Chapter 8

Ecology and Biodiversity

SCOTTISHPOWER RENEWABLES

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Chapter 8
Ecology and Biodiversity

8.1 Introduction

1. This chapter considers the likely effects on the ecology associated with the construction and operation of the proposed Development on habitats and protected and/or notable species, with particular focus on Important Ecological Features (IEFs). The ecology chapter should be read with reference to the scheme description in **Chapter 4: Development Description**, as well as other Chapters as referenced throughout. Chapter 8 relates entirely terrestrial ecology, please refer to **Chapter 9: Ornithology** for all avian baseline details and assessment.

2. This ecology Chapter was informed by the following Figures and Technical Appendices:

- Figure 8.1: Ecological Designated Sites Within 5 km;
- Figure 8.2: Phase 1 Habitats;
- Figure 8.3: National Vegetation Classification;
- Figure 8.4: Potential Groundwater Dependent Terrestrial Ecosystems (GWDTEs);
- Figure 8.5: Protected Species Survey Results;
- Technical Appendix 8.1: National Vegetation Classification & Habitats Survey & Desk Study Report;
- Technical Appendix 8.2: Protected Mammals Survey Report;
- Technical Appendix 8.3: Bat Survey Report;
- Technical Appendix 8.4: Fish Survey Report;
- Technical Appendix 8.5: Northern Access Track Ecology Survey Report;
- Technical Appendix 8.6: Habitats Regulations Appraisal Screening Report; and
- Technical Appendix 8.7: Habitat Management Plan.

8.2 Legislation, Policy and Guidelines

3. The ecology assessment has been written with cognisance to relevant legislation, policy and guidance, notably the following:

8.2.1 Legislation

- Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna (i.e. the "Habitats Directive");
- The Wildlife and Countryside Act 1981 (as amended) (WCA);
- The Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland) (i.e. the "Habitats Regulations");
- The Wildlife and Natural Environment (Scotland) Act 2011 (as amended) (WANE Act);
- Nature Conservation (Scotland) Act 2004 (as amended) (NCA);
- Schedule 9 of the Electricity Act 1989 (as amended by the Utilities Act 2000); and
- The Protection of Badgers Act 1992 (as amended).

8.2.2 Planning Policy

- National Planning Framework 3 (Scottish Government, 2014a);
- Scottish Planning Policy (Scottish Government, 2014b); and
- Dumfries and Galloway Local Development Plan 2 (Dumfries and Galloway Council, 2019).

8.2.3 Guidance

4. Planning Advice Note (PAN) 60: Planning for Natural Heritage provides guidance relevant to this assessment and the Proposed Development.

5. Further key guidance documents relating to the assessment of effects of windfarms and solar developments on terrestrial (non-avian) ecological receptors that have been referenced in this assessment include the following:

- The Scottish Biodiversity List (SBL; Scottish Government, 2013);
- Dumfries and Galloway Local Biodiversity Action Plan (LBAP) (Dumfries & Galloway Biodiversity Partnership, 2009).
- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018);
- Good Practice during Wind Farm Construction 4th Edition (SNH, 2019);
- Planning for development: What to consider and include in Habitat Management Plans (SNH, 2016);
- Natural heritage considerations for solar photovoltaic installations (SNH, 2017); and
- Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems (SEPA, 2017).

6. Where appropriate, more detail relating to specific legislation, guidance or policy is provided in the corresponding Technical Appendix for each specialist input supporting this chapter (i.e. **Technical Appendices 8.1** to **8.7**).

8.3 Consultation

8.3.1 Scoping

7. In April 2019 a scoping report was submitted to the Scottish Government's Energy Consents Unit (ECU) to accompany a request for the Scottish Ministers to adopt a Scoping Opinion under *Regulation 15* of the *EIA Regulations 2017*.The Scoping report included for consideration of ecology (undertaken by Arcus Consultancy Services Limited).

8. In undertaking the ecological baseline and impact assessments, consideration has been given to ecological-specific consultee responses to the Scoping request from the relevant organisations. **Table 8.1** details those consultation responses that have been provided further consideration and outlines how they have been addressed.

Consultee	Response	Applicant Action
Dumfries and Galloway Council (DGC)	The Council considers that the structure of the scoping report is clear and sets out a prudent approach to the topics that may give rise to significant effects and should be fully examined in the forthcoming EIA Report. Additionally, the topics listed in the report are acceptable to the Council and should be fully assessed within the EIA Report.	Acknowledged and addressed accordingly.
Scottish Environmental Protection Agency (SEPA)	Stated key ecological issues that would need to be addressed as: - Map and assessment of impacts upon Groundwater Dependent Terrestrial Ecosystems (GWDTE) and buffers; - Peat depth survey and table detailing re-use proposals; - Map and table detailing forest removal; - Map and site layout of borrow pits; - Schedule of mitigation including pollution prevention measures; and - Borrow Pit Site Management Plan of pollution prevention measures.	GWDTEs assessed as part of the NVC survey and in **Chapter 7: Hydrology, Hydrogeology, Geology and Soils**. Chapter 7 also includes the peat survey and assessment details in full. Any areas of felled woodland are presented in **Chapter 4: Development Description**.

Consultee	Response	Applicant Action
	Specific advice was provided on the consideration of potential for disruption to GWDTE. Further to the above, advice was also provided on botanical and peat surveys: - Any areas within the proposed Development which may have changed since the previous National Vegetation Classification (NVC) should be re-surveyed. This would include areas which have since been deforested. - The above also applied to the peat depth probes. - All infrastructure should be clearly mapped on either previous survey maps or on updated maps as appropriate. - Any areas which were previously subject to habitat management measures and may now fall within this development area must also be resurveyed.	Areas designated for exploration of borrow pits can be found in **Figure 4.1a**. Details of pollution prevention measures, site management plans and associated mitigation is presented in **Technical Appendix 4.1: Outline CEMP**. All areas associated with the proposed Development which may have changed since earlier surveys were completed have been re-surveyed to NVC level, as well as peat depth surveys being conducted. All infrastructure is clearly presented on the appropriate figures. No areas that were subject to previous habitat management measures fall within the current proposed Development area.
Scottish Natural Heritage (SNH)	Agreed with the scope of proposed ecological assessments and surveys and that features scoped out of the assessment have been done so for legitimate reasons. However, advised that the newly released SNH guidance in relation to assessing bats and onshore windfarms (SNH 2019) should be followed for future surveys. In relation to Kirkcowan Flow Special Area of Conservation (SAC), SNH confirmed that a Habitats Regulations Assessment (HRA) will be required and as part of this an Appropriate Assessment (AA). It was also noted that following the AA, any reasonable scientific doubt as to the absence of adverse effects on the integrity of the site must be removed before the project would be authorised.	Acknowledged, although as the access track now passes through different habitats to the Scoping proposed Site Boundary, survey methods were adopted to account for previously scoped out interests in this regard (i.e. red squirrel and pine marten). See **Technical Appendix 8.5** for further details.
Fisheries Management Scotland (FMS)	Stated that FMS's remit is confined to alerting the relevant District Salmon Fishery Board (DSFB) or Trust. The proposed Development falls within the district of the Bladnoch District Salmon Fishery Board, and the catchments relating to the Galloway Fisheries Trust (GFT). It was stated that it is important that the proposals are conducted in full consultation with these organisations and that their response was copied to these organisations.	Acknowledged – see consultation response from GFT below.
Galloway Fisheries Trust (GFT)	GFT noted reference made to a Habitat Restoration Plan and expressed a desire for this to include improvement works to the watercourses located within the development area.	Fish survey completed (conducted by the GFT). No impacts are anticipated on aquatic environments as a result of the proposed Development and therefore there is no need include for watercourse improvements. Management measures are proposed outwith the Site boundary in the form of a HMP (see **Technical Appendix 8.7**), with one of the HMP areas (i.e. Unit 2) being indirectly connected with the catchment of the Site and the Tarf Water further downstream, via Eldrig Loch, although the HMP works aim to aid the recovery of degraded modified bog habitat rather than aquatic features. Two areas within the Kirkcowan Flow SAC have been identified as ideal for habitat management interventions to improve conditions and generate net benefits in terms of the overall SAC condition. Improvements to the SAC are considered to be of a higher significance than investing in restoration of a net smaller area located within the Site boundary. Although still considered to be sensitive to forestry pressures, catchment water quality (i.e. acidification associated with forestry management/felling operations) appears to be improving (**Technical Appendix 8.4**).
	Reference was also made to the connectivity of the various watercourses throughout the Site with the Tarf Water and its association as part of the Bladnoch SAC. Concern was also stated relating to the potential for damage to peat and stressed the need for adequate peat management and restoration works as a result of windfarm construction. The issue of acidification of the Tarf Water catchment, exacerbated by nearby extensive conifer afforestation and drainage of the deep peats as a result of both forestry and grazing improvements, was highlighted and a recommendation for a robust water quality monitoring plan was made. Support of the proposed updated fish surveys was also stated.	
The Royal Society for the Protection of Birds (RSPB) Scotland	Please Note: The RSPB Scotland responded primarily in relation to the ornithological interests at the Site in relation to the proposed Development and those comments are included in **Chapter 9: Ornithology**. For reasons of brevity, only comments relating to terrestrial ecology are included here. It was advised that adequate baseline material on existing habitat is provided in support of the application. In addition, given the significant time lapse since the previous surveys were undertaken (in 2008/09), there is potential for any changes in grazing management over this time to have altered the baseline condition of habitats. This factor should be given consideration as part of the assessment of impact to habitats at this site.	Baseline surveys completed to NVC level and the data analysed to back-work to address habitats to Phase 1. Additional peat surveys have also been completed.

Consultee	Response	Applicant Action
	It was also noted, and support made for, the update to survey of GWDTEs around areas of proposed infrastructure. The RSPB also noted and agreed with the planned survey to update peat condition through peat probing survey work.	
Marine Scotland Science (MSS)	Referred to the MSS generic scoping guidelines which provide details regarding potential impacts on fish populations associated with windfarm developments. MSS also highlighted that the watercourses within the River Bladnoch catchment drain the proposed Development area; the River Bladnoch is a SAC, with salmon a primary reason for this designation status, and advised that: - Adequate fish surveys are carried out; - Appropriate mitigation for is approved in relation to water quality and fish population monitoring; - Consideration of the potential impacts on water quality and fish populations is made; - Consideration of the cumulative potential impacts on water quality and fish populations is made; and - The correct stakeholders are contacted in relation to obtaining data on local fish populations.	Addressed through robust fish survey approach and proposed water quality monitoring

Table 8.1: Consultations Responses

8.4 Assessment Methodology and Significance Criteria

8.4.1 Ecological Desk Study

9. An ecological desk study was undertaken that included obtaining data from third parties is presented as part of **Technical Appendix 8.1** as well as further consideration in **Technical Appendix 8.3** specifically in the case of bats. This data was used to confirm the presence of any statutory and non-statutory nature conservation sites, areas of ancient woodland and legally protected or otherwise notable species (i.e. those species of conservation concern, either nationally or within the Dumfries and Galloway LBAP, ranging to 2 km of the Site. The search distance was increased depending upon the specific ecological feature (i.e. up to 10 km in the case of sensitive bat roosts).

8.4.2 Field Studies

10. The area within which the field surveys were undertaken varies depending on the feature. Details of the extent of each Study Area are further described and presented in the corresponding Technical Appendix and associated Figures, as referenced in **Paragraph 2** above.

8.4.3 Evaluation Methods for Ecological Features

11. **Table 8.2**, below, lists the criteria used to determine the value of ecological features in a geographical context.

