA / monitoring documents not available. | Assessment not practical – EcIA / monitoring documents not available. | Assessment not practical – EcIA / monitoring documents not available. | **No cumulative effect** – construction complete (1 and 2).<br>Cumulative effects possible (3) if construction periods coincide, but following mitigation likely to be **low magnitude** and **not significant.** | Assessment not practical- EcIA/ monitoring documents not available. | As above. |
| **Wether Hill** | Operational | **No impact**, no cumulative effect. | **No impact**, no cumulative effect. | **No impact**, no cumulative effect. | **No cumulative effect** – construction complete. | **No cumulative effect** – not within Provisional Afton LWS | As above. |
| **Sunnyside** (SWF, 2016) | Operational | Assessment not practical – EcIA / monitoring documents not available. | Assessment not practical – EcIA / monitoring documents not available. | Assessment not practical – EcIA / monitoring documents not available. | **No cumulative effect** – construction complete. | Assessment not practical- EcIA/ monitoring documents not available | As above. |
| **Twentyshilling** (Natural Power, 2012) | Under Construction | **No impact**, no cumulative effect. | **No impact**, no cumulative effect. | **No impact**, no cumulative effect. | No cumulative effect – construction will be complete before construction of proposed Development commences. | **No cumulative effect** – not within Provisional Afton LWS. | As above. |
| **Windy Rig** (Element Power, 2015) | Under Construction | Habitat type not referenced in summary table. **No-impact (assumed)**, no cumulative effect | Slight residual impacts predicted on blanket bog.<br>Some cumulative effects are likely, it is considered that | Habitat type not referenced in summary table. **No impact (assumed)**, no | No cumulative effect - construction will be complete before construction of proposed Development commences. | **No cumulative effect** – not within Provisional Afton LWS. | As above. |

| Development (windfarm) | Phase | Impacts to calcareous grassland | Impacts to blanket bog | Impacts to flushes and springs* | Impacts to fish | Impacts to Provisional Afton Upland LWS | Impacts to bats |
|---|---|---|---|---|---|---|---|
| | | | these will be of **low magnitude not significant** | cumulative effect. | | | |
| **Lorg** (EON, 2015) | Consented | **No cumulative effect** - no calcareous grassland recorded (E-ON, 2015a). | *NVC communities that are principal associated communities with blanket bog were recorded (M15, M17, M18, M19, M23). Some of the intersect with proposed infrastructure so habitat loss assumed* (E-ON, 2015a). *Section 42 assessment* (E-ON, 2019), *states no significant effects on habitats were predicted in the 2015 ES (not available).*<br><br>Some cumulative effects are likely, it is considered that these will be of **low magnitude** and **not significant.** | *NVC communities that are principal associated communities with flushes and spring were recorded (M4 and M6). Some of the intersect with proposed infrastructure so habitat loss assumed* (E-ON, 2015a). *Section 42 assessment* (E-ON, 2019), *states no significant effects on habitats were predicted in the 2015 ES (not available).*<br><br>Some cumulative effects are likely, it is considered that these will be of **low** | *Lorg sits adjacent to the Polskeoch area of the Site largely in the Dee/Ken catchment, in addition the upper water of Ken that is also present within the Site flows through it.*<br><br>*Section 42 assessment* (E-ON, 2019), *states no significant effects on fish were predicted in the 2015 ES (not available).*<br><br>Cumulative effects possible if construction periods coincide, likely to be **low magnitude** and **not significant.** | Lorg Wind Farm is partially within the Provisional Afton LWS, therefore impacts to habitats will be cumulative. | As above. |

| Development (windfarm) | Phase | Impacts to calcareous grassland | Impacts to blanket bog | Impacts to flushes and springs* | Impacts to fish | Impacts to Provisional Afton Upland LWS | Impacts to bats |
|---|---|---|---|---|---|---|---|
| | | | | **magnitude** and **not significant.** | | | |
| **Sandy Knowe** (ERG, 2018) | Consented | **No cumulative effect** – no calcareous grassland recorded | *Moderate positive impacts are predicted for blanket bog and acid/ neutral flushes.*<br>Therefore, negative cumulative effects are unlikely and **no significant cumulative impacts** are predicted. | | Sandy Knowe is in the Nith Catchment, however it does not share any water courses with the Site. Tributaries within Sandy Knowe feed into the River Nith up-stream of its confluence with Kello Water (the closet watercourse that intersects the Site. Therefore while cumulative effects are possible if construction periods coincide, given the separation of the sites, dilution would mean that any cumulative effect would likely be of **low/ negligible magnitude** and **not significant** | **No cumulative effect** – not within Provisional Afton LWS. | As above. |
| **Pencloe** (Wind Energy Ltd, 2014) | Consented | **No cumulative effect** – no calcareous grassland recorded | *Habitat restoration is anticipated to have a significant, positive effects for bog/ wet habitats.*<br>Therefore, negative cumulative effects are unlikely and **no significant cumulative impacts** are predicted. | | As above for Sandy Knowe - cumulative effect would likely be of **low/ negligible magnitude** and **not significant.** | **No cumulative effect** – not within Provisional Afton LWS. | As above. |