Value	Criteria	Examples
International	Nature conservation resource, i.e. designated nature conservation area,	International nature conservation areas: - Any SAC; - Any candidate SAC (cSAC); and - Any Ramsar wetland. Significant numbers of a designated population outside the designated area. A site supporting more than 1% of the EU population of a species.
National (i.e. Scotland)	Nature conservation resource, i.e. designated nature conservation area, habitat or populations of species, of national importance. N.B. For designations, such as a Site of Special Scientific Interest (SSSI) or a National Nature Reserve (NNR), this may also include off-site features on which the qualifying population(s) or habitat(s) are considered, from the best available evidence, to depend.	National nature conservation areas: - Any SSSI or NNR designated for biological feature(s). A site supporting more than 1% of the UK population of a species. Nationally important population/assemblage of a European Protected Species (EPS) or species listed on Schedule 5 of the WCA.
Council area (Dumfries and Galloway)	Nature conservation resource, i.e. nature conservation designation, habitat or species, of importance on a county scale.	Statutory and non-statutory nature conservation designations: - Any Local Nature Reserve (LNR); - Any Scottish Wildlife Trust (SWT) reserve; - Any Local Biodiversity Site (LBS); and - Ancient Woodland listed on the SNH Ancient Woodland Inventory (SNH, 2010). A council-scale important population / area of a species or habitat listed on the Scottish Biodiversity List (SBL) (Scottish Government, 2013) as requiring conservation action. A county-scale important population/area of a species or habitat listed on the local Biodiversity Action Plan (local BAP). A county-scale important population/assemblage of an EPS or species listed on Schedule 5 of the WCA.
Local (i.e. within 2 km of the site)	Nature conservation resource, e.g. a habitat or species of importance in the context of the local district.	A breeding population of a species or a viable area of a habitat that is listed in a Local BAP because of its rarity in the locality. An area supporting 0.05-0.5% of the UK population of a species. A breeding population of a species on the SBL. All breeding populations of EPS, Schedule 5 species.
Less than local	Unremarkable, common and widespread habitats and species of little/no intrinsic nature conservation value.	Common, widespread, modified and/or impoverished habitats. Common, widespread, agricultural and/or exotic species.

Table 8.2: Geographical evaluation criteria

12. Where a feature qualifies under two or more criteria, the higher value is applied to the feature.

13. Within this chapter any ecological feature of local or higher value is considered an IEF.

8.4.4 Impact Assessment Methods

14. The approach to the Ecological Impact Assessment (EcIA) follows the Chartered Institute of Ecology and Environmental Management guidelines (CIEEM, 2018), which prescribe an industry-standard method to define, predict and assess potential ecological effects to a given proposed development. Starting with establishing the baseline through a mix of desk study and field survey, key ecological features (the IEFs) are identified and those requiring assessment established through a reasoned process of valuation and consideration of factors, such as statutory requirements, policy objectives for biodiversity, conservation status of the IEF (habitat or species), habitat connectivity and spatial separation from the proposed development. From this stage, these features are assessed for impacts with the assumption of this being in the presence of construction industry-standard mitigations to ameliorate impacts as far as practicably possible. Additional mitigation strategies can then be determined to minimise any residual impacts that would otherwise be experienced by the IEF and any opportunities for enhancement identified.

15. In summary, the impact assessment process (CIEEM, 2018) involves:

- Identifying and characterising impacts and their effects;
- Incorporating measures to avoid and mitigate negative impacts and effects;
- Assessing the significance of any residual effects after mitigation;
- Identifying appropriate compensation measures to offset significant residual effects; and
- Identifying opportunities for ecological enhancement.

8.4.5 Ecological Zone of Influence

16. The Ecological Zone of Influence (EZoI) is defined as the area within which there may be ecological features subject to effects from the proposed Development. Such effects could be direct, e.g. habitat loss resulting from land-take or removal of a building occupied by bats, or indirect, e.g. noise or visual disturbance causing a species to move out of the EZoI. The EZoI was determined through:

- Review of the existing baseline conditions based on desk study results, field surveys and information supplied by consultees;
- Identification of sensitivities of ecological features, where known;
- The outline design of the proposed Development and approach to construction; and
- Through liaison with other technical specialists involved in the assessment, e.g. hydrologists and noise specialists.

8.4.5.1 Access Route

17. The proposed Development will be accessed from the north via the existing forestry access track network forming part of the Operational Kilgallioch Windfarm and the proposed Arecleoch Windfarm Extension. While the access track has been assessed in terms of its ecological baseline conditions, this has been completed up to the point where the proposed Development access route joins with the recently proposed upgraded route for the Arecleoch Windfarm Extension. For the purposes of the proposed Development, and as both sites are proposed by the same Developer, the remaining upgrading work to the access track from this junction to the public road (i.e. the A714) has already been assessed in terms of potential ecological impacts and appropriate mitigation proposed where required. As such, this EcIA Report includes as its EZoI up to the junction with the Arecleoch Windfarm Extension access route, but outlines the assessment as described in the Arecleoch Extension ecology EcIA Report (SPR, 2019) and includes such records within the desk study **Section 8.5.1.2** of this EcIA Report.

With respect to the proposed Development, the baseline conditions for the combined access track route are applicable in this case and the Arecleoch Windfarm Extension assessment concluded that there would be no significant effects resulting from the access track upgrading works[1]. As the ecological mitigation and best practice measures described for the access track to the public road (A712) for the Arecleoch Windfarm Extension mirrors that which are proposed in this EcIA Report (specifically see the proposed Species Protection Plans (SPPs) in **Section 8.6.1**), there are no significant effects, in combination or otherwise, anticipated.

[1] Section 8.3.8.1 – Scoped Out IEFs and sub-section 8.3.8.1.3 Protected Species of the Ecology Chapter 3 of the Arecleoch Windfarm Extension EIA Report (SLR, 2019).

8.4.6 Temporal Scope

18. Potential impacts on ecological features have been assessed in the context of how the predicted baseline conditions within the EZoI might change between the surveys and the start of construction. It is anticipated that construction would take approximately 18 months to complete and would be expected to commence in c.2022.

8.4.7 Characterising Ecological Impacts and Effects

19. In accordance with the CIEEM guidelines, the following definitions are used for the terms ‘impact’ and ‘effect’:

- Impact – Actions resulting in changes to an ecological feature. For example, the construction activities of a development removing a hedgerow; and
- Effect – Outcome to an ecological feature from an impact. For example, the effects on a species population from loss of a hedgerow.

20. In accordance with the CIEEM guidelines, when determining impacts on IEFs, reference is made to the following:

- Positive or negative – i.e. whether the impact has a positive or negative effect in terms of nature conservation objectives and policy;
- Magnitude – i.e. the size of an impact, in quantitative terms where possible;
- Extent – i.e. the area over which an impact occurs;
- Duration – i.e. the time for which an impact is expected to last;
- Timing and frequency – i.e. whether impacts occur during critical life stages or seasons; and
- Reversibility – i.e. a permanent impact is one that is irreversible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it. A temporary impact is one from which a spontaneous recovery is possible.

21. 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 occupied by a species during the construction process. Indirect ecological impacts are attributable to an action but affect ecological resources through effects on an intermediary ecosystem, process or feature, e.g. fencing of a development site may cause scrub to invade marshy grassland.

22. For the purposes of this assessment, the predicted impacts on an ecological feature are categorised as ‘no impact’, ‘negligible, ‘low’, ‘medium’ or ‘high’, based on the definitions in **Table 8.3**, below.

Level of impact	Definition
No impact	No detectable impacts on the ecological resource, even in the immediate term.
Negligible	Immediately detectable impact but reversible within 12 months. Not expected to affect the conservation status of the nature conservation designation, habitat or species under consideration.
Low	Detectable impacts, and may be irreversible, but either of sufficiently small-scale or of short-term duration to have no material impact on the conservation status of the nature conservation designation, habitat or species population.
Medium	Detectable impact on the status of the nature conservation designation, habitat or species population in the medium term but is reversible / replaceable given time, and not a threat to the long-term integrity of the feature.

Level of impact	Definition
High	Irreversible impact on the status of the nature conservation designation, habitat or species and likely to threaten the long-term integrity of the feature. Not reversible or replaceable. Will remain detectable in the medium and long term.
The following definitions have been applied in respect to timescales: Immediate: Within approximately 12 months; Short term: Within approximately 1-5 years; Medium term: Within approximately 6-15 years; and Long term: More than 15 years.	

Table 8.3: Levels of impact

8.4.8 Determining Ecologically Significant Effects

23. An EcIA is undertaken in relation to the baseline conditions that would be expected to occur in the absence of a proposed development and, therefore, may include possible predictions of future changes to baseline conditions, such as environmental trends and other completed or planned development. Both adverse and beneficial impacts/effects are possible.

24. A significant effect, in ecological terms, is defined as an effect (whether negative or positive) on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area, including cumulative and in-combination impacts.

25. In accordance with the CIEEM guidelines, the approach adopted in this chapter aims to determine if the effect of an impact is significant or not based on a discussion of the factors that characterise it, i.e. the ecological significance of an effect is not dependent on the value of the feature in question. Rather, the value of a feature that will be significantly affected is used to determine the geographical scale at which the effect is significant.

26. In accordance with the current CIEEM guidelines, effects of impacts are assessed in the presence of standard mitigation measures. Additional mitigation may be identified where it is required to reduce a significant effect.

27. Any significant effect remaining post-mitigation (the residual effect), together with an assessment of the likelihood of success of the mitigation, are the factors to be considered against legislation, policy and development control in determining the application.

28. In addition to determining the significance of effects on valued ecological features, this chapter also identifies any legal requirements in relation to wildlife.

8.4.9 Survey Limitations

29. All baseline surveys were conducted under optimal survey conditions and at the appropriate times of year. The following outlines some of the more survey-specific limitations that were encountered.

30. **NVC Survey Limitations:** During the National Vegetation Classification (NVC) survey some small areas of the Study Area were not accessible owing to the presence of cattle with young calves. The inaccessible area was a small proportion of the overall Study Area for this survey and was located almost entirely within the wider northeastern survey buffer and considered to not present a significant limitation on the survey results. Any gaps within the wider habitat and vegetation survey data have been assessed by extrapolating from existing survey data, Site knowledge from surveyors combined with high definition aerial photography.

31. **Fish Survey Limitations:** No Site specific limitations were identified with the fish surveys, although there are some specific limitations to electrofishing methods and the technical equipment required for this type of survey. These limitations are acknowledged and described in full in **Technical Appendix 8.4**.

32. **Bat Survey Limitations:** Turbine locations were altered during the survey period, but it was decided that in order to allow consistency the detector locations would not change so as to allow comparable results between seasons. The detectors were still in habitats representative of final turbine locations and so it is considered the conclusions of the study would still be robust.

33. Due to errors with the detectors, memory cards or batteries it was not always possible to achieve ten consecutive nights of recording on all detectors simultaneously. One detector was redeployed 75 m from the original position in the summer period after being damaged by livestock. In spring and autumn, two detectors did not record for the full period, but due to seasonal time restrictions could not be redeployed. Although, once the number of nights each detector recorded across each deployment was averaged across all detectors more than the required 10 days was recorded each season.

34. Some access restrictions, due to health and safety, limited a full internal assessment of the structures at High Eldrig. However, this is not considered to present a limitation as the required buffer from any potential roost features is maintained by any associated infrastructure.

35. Weather data from an onsite meteorological mast was obtained, however the data were not in suitable format to allow inclusion within the analysis for comparison against bat activity.

36. The detectors record in Full Spectrum, but there are some limitations associated with the analysis of bat calls, generally, and the software used subsequently for the identification and labelling process. More details on the specific limitations can be found in **Technical Appendix 8.3**.

37. When the analysis of the results was provided by Ecobat, an error was seen to have occurred with regards to the number of *Pipistrellus* bat passes. As such, it was decided that *Pipistrellus* passes would be removed from the Ecobat analysis. Therefore 92 passes of a total 3,860, or 2.4% of all passes, were removed from the analysis, bringing the total bat passes to 3,768. Furthermore, when data are entered into the Ecobat software for analysis, there is no allowance for entering nights where no bat passes were recorded, and so the analysis is carried out only on presence data. This acts to skew the results and elevate the risk levels of the species. The detectors recorded on Site for 430 nights but bats were only recorded on 200 nights, and so more than half of the nights of recording have not been included within the Ecobat analysis and therefore not factored into the resulting outputs. On a site such as the proposed Development Site where there is open, remote ground and few roosting opportunities or suitable habitat features for bats, it is not unexpected to have nights where bats have not been recorded, due to the fact that there are no bats on these occasions (i.e. rather than due to any other factor such as inclement weather). Although the output from Ecobat has been used to guide the results, as per the recommendations of the guidelines (SNH *at al.* 2019), it is clear that results incorporating all of the data from the Site (both presence and absence) would have given clearer results to base recommendations for mitigation and compensation on.

38. Please refer directly to **Technical Appendix 8.3** for full details on the limitations to the bat survey data and results.

8.5 Baseline Conditions

39. This section of the report details the results of the desk study and field surveys conducted across the Site and respective Study Areas, which provides the baseline conditions from which the impact assessment is based. This includes:

- Designated sites and desk study/external data;
- Habitats and vegetative communities; and
- Protected species.

8.5.1 Current Baseline

8.5.1.1 Designated Sites and Species

40. Three nature conservation designations are located within 5 km of the proposed Development. Designated site details are summarised in **Table 8.4** and presented in **Figure 8.1**. For designations relating to ornithological qualifying features please refer to Chapter 9 for further information.

Site	Designation	Distance from Site	Qualifying Feature/s
Kirkcowan Flow	SAC / SSSI	Immediately adjacent (north and north east Site boundary)	Biological – habitats: - Blanket Bog (primary feature) - Depressions on peat substrates of the *Rhynchosporion*
River Bladnoch	SAC	Immediately adjacent (west and south west Site boundary)	Biological – species: - Atlantic salmon (*Salmo salar*)
Blood Moss	SSSI	2.8 km	Biological – habitats: - Blanket Bog

Table 8.4 Designated sites within 5km of the proposed Development

41. In addition, the proposed Development is located within the peripheral zone of a Biosphere Reserve which is a non-statutory designation that aims to ensure sustainable development. The peripheral zone is referred to as the 'Transition Area' and is detailed within the Biosphere Reserve's website (UNESCO, 2019), as an area "*where the greatest activity is allowed, fostering economic and human development that is socio-culturally and ecologically sustainable*".

8.5.1.2 Desk Study

42. The results of the desk study are presented in **Technical Appendix 8.1**, including the external data obtained from the local records centre, with additional desk study relating specifically to bats in **Technical Appendix 8.3**.

43. Data that was available and in the public domain for other developments within the locality was also considered. This included information within the planning applications for both Arecleoch Windfarm Extension (application stage) (SPR, 2019) and the Operational Kilgallioch Windfarm (SPR, 2010).

44. For the purposes of brevity, all records presented here are relevant to terrestrial ecology. Records pertinent to ornithological interests are included within **Chapter 9: Ornithology**.

8.5.1.3 Protected Species Records – External Data

Otter

45. A single record for otter was returned during the desk study, located within 2 km of the Site in 2013. Both the Operational Kilgallioch Windfarm (SPR, 2010) and Arecleoch Windfarm Extension (SPR 2019) baseline assessments found evidence of otter activity within the desk study search area. Signs of otter activity were also recorded along the proposed Arecleoch Windfarm Extension access track route (SPR, 2019) which is being shared with the proposed Development. Although otter are known to be present, they were scoped out of the Arecleoch Extension assessment following implementation of appropriate design mitigation and SPP , as is the same for the proposed Development and the shared access track route(see **Section 8.6.1**).

Water vole

46. No records of water vole were returned during the desk study, although the baseline surveys for the Operational Kilgallioch Windfarm (SPR 2010) confirmed signs of water vole within the proposed Development boundary. No signs of water vole activity were identified along the shared Arecleoch Windfarm Extension access track route (SPR, 2019). Although water vole are known to be present, they were scoped out of the Arecleoch Extension assessment following implementation of appropriate design mitigation and SPP, as is the same for the proposed Development and the shared access track route (see **Section 8.6.1**).

Badger

47. No records of badger were returned during the external data desk study. The Arecleoch Windfarm Extension ecology Chapter 8 (SPR, 2019) states the following in relation to badger:

"The closest possible badger sett recorded in 2019 was located approximately 43 m away from the proposed access route (which at this point would be already constructed and only require minor works) and over 100 m from borrow pits or turbines. Given the recommended SNH disturbance buffer distances for badger (30 m, or 100 m if blasting/piling), it is considered unlikely that any sett would be affected by the proposed Development if the appropriate buffers are applied. Should any setts be found within the prescribed disturbance-free buffer distances prior to commencement of construction, appropriate mitigation measures would be undertaken in accordance with an agreed SPP to ensure legal compliance and avoid impacts on badgers."

48. Although badger are known to be present, they were scoped out of the Arecleoch Windfarm Extension assessment following implementation of appropriate design mitigation and SPP, as is the same for the proposed Development and the shared access track route(see **Section 8.6.1**).

Red squirrel

49. Twenty records of red squirrel were identified within 2 km of the Site boundary within the last 10 years, with the most recent recorded in 2017. Records obtained from surrounding windfarm applications show that chewed cones were found during surveys. However, it was not established whether these were from red or grey squirrel. An incidental sighting of a red squirrel was recorded during an ornithology survey to the north of the Site, indicating that this species will likely make use of suitable habitat within the Study Area. The Arecleoch Extension ecology Chapter 8 (SPR, 2019) scoped out red squirrel from the assessment, although it was stated that:

"… the SPP would ensure that all reasonably practicable measures are taken to ensure that provisions of the relevant wildlife legislation are complied with in relation to red squirrel and would include pre-felling and pre-construction checks for squirrels and dreys by an ECoW."

50. Red squirrel were scoped out of the Arecleoch Windfarm Extension assessment following implementation of appropriate design mitigation and SPP, as is the same for the proposed Development and the shared access track route(see **Section 8.6.1**).

Pine marten

51. A single record of pine marten was returned during the desk study, located within 2 km of the Site in 2015. From surrounding windfarm applications, the most recent surveys for pine marten (2019) did not find any evidence of activity along the access track route (SPR, 2019). The Arecleoch Extension ecology Chapter 8 (SPR, 2019) states that:

"Measures would be employed as part of the SPP which would avoid impacts on pine marten, including pre-construction surveys for this species."

52. Pine marten were scoped out of the Arecleoch Windfarm Extension assessment following implementation of appropriate design mitigation and SPP, as is the same for the proposed Development and the shared access track route (see **Section 8.6.1**).

Bats

53. Records for the following species of bat were returned within the search terms of the external data desk study, the most recent records for all species were made in 2016: whiskered/Brandt's bat (a single record), Daubenton's bat (three records), natterer's bat (four records), lesser noctule/Leisler's bat (eighteen records), common pipistrelle (eight records), soprano pipistrelle (eight records 2016) and unidentified pipistrelle species (seven records).

54. With regards to the shared Arecleoch Windfarm Extension access track route, effects on roosting bats were scoped out of the assessment according to the following:

"No buildings or trees with bat roost potential were found present within 200 m of a turbine location or 150 m of any other infrastructure. The SPP would ensure that all reasonable measures are taken to ensure that provisions of the relevant wildlife legislation are complied with in relation to buildings and trees with bat roost potential, including where road widening and creation of passing places is proposed along the access route."

Other mammals

55. A single record for brown hare was identified within 2km of the Site boundary and recorded in 2016.

Amphibians

56. Great crested newt: Following the recommendations by O'Brian *et al.* (2017) regarding geographical zones of great crested newt suitability in Scotland, the main development Site lies on the boundary of both category C and B in suitability of the geographic zones of south west Scotland. Category C being considered unsuitable for this species and B being of marginal suitability. The access track to the main development area lies within the category C area.

57. The desk study review of the data available from the surrounding windfarms did not confirm any great crested newt records and the habitat assessment indicated that there was no suitable habitat for great crested newt within any of the windfarms for which information was available and within the EZoI of the proposed Development. The Environmental Statement for the adjacent Operational Kilgallioch Windfarm (SPR, 2010), which at the time of submission included the Site as part of its Study Area, states that lochs and lochans in the study area are "highly unlikely to support protected amphibians, as such species are not normally associated with upland acid mire habitats and acid waterbodies".

Invertebrates

58. No data was returned relating to invertebrates during the desk study.

8.5.1.4 Other Studies

59. In order to fully assess the potential effects resulting from the proposed Development, information from **Chapter 7: Hydrology, Hydrogeology, Geology and Soils** was considered with respect to ecological interests. Reference is made within the report when input from other specialist assessments has been needed.

8.5.1.5 Field Surveys

60. Specific details relating to field survey methodologies and results are included within each of the relevant **Technical Appendices 8.1 to 8.5**. The following section summarises the baseline conditions following these ecological surveys.

Habitat Surveys

61. As part of the original Kilgallioch Windfarm application, the habitat survey boundary encompassed the area that is now being considered for the proposed Development and was surveyed in 2009 to Phase 1 habitat level as part of the baseline assessment for this application. As such, the proposed Development area was surveyed to the more detailed National Vegetation Classification (NVC) level and the results back-worked in order to refresh the earlier Phase 1 habitat assessment.

62. The Habitats Study Area for the proposed Development included the Site boundary and a 250 m survey buffer, which was reduced to 150 m from the existing access track to the south east (see **Figure 8.2**). The large Study Area assisted with the placement of infrastructure and Site design, due to the requirement to ensure sufficient areas were surveyed to account for the presence of potential GWDTEs, i.e. as per SEPA guidance (SEPA, 2017), as well as allowing to inform progressive layout iterations of the proposed Development as the design became more refined.

Phase 1

63. For each of the described vegetation and habitats types found during the survey, **Table TA_8.1.1** presents the equivalent habitats according to the Phase 1 habitat classification system (as per JNCC, 2010). As NVC communities are not always immediately comparable to Phase 1 habitat categories, the comparisons made here also take into account for species composition, peat depth and habitat quality recorded during the fieldwork. Some NVC communities can occasionally have more than one Phase 1 habitat category, depending on ground conditions. When NVC polygons were found to consist of mosaic NVC communities, these areas have been assigned a single Phase 1 classification based on the more dominant NVC-type.

64. The Phase 1 results are shown on **Figure 8.2** and have been effectively reverse interpreted from field notes, peat mapping data, and the NVC data and using the equivalent codes as presented in **Table 8.5**, which includes those areas of non-NVC communities recorded under Phase 1 habitat criteria.

Phase 1 Habitat Code	Phase 1 Habitat Description	Corresponding NVC Community Equivalent	Extent in Study Area (ha)	% of Study Area
A1.1.1	Broadleaved woodland - semi-natural	-	0.06	0.01
A1.2.2	Coniferous woodland - plantation	-	98.82	12.52
A4.2	Felled plantation woodland	-	25.62	3.24
B1.1/B1.2	Acid grassland – improved/semi-improved	U4, U6	37.68	4.77
B5	Marsh/ marshy grassland	M23, M25	90.58	11.47
C1.1/C1.2	Bracken: continuous/scattered	U20	35.25	4.46
D2	Wet dwarf shrub heath	M15	1.98	0.25
E1.6.1	Blanket bog	M17, M19	58.49	7.41
E1.7	Wet modified bog	M1, M2, M15, M17, M25	422.35	53.49
E1.8	Dry modified bog	M19	4.88	0.62
E2.1	Flush and spring – acid and neutral	M6	8.28	1.05
E3.2	Fen – basin mire	M2/M6	0.21	0.03
G1.3	Standing water - oligotrophic	-	2.48	0.31
J4	Bare ground	-	2.86	0.36

Table 8.5 Phase 1/NVC community equivalents within the Study Area

NVC

65. All NVC communities (and the non-NVC habitat types) recorded within the Study Area are provided in **Table 8.6**. This table includes the proportions of each community or habitat type as an area and percentage found within the infrastructure buffers, including proportions within mosaic habitats. The communities are shown on **Figure 8.3.** Full descriptions of each of the NVC communities, non-NVC communities and associated Phase 1 habitats found within the Study Area are provided in **Technical Appendix 8.1**.

66. The NVC survey resulted in 12 recognised communities (some with associated sub-communities) recorded within the Study Area. Several non-NVC communities are also present, in particular this includes larger stands of coniferous plantation (Phase 1 code A1.2.2) woodland and some smaller areas of clear-fell (Phase 1 code A4.2). The areas categorised according to Phase 1 habitat only are excluded from this table (i.e. woodland categories and bare ground), with the exception of oligotrophic standing water.

67. The 12 communities are summarised in **Table 8.6** below, along with any conservation value, potential for supporting GWDTEs and the proportion of the total Study Area. For the purposes of clarity, communities formed from mosaics have been prioritised and allocated by dominant community.