| Development (windfarm) | Phase | Impacts to calcareous grassland | Impacts to blanket bog | Impacts to flushes and springs* | Impacts to fish | Impacts to Provisional Afton Upland LWS | Impacts to bats |
|---|---|---|---|---|---|---|---|
| **Lethans** (Banks Group, 2019) | Consented | **No cumulative effect** - no calcareous grassland recorded (Applied Ecology, 2019). | *Phase 1 blanket bog and flushes were recorded* (Applied Ecology, 2019). *Some of the intersect with proposed infrastructure so habitat loss assumed. However, these habitats are small in area and restricted to forest rides, so loss is likely low (EcIA Chapter not available).*<br><br>Therefore, some cumulative effects are likely, however it is considered that these will be of **low magnitude** and **not significant.** | | As above for Sandy Knowe - cumulative effect would likely be of **low/ negligible magnitude** and **not significant.** | **No cumulative effect** – not within Provisional Afton LWS. | As above. |
| **Glenmuckloch** (Buccleuch, 2015) | Consented | **No cumulative effect** - no calcareous grassland recorded. | Minor adverse effects predicted on mire and bog habitats.<br><br>Therefore, some cumulative effects are likely, however it is considered that these will be of **low magnitude** and **not significant.** | | As above for Sandy Knowe - cumulative effect would likely be of **low/ negligible magnitude** and **not significant.** | **No cumulative effect** – not within Provisional Afton LWS. | As above. |
| **Sanquhar II** (Community Windpower, 2019) | Proposed | *Only recorded in small areas (U5c), no predicted impacts are specified.*<br><br>Cumulative impacts are possible but considered unlikely. | *The loss of blanket bog, wet modified bog and dry modified bog is approximately 7.3% and therefore assessed as being of medium magnitude, of moderate significance and permanent. However, some habitat enhancement work/ bog restoration is proposed of offset this.*<br><br>Therefore, some cumulative effects are likely, however it is considered that these will be of **low magnitude** and **not significant.** | | *Sanquhar II sits adjacent to the Polskeoch and Euchanhead areas of the Site in the Nith catchments, a number of watercourse flow thought both Sanquhar II and the Site. Sanqhuar II impacts on fish are predicted to be low magnitude, short term, possibly even negligible and not significant.* | Sanquhar II Wind Farm is partially within the Provisional Afton LWS, therefore impacts to habitats will be cumulative. | As above. |

| Development (windfarm) | Phase | Impacts to calcareous grassland | Impacts to blanket bog | Impacts to flushes and springs* | Impacts to fish | Impacts to Provisional Afton Upland LWS | Impacts to bats |
|---|---|---|---|---|---|---|---|
| | | | | | Cumulative effects are possible if construction periods coincide, but likely to be **low magnitude** and **not significant** | | |
| **Lorg Increased Tip Height** (EON, 2019) | Proposed | Assessment not practical – EcIA / monitoring documents not available. | Assessment not practical – EcIA / monitoring documents not available. | Assessment not practical – EcIA / monitoring documents not available. | Assessment not practical – EcIA / monitoring documents not available. | Assessment not practical – EcIA / monitoring documents not available. | As above. |
| **Cornharrow Resubmission** (EnergieKontor, 2020) | Proposed | **No cumulative effect** – no calcareous grassland recorded | Bog and mire communities within the Site had very low cover and occurred within a coniferous plantation setting, there were valued as being of less than local value and excluded from the impact assessment.<br>They are therefore not considered of sufficient value for inclusion in cumulative impact assessment and **no cumulative impacts** are therefore predicted. | | Cornharrow is in the Dee/Ken Catchment, however it does not share any watercourses with the Site. Tributaries within Cornharrow feed into the Water of Ken down-stream of its origin in the Site. Therefore, while cumulative effects are possible if construction periods coincide, given the separation of the sites, dilution would mean that any cumulative effect would likely be of **low/ negligible** | **No cumulative effect** – not within Provisional Afton LWS. | As above. |