NVC Community	Annex I Habitat	SBL Priority Habitat	Dumfries and Galloway Local BAP	Potential GWDTE Status	Extent in Study Area (ha)	% of Study Area
G1.3 Standing Water – oligotrophic	Not listed	Oligotrophic lakes are listed only as habitats on which negative impacts should be avoided	Oligotrophic Lochs	Not listed	2.48	0.31
M1 *Sphagnum auriculatum*	M1 is included in the priority habitat description for	M1 is included in the priority habitat description for blanket mire (Maddock 2011)	Blanket Bogs	Not listed	0.11	0.01

NVC Community	Annex I Habitat	SBL Priority Habitat	Dumfries and Galloway Local BAP	Potential GWDTE Status	Extent in Study Area (ha)	% of Study Area
bog pool community	7130 Blanket bogs					
M2 *Sphagnum cuspidatum / fallax* bog pool community	M2 is included in the priority habitat description for 7130 Blanket bogs	M2 is included in the priority habitat description for blanket mire (Maddock 2011)	Blanket Bogs	Not listed	0.23	0.03
M6 *Carex echinate – Sphagnum recurvum / denticulatum* mire	Not listed	Upland flushes, fens and swamps are listed with a watching brief only	Upland springs and flushes	Potentially highly groundwater dependent	7.8	0.99
M17 *Scirpus cespitosus*[2] – *Eriophorum vaginatum* blanket mire	7130 Blanket bogs	Blanket mire	Blanket Bogs	Not listed	86.33	10.93
M19 *Calluna vulgaris – Eriophorum vaginatum* blanket mire	7130 Blanket bogs	Blanket mire	Blanket Bogs	Not listed	9.89	1.25
M23 *Juncus effuses / acutiflorus – Galium palustre* rush-pasture	Not listed	M23a is listed in the description for upland flushes, fens and swamps (Maddock 2011), which are listed with a watching brief only Purple moor-grass and rush-pastures are priority habitats, although it is the richer M23a vegetation, which is described	Purple moor-grass and rush-pastures are priority habitats, although it is the richer M23a vegetation, which is described	Potentially highly groundwater dependent	38.23	4.84
M25 *Molinia caerulea – Potentilla erecta* mire	7130 Blanket bogs (on peat deeper than 0.5 m)	M25 is included in the priority habitat description for blanket mire (Maddock 2011)	Purple moor-grass and rush-pastures	Potentially moderately groundwater dependent	427.28	54.12
M15 *Scirpus cespitosus*[1] – *Erica tetralix* wet heath	4010 Northern Atlantic wet heaths with *Erica tetralix*	M15 is included in the priority habitat description for both blanket mire and upland heathland (Maddock 2011)	Upland heaths	Potentially moderately groundwater dependent	15.60	1.92
U4 *Festuca ovina - Agrostis capillaris - Galium saxatile* grassland	Not listed	Listed in the priority habitat description for lowland (to 300 m) dry acid grassland (Maddock 2011)	Acid grassland	Not listed	36.85	4.67
U6 *Juncus squarrosus - Festuca ovina* grassland	Not listed	*Juncus squarrosus-Festuca ovina* grassland listed with a watching brief only	Acid grassland	Potentially moderately groundwater dependent	0.83	0.10
U20 *Pteridium aquilinum – Galium saxatile* community	Not listed	Not listed	Not listed	Not listed	36.87	4.67

Table 8.6: NVC Summary

[2] Now known as *Trichophorum germanicum*

Habitat Descriptions

68. A brief description of the NVC types and their associated Phase 1 habitats recorded within the NVC Study Area is presented below: for full descriptions please refer to **Technical Appendix 8.1** and **Figures 8.2** and **8.3**. In the following paragraphs where reference is made to NVC community or non-NVC habitat codes, the full community name can be found in **Table 8.6**.

Wet modified bog

69. Wet modified bog (E1.7) forms over 422 hectares (ha) of the total Study Area (under 54%) and the majority of this habitat consists of M25 mire and associated mosaics. M25 is a rush-pasture community that is dominated by purple moor-grass (*Molinia caerulea*) and is often found in large open stands but also as mosaics with other communities (i.e. with other areas of mire, wet heath, rush-pasture, acid grassland as well as stands of bracken). Other NVC communities that can be classified as wet modified bog habitat include; M1 and M2 bog pool communities, M15 wet heath and M17 mire (on areas of shallower peat). Areas of mire throughout the Study Area were found to have varying degrees of grazing pressure from cattle, despite there being no effective exclusion fencing in place. Some areas were found to have been grazed to be relatively closely cropped while other stands having developed into substantial expanses of more mature purple moor-grass tussocks that dominate other vegetation, restricting the development of other basal species.

Plantation woodland

70. Coniferous plantation woodland (A1.2.2) forms the second most prevalent habitat within the Study Area, with just under 99 ha of the Study Area (12.5%), although all stands of coniferous woodland are located entirely within forest blocks located to the south, west and north west of the wider survey buffer rather than within the Site.

71. For ease of reference, also included within this habitat are areas of felled/recently replanted woodland coupes (A4.2), which equate to a further 25.6 ha (3.24%) of the Study Area. As per the areas of coniferous plantation woodland, all areas of felled/replanted woodland are located in the wider survey buffer and so make up part of the wider commercial forestry complex and do not form part of the Site.

Marshy grassland

72. Marshy grassland (B5) is the third most prevalent habitat type found within the Study Area constituting 90.5 ha (11.5%) of the Study Area. The areas of marshy grassland found within the Study Area are formed primarily from M23 and M25 rush-pasture and mire, but also as mosaics formed with other vegetative communities, such as M6 sphagnum mire and U4 and U6 acidic grassland. Within the Site, areas of marshy grassland are associated predominantly with the areas of historically improved grazing to the west of High Eldrig as well as the watercourse floodplains. Beyond the main Site boundary, the embankments of the Tarf Water and the forest rides of the conifer plantation woodland in the wider survey buffer, to the south and west, consisted primarily of M23 rush-pasture also.

Blanket bog

73. Areas of blanket bog (E1.6.1) were found in pockets throughout the Study Area and consisted of M17 and M19 blanket mire communities formed on substrates consisting of deeper peat (>0.5 m in depth) forming 58.4 ha (7.4%) of the Study Area. The largest, homogenous areas of blanket bog are formed by M17b *Scirpus cespitosus–Eriophorum vaginatum* blanket mire, *Cladonia* spp. sub-community, and they are located in the centre of the Site, as well as in the south west corner. Smaller pockets of M19 blanket mire (including M19a *Erica tetralix* and M19c *Vaccinium vitis-idaea-Hylocomium splendens* sub-communities) are located across the outer parts of the Study Area, particularly just inside the north western Site boundary and the north eastern wider survey buffer.

Acid grassland – unimproved/semi-improved

74. Areas where topography rises often present rockier outcrops, or shallower substrate, that have taken well to management for grazing pasture between the wider expanses of M25 mire. The acidic grassland (unimproved and semi-improved) consists of two communities: U4 *Festuca ovina-Agrostis capillaris-Galium saxatile* (including U4a and U4d sub-communities) and U6 *Juncus squarrosus-Festuca ovina* (typical and U6d sub-community) grasslands and form 37.7 ha (4.7%) of the Study Area. The abandoned farm buildings at High Eldrig lie within south eastern corner of the Site, demonstrating the anthropomorphic nature of the area, and are still used to house supplies and hardware for managing livestock (sheep and cattle) given over to the wider area for grazing. The historical management of the Site for improving ground conditions and flora for livestock grazing is evident from the drains and grips, many of which have filled in with vegetation, but also the remains of old sheep pens, drystane dykes as well as several areas marked as burnt mounds from historical habitation of the area.

Bracken: continuous/scattered

75. U20 *Pteridium aquilinum–Galium saxatile* vegetation forms 35.25 ha (4.46%) of the Study Area and is dominated by bracken (*Pteridium aquilinum*). It was recorded sporadically throughout the Study Area, along elevated areas found to be rockier and with more mineral substrate deposits. In some areas the bracken appeared denser and featured few associate species and NVC communities. However, other species are present at lower abundance and found to be forming mosaics, most often with U4 grassland although also with the other rush-pasture and mire communities found across the Study Area.

Flush and spring – acid and neutral

76. Areas of flush consisting of M6 mire were found throughout the lower lying depressions and minor valleys within middle, east and southern parts of the Site, with two other areas found in the south east (to the south of the existing farm track) and north west corner of the application boundary. These areas form over 8.2 ha (1%) of the Study Area and consist of sedge-dominated M6a as well as the two rush-dominated sub-communities. M6 mire is essentially a poor-fen with dominant small sedges or rushes over a carpet of oligotrophic and base-intolerant bog-mosses (Rodwell *et al.* 1991). It is commonly found in tracts of unenclosed pasture on upland fringes, particularly between 200 m and 400 m (Rodwell *et al.* 1991). M6 mires are not species-rich communities, although they are considered to contribute to the diversity of the vegetation of upland margins (Averis *et al.* 2004).

Dry modified bog

77. Areas of dry modified bog consisted entirely of stands of M19 blanket mire and collectively form almost 4.9 ha (0.62%) of the Study Area. M19 was recorded mostly to the north of the Site boundary (i.e. within the Kirkcowan Flow SAC) as well as other stands in the south east, north east and north west corners of the Site. An area, just west of Ha' Hill, was formed from a mosaic transitioning with the wider M25 mire-dominant community. The extent of M19 community was relatively small, in relation to the Study Area, but its condition was relatively good in some parts, despite evidence of historical drainage and grazing pressures, although the overall quality is nevertheless lower than that described for blanket bog above.

Bare ground

78. Areas of bare ground (J4) were minimal within the study area, and relate to areas of existing tracks, hardstandings and disturbed ground surrounding, etc., and formed 2.86 ha (0.36%) of the Study Area.

Standing water

79. Eldrig Loch is the only standing waterbody within the Study Area. It is located inside the wider survey buffer within the boundary of the Kirkcowan Flow SAC, to the north east of the application boundary and covers 2.48 ha (0.31%) of the Study Area. The water of Eldrig Loch consists of oligotrophic water, which are clear waters of low alkalinity that are commonly found in the Scottish Lowlands.

Wet dwarf shrub heath

80. M15 wet heath occurs in distinct pockets along the northern-most reach of the Study Area forming 1.98 ha (0.25%) of the total Study Area, although the distinct stands keyed out to M15d *Vaccinium myrtillus* sub-community where the ground conditions appear to be drier.

Fen – basin mire

81. A distinct area within the middle-west of the Site is formed of basin mire and consists primarily of M2 bog pool community, with a small proportion of M6 mire. This area appears to have developed over the top of a stretch of watercourse that has filled in over time, flowing north east-west at Ha' Hill Strand, between Ha' Hill and Belgaverie, and covers 0.21 ha (0.03%) of the total Study Area.

Broadleaved woodland - semi-natural

82. A small area of semi-natural broadleaved woodland is located at the very western-most corner of the Study Area and is immediately adjacent to the Tarf Water. This area forms just over 0.06 ha (0.01%) of the total Study Area.

Annex 1 Habitats

83. Some NVC communities can correlate to Annex I habitat types, designated under the Habitats Directive. However, although an NVC community may align with an Annex I habitat type, it does not necessarily mean that a specific area of an NVC community constitutes Annex I habitat. Various factors, including quality, area, geographical location and substrates, all need to be considered in this respect.

84. NVC survey data and field observations have been compared to JNCC Annex I habitat classifications and descriptions. Those habitats within the study area which could be considered Annex I habitats are also summarised in **Table 8.6**.

85. The extents and, due to historical agricultural management pressures, often relatively low quality and degraded nature of these potential Annex I habitats within the Study Area mean that none are considered of more than Local area nature conservation value. Full details and discussion of Annex I habitat types present with the NVC study area are provided within **Technical Appendix 8.1**.

Groundwater Dependent Terrestrial Ecosystems (GWDTEs)

86. Potential groundwater dependency is shown on **Figure 8.4**, although the catchment is considered likely to be predominantly surface water or rain fed, partly due to the wider network of blanket bog habitats (which, by definition, are fed by precipitation) as well as the underlying geology being unconducive to groundwater flow. Hydrogeology

mapping data from the British Geological Society shows the bedrock beneath the Study Area to comprise a low productivity aquifer in which flow is virtually all through fractures and other discontinuities (please see **Chapter 7: Hydrology, Hydrogeology, Geology and Soils**). Also, till, where present, is anticipated to have relatively low permeability, thus inhibiting groundwater flow.