| Development (windfarm) | Phase | Impacts to calcareous grassland | Impacts to blanket bog | Impacts to flushes and springs* | Impacts to fish | Impacts to Provisional Afton Upland LWS | Impacts to bats |
|---|---|---|---|---|---|---|---|
| | | | | | **magnitude** and **not significant.** | | |
| **Shepherds Rig** (Infinergy, 2018) | Proposed | **No cumulative effect** – Phase 1 habitat type not recorded on the Site. | **No cumulative effect** – Phase 1 habitat type not recorded on the Site. | **No cumulative effect** – Phase 1 habitat type not recorded on the Site. | Fish were scoped out of assessment for Shepherds Rig, however brown trout were present and it drains into the Water of Ken down-stream of its origin in the Site.<br><br>Therefore, while cumulative effects are possible if construction periods coincide, given the implementation of proposed mitigation and given the separation of the sites, dilution would mean that any cumulative effect would likely be of **low/ negligible magnitude** and **not significant.** | **No cumulative effect** – not within Provisional Afton LWS. | As above. |
| **Pencloe** (PWEL, 2019) | Proposed | Assessment not practical – EcIA / monitoring documents not available. | Assessment not practical – EcIA / monitoring documents not available. | Assessment not practical – EcIA / monitoring documents not available. | Assessment not practical – EcIA / monitoring documents not available. | Assessment not practical – EcIA / monitoring documents not available. | As above. |

| Development (windfarm) | Phase | Impacts to calcareous grassland | Impacts to blanket bog | Impacts to flushes and springs* | Impacts to fish | Impacts to Provisional Afton Upland LWS | Impacts to bats |
|---|---|---|---|---|---|---|---|
| **Overall summary/ assessment** | | Sanquhar II is the only other development for which EcIA documents were available where calcareous grassland was recorded and no loss of calcareous grassland at Sanquhar II was predicted. Therefore, **no significant cumulative effects** on calcareous grassland are considered likely. | The majority of windfarm developments for which EcIA documents were available, involved the loss of at least some bog and flush habits. However, loss was typically small and at some sites was more than off-set through habitat creation/ restoration. Therefore, **no significant cumulative effects** on bog habitats are considered likely. | | Six of the windfarm developments for which EcIA documents were available have potential to undergo construction at the same time as the proposed Development and therefore present a possibility for cumulative impacts on fish. However, all include mitigation and monitoring to reduce the risk of impacts to fish and only three of these sites Sanquhar 6, Sanquhar II and Lorg are close enough to the Site hydrologically for cumulative impacts to be likely taking into account the dilution effect.<br><br>The likelihood of all four sites undergoing construction simultaneously is low, and in addition mitigation across all four sites is expected to be sufficient to prevent | Four of the windfarm developments for which EcIA documents were available overlap the Afton Uplands provisional wildlife site. Loss of upland habitats was either minimal or off-set through habitat restoration (e.g. Afton Wind Farm). In addition, loss of habitat due to the proposed Development is small (15.75 ha) representing a very small proportion of the LWS. Therefore, **no significant cumulative effects** on the Afton Uplands provisional wildlife site are considered likely. | Meaningful assessment is impossible. However, following the implementation of the proposed mitigation measures there is no potential for significant residual effects at Euchanhead and therefore the possibility of significant cumulative effects due to Euchanhead is very low. |

| Development (windfarm) | Phase | Impacts to calcareous grassland | Impacts to blanket bog | Impacts to flushes and springs* | Impacts to fish | Impacts to Provisional Afton Upland LWS | Impacts to bats |
|---|---|---|---|---|---|---|---|
| | | | | | significant cumulative impacts.<br><br>Therefore, **no significant cumulative effects** on fish habitats are considered likely. | | |
| * Impacts due to project effects on ground water are not considered here. An assessment of GWDTE is provided in **Chapter 10: Hydrology**. | | | | | | | |

# 8.8 Statement of significance

237. Following the avoidance of important receptors during the project design where possible, and with the implementation of the proposed good practice measures and additional mitigation, impacts would be minimised as far as possible.

238. The proposed Development would result in a significant negative effect for the loss of M18 blanket bog which is important at a regional level. However, the loss of M18 blanket bog, and the non-significant loss of other peatland habitats, would be offset through the compensatory peatland restoration proposed, to be delivered via an HMP. The HMP would also provide biodiversity enhancements.

239. With the implementation of the proposed bat mitigation and monitoring plan and other good practice measures, no significant negative residual effects are predicted during the operation phase.

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