Scottish Biodiversity List Priority Habitats

87. The Scottish Biodiversity List (SBL) (Scottish Government, 2013) is a list of animals, plants and habitats that Scottish Ministers consider to be of principal importance for biodiversity conservation in a Scottish context. Scientific and social criteria have been used to define the species and habitats included on 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*.), which occur in Scotland. This chapter only considers those listed using scientific criteria.

88. Those habitats referred to in the SBL are highlighted in Table 8.6 as well as in **Technical Appendix 8.1**, according to their corresponding NVC classifications.

Dumfries and Galloway Local Biodiversity Action Plan

89. The Dumfries and Galloway Local Biodiversity Action Plan (BAP) (Dumfries & Galloway Biodiversity Partnership, 2009) sets out a number of aims and objectives to help support the over-arching themes of the plan, including protection and enhancement of existing biodiversity of existing habitats. The plan identifies a wide range of local priority habitats and species.

90. Those habitats referred to in the Dumfries and Galloway LBAP are highlighted in **Table 8.6** as well as in **Technical Appendix 8.1**, according to their corresponding NVC classifications.

Protected Species

91. Full details of the survey methods adopted, the field survey results and the legislation protecting each of the species referred to below can be found in **Technical Appendices 8.2–8.5** and in **Figure 8.5**.

Otter

92. Otter field signs and survey methods followed that of CIEEM (2013a) and Chanin (2003). The results of the otter survey are presented in **Figure 8.5**. In summary, a potential hover (or otter resting place) was identified in the north of the Site, on the banks of the Tarf Water. Indentations in the vegetation indicate a slide was present to and from the water, however there was no further evidence to suggest use by otter (such as spraints or footprints). Some signs of sprainting on rocks were found further along the Tarf Water, although the spraints were aged and comprised fish bones. In addition, evidence of frogs, an otter prey species, was identified throughout the survey area.

93. The water courses within the Site are suitable for commuting and foraging by otter and the previous spraints indicate historical use by otter. However, the Study Area is considered unsuitable for holt construction given the flat topography, wetland habitat and dense coniferous plantation. No other evidence of otter presence was identified during the survey.

Water vole

94. Water vole field signs and survey methods followed that of CIEEM (2013b) and Dean *et al*. (2016). The results of the water vole survey are presented on **Figure 8.5**. Evidence of water vole, including burrows, droppings and feeding evidence, was found on the Monandie Burn, Loch Strand watercourse and the Tarf Water. Signs of water vole activity was found to be greatest at the north of the Site on Tarf Water, and in the centre of the Site along Loch strand and Monandie Burn indicating an established population of water voles.

95. As would be expected, evidence of water vole concentrated on areas where waters were slow-moving and there was plentiful vegetation for feeding along embankments. The watercourses within the Study Area were considered to be generally suitable for use by water vole, although parts of the Tarf Water that were faster flowing are unsuitable. No other evidence of water vole presence was identified during the survey.

Badger

96. Badger field signs and survey methods followed that of CIEEM (2013c) and Scottish Badgers (2018). No evidence to suggest presence of badger was identified within the Study Area during the protected mammal survey, but incidental evidence (see **Technical Appendix 8.2**) comprising badger prints was identified in the far east of the Site during a peat probing survey in early October 2019.

97. The flat topography and wet nature of the habitats found within the Study Area, as well as the surrounding dense coniferous woodland in the wider survey buffer, makes the Site largely unsuitable for sett building. Although, given the highly mobile habits of badger, they could still commute and forage throughout the Site as demonstrated by the incidental prints.

Red Squirrel

98. Red squirrel field signs and survey methods took cognisance of Gurnell and Pepper (1994) and Gurnell *et al*. (2009). No evidence of red squirrel activity was recorded during the survey. However, squirrel could use the areas of more mature coniferous plantation woodland within the wider Study Area to forage and construct dreys.

Pine marten

99. Pine marten field signs and survey methods took cognisance of CIEEM (2013d), O'Mahony *et al.* (2006) and Vincent Wildlife Trust (2017). No evidence of pine marten activity was recorded during the survey. Pine marten could use the coniferous plantation woodland within the wider Study Area to forage, commute and construct dens (particularly in areas of wind-throw).

Reptiles

100. Although no dedicated survey was undertaken for reptiles, an incidental log of all protected or notable species sightings recorded during all other survey and site visits was maintained throughout all surveys and Site visits (see **Technical Appendix 8.2**). Throughout all Site and survey visits, three sightings of individual adder were recorded during three separate Site visits, one of which consisted of a juvenile. In addition to these sightings, local residents have also expressed knowledge of adder being located throughout the Site (during the public consultation event that took place 04 June 2019. Six individual common lizard were recorded during two separate survey visits. The study area presents good suitability for supporting basking and hibernating reptiles.

Amphibians

101. Although no dedicated survey was undertaken for amphibians, an incidental log of all protected or notable species sightings recorded during all other survey and site visits was maintained throughout all surveys and Site visits (see **Technical Appendix 8.2**). Ponds along the existing access track to the main development area were all assessed as having low suitability for great crested newt (see **Technical Appendix 8.5**), as were other bog pools found within the main development area as they were filled in with vegetation. Three individual common frogs were incidentally recorded during three separate survey visits.

Bats

102. The survey methods employed to assess the bat baseline conditions were taken from the latest SNH guidance for assessing bats and onshore wind developments (SNH *et al.* 2019) and the 'Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016). A summary of the results is provided below, but full details can be found in **Technical Appendix 8.3**.

<u>Bats: Preliminary Roost Assessment</u>

103. A Preliminary Roost Assessment (PRA) of the buildings and trees at High Eldrig was conducted in late June 2019. The farmhouse and stone barns were only surveyed externally due to health and safety issues and were assessed as being of moderate and high suitability, respectively, for summer roosting bats. In addition, there were a small number of broadleaved trees with roost suitability.

104. During the PRA the structures were also assessed as to the suitability to support over-wintering bats. The barns were assessed as having moderate suitability for winter roosting bats and the farmhouse had low winter suitability. There are features suitable for small numbers of bats but due to the partially exposed nature of both structures it is considered unlikely for a large hibernation roost to be present as the conditions are not optimal with regards to the protection from winter weather and temperature changes. As a distance of over 450 m is maintained from structures

and trees and the nearest turbine location, no further bat roost surveys (summer or hibernation) were required as the features would not be impacted by the proposed Development.

Bats: Automated Bat Detector Surveys

105. A walkover assessment of the Site was conducted in early May to assess the habitats within the Site and determine the locations for the automated recorders. The methodology followed that in the survey guidelines (SNH *et al.* 2019). The Site has been assessed as having low habitat risk, as there are no potential roost features within the Site, the foraging habitat is of low quality and there are no prominent linear features connecting the Site with the wider landscape. Given the scale of the proposed Development, the project size has been assessed as medium. Therefore, the site risk level has been assessed as low (2), in line with SNH risk assessment guidelines (SNH 2019).

106. Automated bat detectors (Titley Anabat Swift detectors with omni-directional microphone on a 1.5 m microphone extension cable) were deployed in eleven locations within various habitats across the Site (see **Figure TA_8.3.1**). Detector locations were chosen for being close to the proposed turbine locations at the time surveys commenced, although, as mentioned in **Section 8.4.9**, due to subsequent design iterations these locations have since changed but in order to maintain continuity in the results each detector was deployed in their original position. The detectors remained in locations of habitat representative of the new turbine locations and so the survey findings remain robust.

107. The detectors were deployed for periods of over ten days with an aim of recording at least ten days of consecutive bat data each for three seasons (Spring, Summer and Autumn), recording in full spectrum, and a total recording time of 430 nights was achieved, averaging 13 nights per detector per season. The data were then downloaded from the detector memory cards and saved in .wav file format and analysed using Anabat Insight (v 1.9.0-4-g15fdd88) software (Titley Scientific).

Assessment of Potential Risk

108. In order to allow an objective assessment of bat activity a measure of relative activity was obtained using the online tool “Ecobat”, hosted and developed by the Mammal Society (Lintott *et al.* 2018). Using Ecobat the data gathered at the Site were compared to a stratified reference range of data from other Sites. The data input reveals a percentile score and categorised level of bat activity and the results can be interpreted at the local scale and site scale.In total, five species (or genera, in the case of more cryptic species) were recorded on the static detectors. These were: soprano pipistrelle, common pipistrelle, *Myotis* species, *Nyctalus* species (noctule or Leisler’s bat) and brown long-eared bat. Across all detectors for the whole survey period, the total number of passes of all bat species was 3,768. The most commonly recorded species was soprano pipistrelle (64.1% of all bat passes), followed by common pipistrelle (19.3% of all bat passes). 11.4% of all bat passes recorded were from *Nyctalus* species, followed by *Myotis* species (5.1%) and brown long-eared bat (0.2%).

109. Further details of species composition and rate of passes at each detector (D1 to D11) can be found in **Technical Appendix 8.3**. In summary, soprano pipistrelle dominated the passes at most detector locations but the highest proportion was found at D10. The highest proportions of common pipistrelle and *Nyctalus* passes both occurred at D7. D4 recorded the highest proportional activity of brown long-eared bat, whilst the highest proportion of *Myotis* activity occurred at D9. D7 and D10 were close to linear features (the river, a wall and coniferous plantation respectively) while D9 was within 60 m of High Eldrig Farm. D4 was located in open habitat.

110. Using the SNH criteria (SNH 2019), which multiplies site risk (low, 2) against Ecobat activity category, the overall level of risk for each species across the whole site, and per detector and per month can be examined. Both the median and maximum levels of activity were used to calculate the typical site risk level, and the maximum site risk level. The results are presented in **Table 8.7.**

111. The overall risk level for all high-risk species was either low (green) or medium (amber). No species are at high risk overall at any detector or during any temporal period. When considered per month, the maximum risk to common pipistrelle, soprano pipistrelle and *Nyctalus* bats was medium. The median risk was low for both pipistrelle species in May and June (i.e. Spring and Summer) but medium in August and September (i.e. Autumn). Overall risk was low in May, June and September for *Nyctalus* species but medium in August.

Species / Species Group	Location	Median Risk	Maximum Risk	Month	Median Risk	Maximum Risk
Common pipistrelle	Whole site	6	10	May	4	10
	D1	6	8	June	4	10
	D2	2	2	August	6	10
	D3	4	8	September	8	10
	D4	2	6			
	D5	4	8			
	D6	2	8			
	D7	6	8			
	D8	8	10			
	D9	6	10			
	D10	6	10			
	D11	6	10			
Soprano pipistrelle	Whole site	6	10	May	2	10
	D1	6	10	June	4	10
	D2	4	6	August	8	10
	D3	8	10	September	10	10
	D4	6	8			
	D5	6	10			
	D6	6	10			
	D7	4	8			
	D8	8	10			
	D9	6	10			
	D10	8	10			
	D11	8	10			
Nyctalus	Whole site	6	10	May	2	6
	D1	6	8	June	4	8
	D2	4	4	August	6	10
	D3	6	8	September	4	6
	D4	2	6			
	D5	4	8			
	D6	6	10			
	D7	6	8			
	D8	8	10			
	D9	4	8			
	D10	6	8			
	D11	2	8			

Table 8.7: Overall risk assessment of high-risk species for the site, per detector

112. When looking at detector location including the whole Site, the maximum risk for all species/species groups is almost always medium (the exceptions being common pipistrelle and *Nyctalus* species at D2). The median risk varied between low and medium although for the whole Site, the risk is medium for the three species/species groups.

113. The maximum risk for common pipistrelle, soprano pipistrelle and *Nyctalus* species has been assessed as medium at all detector locations except for D2, and during all survey months. The median risk is more variable, although for each species there was medium risk when the whole site was analysed. Generally, the risk at detector locations in open habitats (D2, D3, D4, D5 and D6) was low whereas risk at detectors closer to bat-friendly features, and away from any proposed Development infrastructure, was higher (D8, D9 and D10).

114. Temporal patterns in activity revealed the overall risk for common pipistrelle, soprano pipistrelle and *Nyctalus* species was lower in Spring and Summer and higher in Autumn. As there is no allowance for entering nights where no bat passes were recorded while using the Ecobat software, the analysis will be skewed and therefore the medium risk recorded for the Autumn season will be significantly elevated above the actual risk level (more than half of the nights of recording have not been included within the analysis as no bats were recorded).

Foraging and Commuting

115. Bat activity was found to be lower at detectors located in open areas of habitat, as would be expected, and higher where detectors were located closer to linear features. Activity recorded at D2 and D4 was low, and these two detectors were located in the open with very little by way of habitat features. It would be expected that activity would also be low at D3, D5 and D6 which were also in open habitat, and this was seen for some species but not all.

116. Highest activity for both pipistrelle species and *Nyctalus* bats was recorded at D8 and *Myotis* activity was highest at D9. D8 was located on woodland edge, and close to the Tarf Water, and 500 m from High Eldrig Farm (D9) and the eastern farm access track. D10 was also close to a woodland edge and closer to structures outwith the Site than other detectors. These three detectors were all located in the vicinity of habitat features which may be favourable to bats and which may be used by commuting bats. Once in the Site the presence of bats may be diluted, due to lack of habitat features, which explains the lower activity found on the detectors located in open habitat.

Fish

117. The fish survey was undertaken by Galloway Fisheries Trust (GFT) who are a partner of the Scottish Fisheries Coordination Centre (SFCC). The SFCC and its partners have developed a set of agreed survey and data collection methodologies for electrofishing surveys and an associated database in which to record information gathered from such surveys. The electrofishing surveys undertaken by GFT to assess the baseline conditions at the Site have been completed to the high standards that are required by the SFCC and recorded using the agreed methodologies. For full details on these methods please refer to **Technical Appendix 8.4**.

118. A total of five sites were surveyed using electrofishing techniques for this study. All sites were located within the River Bladnoch catchment. Overall, good and moderate quality habitats were found throughout the electrofishing survey. This was not necessarily reflected in the densities of fish recorded across the survey, although this was potentially due to water quality issues (acidification).

119. Four of the five sites surveyed held fish. Juvenile salmon were recorded at one site on the Tarf Water. Salmon are only periodically recorded in the Upper Tarf catchment, considered most likely due to water quality issues relating to acidification. Headwater watercourses are also often narrow in the upper catchment and are therefore less likely to hold populations of juvenile salmon.

120. Juvenile trout across the survey were recorded in very low to moderate densities.

121. Eels and pike were the only non-salmonid fish species encountered during the survey and were present in three of the five sites surveyed.

8.5.2 "Do Nothing" Baseline

122. In the event that the Study Area remained undeveloped, aside from slight variations in populations and their distribution of more mobile species, it is considered unlikely that there would be any significant change to the baseline conditions within the Study Area. There would continue to be cyclical changes to the woodland structure associated with the commercial forestry felling/stocking in the wider survey area. Also any changes in livestock management within the Site may give rise to changes to the ground conditions over extended periods of time.

8.5.3 Future Baseline

123. The Site is likely to currently support species at or near to its carrying capacity. This means that a net increase in species population numbers would not be expected, should the proposed Development not go ahead.

124. Other changes over time may occur as a result of climatic change, although these are difficult to predict but likely to involve increased precipitation and gradual increases in average temperatures. Some change in the vegetation assemblage is likely to occur as a result.

8.5.4 Design and Layout Considerations

125. The ecological baseline has been considered throughout the design process for the proposed Development (see **Chapter 3: Site Selection and Design**), including design meetings where representatives of each specialist subject provided input to subsequent design iterations. This was with an aim to either eliminate or reduce the potential for any significant effects on receptors. Ecological factors taken into account included the following:

- A minimum 50 m buffer for any infrastructure or construction activity around all watercourses, except where watercourse crossings/upgrading works are required. The design process has actively minimised the number of watercourse crossings required for associated infrastructure;
- The avoidance of areas of deeper peat (>1 m) for the location of turbines and associated infrastructure, as far as practicable; and
- To minimise the take of potential GWDTEs, even though these have subsequently been assessed as predominantly non-groundwater dependent.

8.5.5 Scoped Out IEFs

126. Following the collation of the baseline data and the desk study external data collected, and following the design mitigation and those measures described in the design layout considerations (see **Section 8.5.4**) and project assumptions sections (see **Section 8.6.1**), several potential effects on IEFs can be scoped out of further assessment. This is based on professional judgement and experience from other relevant projects in this region.

8.5.5.1 Designated Sites

127. The Blood Moss SSSI site is one of the three designated sites located within 5 km of the proposed Development and is located approximately 2.8 km to the north east of the Site boundary. This site is designated for its blanket bog habitat and due to the distance from the Site it is considered to be scoped out of the assessment due to lack of connectivity.

128. The River Bladnoch SAC is designated for supporting Atlantic salmon and all watercourses within the main development Site drain into the Tarf Water, one of the SACs constituent catchment waters. The River Tarf is c.150 m from the nearest infrastructure at its closest point. Although the sensitivity of the watercourses is fully acknowledged, the precautions listed in **Section 8.6.1** (i.e. the pollution protection guidelines and measures outlined in the CEMP) will ensure the avoidance of any degradation of water quality and/or impacts on fish populations. For details on Habitats Regulations Appraisal (HRA) considerations, please see Section 8.6.2 and **Technical Appendix 8.6**.

129. The proposed Development is within the peripheral zone of a Biosphere Reserve (non-statutory designation). With sustainable economic and community development being actively promoted within this zone, the Biosphere Reserve has been scoped out of the assessment.

8.5.5.2 Potential GWDTEs

130. Areas of potential GWDTEs were initially defined in terms of their NVC community and cross-referenced with SEPA criteria (SEPA, 2017), although an NVC community being described as a potential GWDTE does not necessarily relate to ecological value, and as such GWDTE status has not been used to determine conservation importance in this assessment. However, **Paragraph 86** summarises the GWDTE assessment, but SEPA guidance requires an assessment of GWDTEs to be completed as part of an EIA report and this is described in full in **Section 7.5.2.1** of **Chapter 7: Hydrology, Hydrogeology, Geology and Soils**.

8.5.5.3 Habitats

131. The habitats present and their respective areas are presented in **Table 8.5**. Areas of estimated direct and indirect habitat loss anticipated to occur for all new infrastructure is presented in **Table 8.9**. An estimated total of 19.77ha of habitat would be directly lost due to the proposed Development. A further 8.73 ha would be subject to shading by the solar arrays.

132. Coniferous plantation woodland constitutes 12.5% of the study area, and felled plantation woodland an additional 3.2%. These habitats are considered to be of a low conservation value and would, therefore, not be subject to significant ecological effects by the proposed Development. A very small area (0.06 ha, 0.01% of the Study Area) of semi-natural broadleaved woodland is located at the outer edge of the survey buffer, towards the far western-reach of the Study Area. Although this wooded habitat may have some ecological value, it is distant enough from all proposed infrastructure to be outwith the EZoI and, therefore, not connected. As such, coniferous, felled and semi-natural broadleaved woodland are scoped out of the assessment.

133. Within the Study Area, marshy grassland habitats consist of both M23 and, on areas of shallower peat, M25 NVC communities. M23 is a rush-dominated community that tends to have low species richness and is considered to be generally of low ecological value. The M25 community is by far the most dominant community within the Study Area and is regularly found as a mosaic, with almost 12.5% of Study Area consisting of mosaics formed along with M25. The largest expanse of marshy grassland is found in the middle-south of the Study Area, west of High Eldrig, although the forest rides, located within the wider survey buffer (i.e. beyond the Tarf Water to the south and west of the Site), consist of marshy grassland habitat. After conifer plantation and wet modified bog, marshy grassland is the most wide-spread community within the Study Area. Approximately 7.61 ha of marshy grassland is expected to be lost (i.e. total direct and indirect loss) as a result of the proposed Development. Although M23 and M25 Marshy grassland is listed under the Dumfries and Galloway LBAP, it is considered to be of high abundance in the region and within the Study Area of a heavily modified nature and therefore, in the context of the proposed Development, considered to be of less than local value.

134. A number of habitats are identified as being of local importance at the Site due to their intrinsic value by aligning with Annex I or SBL priority habitat descriptions. However, as they consist of such small areas within the Study Area, any direct or indirect effects on the habitat are considered to be so minor or outwith the EZoI of the proposed Development footprint (please see habitat loss calculations in **Table 8.9**) that they are scoped out of this assessment. These habitats include acid grassland (U2, U6), acid and neutral flush (M6), dry modified bog (M19), wet dwarf shrub heath (M15), oligotrophic standing water (G1.3) and fen (M2/M6).

135. With the exception of M17 blanket mire, all other habitats that are considered to be of less than local/negligible ecological value and sensitivity have been scoped out of the assessment. These habitats include continuous/scattered bracken and bare ground.

8.5.5.4 Protected Species

136. **Section 8.6.1** describes the best practice and reasonable precautions that are proposed to be in place in order to safeguard protected species from significant effects as a result of the proposed Development. A Species Protection Plan (SPP) forms the primary mechanism by which this will be done and will be agreed with key consultees in advance of any construction works commencing.

137. Otter is scoped out of the assessment. Signs of otter activity were found only within the north western reach of the Study Area, with only two sprainting sites and a potential resting site, indicate that they are active in the area although they appear to only use the Site for limited commuting and foraging. All infrastructure is buffered from watercourses by a minimum of 50 m, with the exception of water-crossings. The additional measures ensured by the SPP (see **Section 8.6.1**), complimented by pre-construction surveys, will ensure the avoidance of any significant impacts on otter.

138. Water vole is scoped out of this assessment. Field signs of water vole were found along three of the watercourses within the Site during the surveys. However, all infrastructure is buffered from watercourses by a minimum of 50m, with the exception of water-crossings. The additional measures ensured by the SPP, complimented by pre-construction surveys, will ensure the avoidance of any significant impacts on water vole.

139. Badger is scoped out of the assessment. No badger sett is present within the Study Area and the only recorded evidence comprised a group of badger prints. As such badgers are thought to commute through the Site only occasionally. The additional measures ensured by the SPP (see **Section 8.6.1**), complimented by pre-construction surveys, will ensure the avoidance of any significant impacts on badgers.

140. Red squirrel is scoped out of the assessment. No field signs indicative of red squirrel were found within the Study Area. However, this species is active in the region and the habitat along the existing access track route through the Operational Kilgallioch Windfarm may support red squirrel. The additional measures ensured by the SPP (see **Section 8.6.1**), complimented by pre-construction surveys, will ensure the avoidance of any significant impacts on red squirrels.

141. Pine marten is scoped out of the assessment. No field signs indicative of were found. However, this species is active in the region and the habitat along the existing access track route through the Operational Kilgallioch Windfarm route may support pine marten. The additional measures ensured by the SPP (see **Section 8.6.1**), complimented by pre-construction surveys, will ensure the avoidance of any significant impacts on pine marten.

142. Reptiles are scoped out of the assessment. Incidental records were made of both common lizard and adder during the suite of surveys completed across the Site in 2019. The measures ensured by the SPP (see **Section 8.6.1**) and checks completed by the designated ECoW will ensure the avoidance of any impacts on reptiles and to protect any hibernaculum during the construction phase.

143. Amphibians are scoped out of the assessment. Habitats within the Study Area are unsuitable for great crested newt and they are therefore highly unlikely to occur within the local area.

144. Roosting bats are scoped out of the assessment. Bats were assessed as potentially using the dilapidated buildings and structures at High Eldrig for roosting (determined through both the potential roost assessment and static detector results). Trees with the potential for use by roosting bats were also identified near the barns at High Eldrig, but not elsewhere within the Study Area. High Eldrig is located approximately 450 m away from the nearest proposed turbine location and 150 m from other infrastructure, and therefore considered a sufficient distance to avoid significant impacts on any roosting bats.

145. Habitat loss effects on foraging/commuting bats are scoped out of the assessment. The Site is dominated with open ground habitats, of which the larger watercourse corridors and the woodland to the south of the Site boundary have the greatest value for foraging/commuting bats, whereas the habitat detected higher numbers of bat passes than those located throughout the remainder of the Study Area. The habitat that is expected to be lost to the proposed Development is considered to be of generally poor-quality foraging habitat for bats, with other more optimal conditions located adjacent to the Site. As such, any effects of habitat loss on foraging potential for bats is considered to have a negligible impact on local bat populations.

146. Based on SNH *et al.* (2019) guidance, brown long-eared bat and *Myotis* bats in Scotland are considered to be of low population vulnerability to windfarms, relating to their relative abundance and low collision risk. Activity rates of these species were low during baseline surveys. It is therefore considered that these species can be scoped out from the assessment as they are of low sensitivity.

147. Fish are scoped out of the assessment. The adjacent Tarf Water does support salmon, also forming the qualifying of the Bladnoch SAC. While watercourses within the main development Site drain into the Tarf Water, they do not support salmon, though trout and non-salmonid fish species were found to be present. The sensitivity of the watercourses is fully acknowledged, but the precautions listed in **Section 8.6.1** (i.e. the pollution protection guidelines and measures outlined in the CEMP) will ensure the avoidance of any degradation of water quality and/or impacts on fish populations.

8.5.6 Scoped in IEFs

148. The subsequent assessment of effects will be applied to IEFs considered to be of local, regional, national, and international Nature Conservation Value (**Table 8.12**) that are known to be present within the Site or surrounding area (as confirmed through survey results and consultations outlined above). These comprise Kirkcowan Flow SAC and SSSI, wet modified bog, blanket mire and bats.

IEF	Nature Conservation Value	Comments
Kirkcowan Flow SAC and SSSI	International	The Kirkcowan Flow site is situated immediately adjacent to the northern application boundary and existing farm track to High Eldrig farm steadings and is designated as a SAC and as an SSSI for supporting the Annex 1 habitat blanket bog. The SAC is also designated for its depressions on peat substrates of the *Rhynchosporion*. The depressions on peat substrates of the *Rhynchosporion* feature is currently assessed as being in favourable maintained condition (last assessment cycle took place in 2013). However, the blanket bog feature is currently assessed as "unfavourable declining" with four recorded pressures, as follows: • Invasive non-native species; • Over grazing; • Water management; and • Other (unlisted). Current management measures are in place in order to improve the feature condition back to a favourable status. These measures involve: • 70 peat dams installed over an 8 ha area; • Summer grazing (four months) of 60 cattle; • Clearing of Sitka spruce regeneration; and • All stock removed from the SAC area between November-December. As a Natura designated site, and given proximity to the proposed Development boundary, the Kirkcowan Flow SAC is considered to be of international value.
Wet modified bog	Local	The majority of the Study Area consists of wet modified bog (E1.7), formed predominantly of M25 and associated mosaics, located on wet, deeper peat (i.e. >0.5m deep), but also includes stands of M1, M2 and M15 communities, and locally grades into M17 and M19 blanket mire (see **Technical Appendix 8.1** and **Figures TA_8.1.2** and **TA_8.1.3**). Wet modified bog is a heavily modified habitat through anthropogenic means. The modified nature is exemplified by the historical farm buildings at High Eldrig (which are still used to house supplies and hardware for managing the livestock) and the wider area remains given over to grazing. The historical management of the Site for improving ground conditions and flora for livestock grazing is evident (as discussed in **Section 8.5.1.5, Habitat Descriptions**). Despite its heavily modified form, the extent of this habitat and its potential for recovery to SBL and Dumfries and Galloway LBAP quality bog habitat warrants a value considered to be of local value.
Blanket mire	Local	M17 and M19 blanket mire occupies some areas of deep peat. The vegetation is relatively uniform and has a modest range of species, likely as a result of the same degrading factors, notably draining, which have turned other areas to wet or dry modified bog. Although it is degraded and fragmented, the blanket bog aligns with SBL and Dumfries and Galloway LBAP priorities and is considered to be of local value.
Bats: *Nyctalus*, soprano pipistrelle and common pipistrelle	Council area for Leisler's bat. Local for noctule, soprano pipistrelle and common pipistrelle.	All bat species are protected under the Conservation (Natural Habitats &c.) Regulations 1994 (as amended), the Wildlife and Countryside Act 1981 (as amended) and the Nature Conservation (Scotland) Act 2004 (as amended). They are also SBL and Dumfries and Galloway LBAP priority species. SNH *et al.* (2019) (adapted from Wray *et al.* 2010) consider *Nyctalus* bats (either Leisler's bat, *Nyctalus leisleri*, or noctule, *Nyctalus noctula*) in Scotland to be of high risk to windfarms at the population level, because they are rare species and because individuals are at high risk of collision with turbines. In a recent review, Mathews *et al.* (2018) concluded that there was insufficient data to make a population estimate for *Nyctalus* species at the national level, although they estimated the Scottish population of Leisler's bat to number 6,100 adults. In a survey of high-risk bat species across southern Scotland, Newson *et al*. (2017) had also concluded that that the minimum population sizes of Leisler's bat and noctule for the whole of Scotland is in the thousands, most of which occur in the south. Earlier estimates had put the populations at 250 for each of noctule and Leisler's bat (Harris *et al.* 1995), although these were provided with poor reliability scores. The work by Newson *et al.* (2017) also found there was little overlap in the ranges of noctule and Leisler's bat, with a clear east-west split, and with Leisler's bat occurring in the west and noctule mainly in the east. Spatial modelling in the work suggested that between 16% and 24% of regional populations of high-risk species (including noctule and Leisler's bat as well as Nathusius' pipistrelle, *Pipistrellus nathusii*) in southern Scotland overlaps with existing and approved windfarms, with 50% of this overlap concentrated at 10% of the windfarms, indicating that there are very localised risk areas for these species. The spatial modelling also predicted the distribution of *Nyctalus* species to be mainly in the south western (Leisler's bat) and south eastern areas (noctule) of Dumfries and Galloway. The proposed Development is within the core area for Leisler's bat. As such, Leisler's bat is given a Council area value, with noctule given a local value. Soprano and common pipistrelles in Scotland are considered to be of medium population vulnerability to windfarms, because they are common species but individuals have a high risk of collision with turbines (SNH *et al.* 2019). The Scottish population of soprano pipistrelle is estimated to be 1,210,000 adults, whereas for common pipistrelle it is 875,000 adults (Mathews *et al.* 2018). The spatial modelling by Newson *et al.* (2017) predicted the distribution of pipistrelle species to be widespread in Dumfries and Galloway, but with soprano pipistrelle having noticeably greater levels of activity in lowland river valleys, and noticeably lower activity in upland areas. Both species are assigned a local value in the assessment. As roosting and foraging/commuting habitats are scoped out of the assessment, and following the SPP and best practice measures (as outlined in **Section 8.6.1**), only operation phase impacts are relevant in the assessment.

Table 8.8: Summary of IEFs Brought Forward in the Assessment

8.6 Assessment of Potential Effects

149. This section provides an assessment of the likely effects of the proposed Development on the IEFs identified through the baseline studies. The assessment of effects is based on the development description outlined in **Chapter 4: Development Description** and is structured as follows:

- construction effects;

- operational effects; and
- cumulative effects.

150. The consent being sought for the proposed Development is in perpetuity. However, in the event that the development was to be decommissioned in the future, the effects arising from decommissioning are considered to be the same or less significant than those arising from the construction phase.

8.6.1 Project Assumptions

151. In line with current CIEEM guidelines, the assessment of potential effects is carried out in the presence of any mitigation measures. The following good practice and mitigation measures will be applied to the project during construction to ensure that any effects on the IEFs are reduced:

- Design mitigation has included the following measures:
  - Existing tracks have been used where possible, in order to reduce the footprint of the proposed Development and to limit the number of watercourse crossings as far as practicable. Some localised upgrading may be required to ensure a minimum 5 m running width, with local widening on corners;
  - Any watercourse crossings will be designed to enable passage by fish, i.e. will avoid perched inverts that will be sufficiently large for fish passage and to avoid problems with flow rates being too fast for fish to swim against;
  - The presence of potential GWDTEs has informed the site layout, which has maximised distances to such features as far as possible (see above). Although the potential GWDTEs have been assessed as either being non-GWDTE or having a low dependency on groundwater, these surface-water dependent habitats still present a potential engineering constraint and some precautions will therefore be taken, which may include cross-drains or culverts to maintain hydrological connectivity;
  - Electrical infrastructure cabling will be installed alongside tracks, wherever possible, to further minimise habitat loss;
  - Turbines have been sited at least 50 m from standing water and watercourses; and
  - Turbines and infrastructure have also been sited to avoid areas of blanket bog or heath habitat as far as practicable and the design also sought to minimise the take of areas of potential GWDTEs, even though these have subsequently assessed as predominantly non-groundwater dependent.
- SPR will appoint a suitably qualified Ecological Clerk of Works (ECoW) prior to the commencement of any construction activities take place. The ECoW will be present and oversee all construction activities as well providing toolbox talks to all site personnel with regards to priority species and habitats, as well as undertaking monitoring works and briefings to relevant staff and contractors as appropriate.
- A Species Protect Plan (SPP) will be produced and agreed prior to construction commences and then implemented during the construction period. The SPP will detail measures to safeguard protected species known to be in the area and will include for pre-construction surveys for protected species (complimenting the seasonality of the construction start date) as well as ensuring the use of Best Practice measures during all construction activities (such as sensitive lighting, ramps exiting open excavations, etc.). The SPP will describe the process to be followed in the case that new protected species are recorded on site that will therefore also need to be protected during construction works, as well ensuring the implementation of effective toolbox talks to raise awareness of site personnel to sensitive ecological receptors on site.
- In order to prevent pollution of watercourses within the Site (with particulate matter or other pollutants such as fuel), best practice techniques will be employed. These are outlined in **Chapter 7: Hydrology, Hydrogeology, Geology and Soils** and will include:
  - For water crossings: buffer strips around sections of track adjacent to watercourse crossings; and bund and embankment features to be implemented;
  - For tracks: camber in track design; trackside drains, e.g. infiltration trenches with check dams; routine maintenance of tracks; cross drains at regular intervals along access tracks; and check dams will be installed immediately above cross drain inlets; and
  - General drainage: no direct discharges of water from works areas to existing drainage channels or surface watercourses; drainage will be directed to infiltration trenches, settlement swales or lagoons.
- Full details of construction mitigation measures will be provided in a Construction Environment Management Plan (CEMP) to be agreed with DGC, in consultation with SNH and SEPA, post-consent but prior to development commencing.

8.6.2 Habitats Regulations Appraisal (HRA)

152. Given the proposed Development's proximity to both the Kirkcowan Flow and River Bladnoch SACs, a Habitats Regulations Appraisal (HRA) will be required to ensure that the integrity of the Natura sites will be maintained in the event that the proposed Development were to proceed. Consideration of HRA implications and the potential for adverse effects on qualifying features are considered to be necessary to identify the nature, extent and significance of any adverse effects and, if found, whether these are likely to impact the integrity of a Natura designated site.

153. A shadow HRA is presented in full in **Technical Appendix 8.6**, where the two Stages of the HRA process are mirrored to help inform the competent authority; Stage 1: screening for Likely Significant Effects (LSE), and Stage 2: Appropriate Assessment (AA) where it is assessed whether there are to be adverse impacts on the integrity of a Natura site. Please refer to **Technical Appendix 8.6**, as a standalone document, for the shadow HRA and AA.

8.6.3 Potential Construction Effects

154. This section provides an assessment of the likely effects of construction of the proposed Development upon the scoped-in IEFs.

8.6.3.1 Kirkcowan Flow SAC and SSSI

155. Impact: The footprint of the proposed Development does not overlap with the Kirkcowan Flow SAC and there will therefore not be any direct impacts on the SAC's features. However, there is potential for indirect negative changes to the hydrological regime of the qualifying features, blanket mire and depressions on peat substrates, both of which require constant moisture. Drying of the underlying peat body, e.g. as a result of dewatering turbine excavations or from trackside drainage, can lead to an associated change in the blanket mire vegetation, both in terms of structure and species composition. Reduced moisture within peat depressions, especially during periods of little rainfall, could prevent the establishment of the pioneer and heliophilous *Rhynchosporion* vegetation on the exposed peat surfaces.

156. Feature Value and Status: As per **Table 8.8**: Summary of IEFs Brought Forward in the Assessment, Natura sites have international value. The status of the qualifying features are currently assessed as 'unfavourable declining' for blanket bog, but 'favourable maintained' for depressions on peat substrates.

157. Magnitude: The SAC and SSSI cover an area of circa 777 ha. However, the vast majority of this is beyond the zone of potential hydrological influence of the proposed Development. In line with the carbon calculator, drying impacts in peat are likely only within a zone of c.10 m. As the Site boundary bounds with approximately 5 km of the SAC/SSSI, the zone of potential hydrological influence of the proposed Development is c. 5 ha.

158. The proposed Development is set back from the Site boundary by at least 50 m, with the exception of the borrow pit exploration area 2 to the southeast of the Site which is located to the south of the existing track and drainage ditches separating the SAC and therefore not connected. There will therefore be no impact on the designated qualifying features.

159. Significance of Effect: Given the above consideration of sensitivity and magnitude, the effect significance is considered to be **Negligible** and **Not Significant** under the EIA Regulations.

8.6.3.2 Habitats

160. Negative impacts on habitats may include direct losses, e.g. permanent land-take for turbine foundations and other infrastructure, temporary land-take for construction site compounds, as well as temporary disturbance of habitats within and adjacent to work areas. Negative impacts on habitats can also be indirect, e.g. through changed hydrological conditions, disrupted grazing levels and habitat fragmentation.

161. The main negative effect during the construction stage of the proposed Development will be direct habitat loss due to the construction of the turbines and associated tracks, hard-standings, laydown areas, compounds, substation and borrow pits. Much of this infrastructure will be permanent, although the temporary construction compound and borrow pits will be restored at the end of the construction period. Despite the restoration, and taking a precautionary approach, it is assumed for the assessment that the areas of land-take for infrastructure also represent permanent losses of habitat due to the complexities in re-creating habitat types such as blanket bog which rely on a constant water table being achieved.

162. The installation and operation of solar photovoltaic modules is likely to comprise both direct and indirect impacts, the effects of which are difficult to quantify. For example, some habitat will be permanently lost to support structures and shade, whereas some vegetation may persist between and under the edges of panels but undergo some

change as a result of partial shading. Taking a precautionary approach, it is assumed that all habitat under the footprint of the panels will be permanently lost during the construction and operation phases.

163. For the purposes of this assessment it is assumed that wetland habitat losses due to indirect drainage effects may extend out to 10 m from infrastructure (i.e. in keeping with indirect drainage assumptions within the carbon calculator). It is expected that any indirect drainage effects would only impact wetland habitats at the Site, including wet modified bog, blanket bog, wet heath, flushes and marshy grassland. Although there may be some construction disturbance experienced by the surrounding drier habitats, such habitats are expected to recover in the short terms and, as such, no indirect drainage effects are expected to impact or alter the quality or composition of dry habitats.

Phase 1 Habitat	NVC Community or Habitat Types Lost	Total Phase 1 Extent (ha)	Direct Habitat Loss (ha)	Direct Habitat Loss as a % of Phase 1 type	Area of Direct & Indirect Habitat Loss (ha)	% of Direct & Indirect Habitat Loss
A1.2.2 Coniferous woodland - plantation	-	98.82	0.23	0.23	As per direct loss	
A4.2 Felled plantation woodland	-	25.62	0.31	1.20	As per direct loss	
B1.2 Acid grassland – improved / semi-improved	U4, U6	36.85	0.73	1.99	As per direct loss	
B5 Marsh / marshy grassland	M23, M25	90.58	5.29	5.84	7.61	8.40
C1.1 / C1.2 Bracken: continuous / scattered	U20	35.25	1.98	5.62	As per direct loss	
D2 Wet dwarf shrub heath	M15	1.98	0.03	1.34	0.12	5.85
E1.6.1 Blanket bog	M17, M19	58.49	0.27	0.46	1.20	2.06
E1.7 Wet modified bog	M1, M2, M15, M17, M25	422.35	10.49	2.48	26.88	6.36
E1.8 Dry modified bog	M19	4.88	0.17	3.50	0.61	12.45
E2.1 Flush and spring – acid and neutral	M6	8.28	0.21	2.57	0.66	7.99
J4 Bare ground	-	2.86	0.01	0.47	As per direct loss	

Table 8.9: Estimated loss of habitat from proposed Development infrastructure

Phase 1 Habitat	NVC Community or Habitat Types Lost	Total Phase 1 Extent (ha)	Habitat under Solar Arrays (ha)	Habitat under Solar Arrays as a % of Phase 1 Extent
B1.2 Acid grassland – improved / semi-improved	U4, U20	36.85	0.47	1.29
B5 Marsh / marshy grassland (and mosaics)	M25, M6, U4 and U20	90.58	0.16	0.18
D2 Wet dwarf shrub heath (and mosaics)	M15 and M25	1.98	0.66	33.10
E1.6.1 Blanket bog	M17	58.49	<0.01	<0.01
E1.7 Wet modified bog	M15, M17, M25	422.35	7.11	1.68
E1.8 Dry modified bog	M19	4.88	0.33	6.67

Table 8.10: Estimated loss/shading of habitat from solar arrays

164. The following sections assess the effect of these losses for each habitat IEF scoped-in:

Wet modified bog

165. Impact: Both direct and indirect negative effects on wet modified bog are likely from construction phase impacts. There will be a direct loss of habitat during construction of the proposed Development and indirect losses (through potential drying effect upon neighbouring bog habitats occurring in the construction period and into the operational period).

166. Nature Conservation Value and Conservation Status: As per **Table 8.8**, wet modified bog within the Study Area represents degraded blanket mire and is considered to be of no more than local value. In the 3rd UK Habitats Directive Report (JNCC, 2013) the conservation status of blanket bog status is listed as 'Bad' and 'Declining' at the UK level. The corresponding Scottish report (SNH 2013) does not include an assessment specifically for Scotland.

167. Magnitude: Scotland has an estimated 1,759,000 ha of blanket bog (SNH 2013). Wet modified bog accounts for 422.35 ha of the Study Area, and most of this is comprised of M25 mire.

168. A total of 10.49 ha will be directly lost to proposed Development infrastructure (**Table 8.9**), with a further 7.11 ha being lost to the solar arrays (**Table 8.10**). Direct habitat loss due to permanent infrastructure is therefore predicted to be at most 4.17% of the wet modified bog within the Study Area. The direct loss of this degraded habitat is of a small extent in the local context. In addition to direct loss, there may be some indirect loss because of the zone of drainage around infrastructure. If, as a worst-case scenario, indirect drainage impacts were fully realised out to 10 m in all wet modified bog areas, this would result in an additional 16.39 ha, thus increasing the predicted loss to 33.99 ha or 8.05% of the habitat within the Study Area. The distance of the impacts of drainage is very variable and depends on various factors, such as the type of peatland, its characteristics and properties of the peat, the type, size distribution and frequency of drainage features, and whether the drainage affects the acrotelm only or also penetrates the catotelm. As such, drainage impacts can be restricted to just a few metres around drains or extend out to tens of metres or more (Landry & Rochefort, 2012). However, as a general rule, the dewatering and increased flow (i.e. loss of water) of a drained peatland is inversely proportional to the space between the ditches (Landry & Rochefort, 2012), and in the context of drainage impacts from a windfarm development, it is appropriate to consider single drains rather than whole networks of drains, which are more typical in situations where the objective is a systematic lowering of the water table to improve the land, e.g. for grazing or afforestation. In a study at Moor House-Upper Teesdale National Nature Reserve, County Durham, Coulson *et al.* (1991) concluded that the greatest effect of drainage is desiccation and would occur immediately downslope of a drain, but there was no measurable change beyond a 5 m distance in the composition of the flora relative to the position of the ditch. In addition, hydraulic conductivity is a key variable; in general, less decomposed, more fibrous peat, such as is commonly found in fen type habitats, generally have a higher hydraulic conductivity and drainage impacts can extend out to tens of metres, whereas more decomposed peat drainage impacts may only extend to a few metres (around 2 m). Modified and degraded bog habitats, such as the type found at the proposed Development, are commonly characterised by highly decomposed peats (Nayak *et al.* 2008) and indirect impacts are therefore unlikely to extend beyond around 2 m. This is likely to reduce the likely indirect impacts from 16.39 ha to 3.28 ha. Moreover, the adoption of standard good practice and environmental management techniques, as well as an appropriate and considered drainage design, will further minimise the risk of significant drainage impacts.

169. As such, when considering the likely direct and indirect habitat losses (using the likely reduced indirect loss, giving a total area loss of 20.88 ha), the magnitude of impact within a local or regional context is considered to be **Medium Spatial** and **Long-term Temporal**.

170. Significance of Effect: Given the above consideration of sensitivity and magnitude, the effect significance is considered to be **Medium** and **Significant** under the terms of the EIA Regulations.

Blanket mire

171. Impact: Both direct and indirect negative effects are likely on blanket bog during the construction phase. Similar to the assessment for wet modified bog, there will be a direct loss of habitat during construction of the proposed Development and indirect losses (through potential drying effect upon neighbouring bog habitats occurring from the construction period into the operational period).

172. Nature Conservation Value and Conservation Status: As per **Table 8.8**, blanket mire within the Study Area is relatively uniform and has a modest range of species, likely as a result of the same degrading factors, notably draining, which have turned other areas to wet or dry modified bog. As such it is considered to have no more than local value. In the 3rd UK Habitats Directive Report (JNCC, 2013) the conservation status of blanket bog status is listed as 'Bad' and 'Declining' at the UK level. The corresponding Scottish report (SNH 2013) does not include an assessment specifically for Scotland.

173. Magnitude: Scotland has an estimated 1,759,000 ha of blanket bog (SNH 2013). Blanket mire accounts for 58.49 ha of the Study Area, comprising M17 and M19 mire.

174. A total of 0.27 ha will be directly lost to proposed Development infrastructure (**Table 8.9**), with less than 0.01 ha being lost to solar arrays (**Table 8.10**). Direct habitat loss due to permanent infrastructure is therefore predicted to be at most 0.46% of the blanket mire within the Study Area. This direct loss is of a small extent in the local and regional context. In addition to direct loss, there may be indirect losses associated with the zone of drainage around infrastructure. If, as a worst-case scenario, indirect drainage impacts were fully realised out to 10 m in all areas of blanket mire, this would result in an additional loss of 0.93 ha blanket mire, thus increasing the predicted loss to 1.20 ha or 2.06% of the habitat within the Study Area. However, as described for modified bog above, indirect impacts are unlikely to extend beyond around 2 m. This is likely to reduce the likely indirect impacts from 0.93 ha to 0.19 ha. The adoption of standard good practice and environmental management techniques, as well as an appropriate and considered drainage design, will further reduce the risk of impacts.

175. When considering the likely direct and indirect habitat losses (total area of 1.20 ha), the magnitude of impact within a local or regional context is considered to be **Negligible Spatial** and **Long-term Temporal**.

176. Significance of Effect: Given the above consideration of sensitivity and magnitude, the effect significance is considered to be **Negligible** and **Not Significant** under the terms of the EIA Regulations.

8.6.4 Proposed Mitigation and Compensation

177. No specific mitigation is proposed during construction beyond the standard in-built mitigation (50 m watercourse buffer) and adoption of good practice as detailed in the project assumptions above (**see Section 8.6.1**). Furthermore, an ECoW would advise on micro-siting requirements to ensure impacts on modified bog and blanket mire are reduced further where possible.

178. A Habitat Management Plan (HMP) will be implemented during the construction and operation phases that will focus on restoration of wet modified bog through the blocking of drains in areas where historical drainage channels are more concentrated. The HMP is outlined in **Technical Appendix 8.7** and includes for two separate areas (defined as Unit 1, covering 33 ha, and Unit 2, 19.3 ha) identified through field visits as consisting of poor quality wet modified bog habitat primarily as a result of historical drainage practices. Map 3 of Technical Appendix 8.7 presents the habitat management area (HMA) and associated drains within each HMP Unit. The blocking of such historical drainage channels (using "wave dams") has been proven to benefit from positive management to improve the quality of bog habitats and has been used by the SNH Peatland ACTION project on several peat restoration programmes. Both HMP units are located within the adjacent Kirkcowan Flow SAC rather than within the Site as the restoration and improvement of modified bog within the context of the SAC is considered to have a more significant net benefit within the context of the more expansive SAC-associated habitats as opposed to restoring an overall smaller area of similar habitat within the Site boundary. The aims of the HMP are summarised as:

- Aim 1: Restore Conditions of Modified Blanket Bog; and
- Aim 2: Improve Quality of Modified Blanket Bog Habitat.

179. The measures to be implemented include the blocking or damming of approx. 31 km of historical drains and conifer removal. Monitoring is also proposed by way of establishing whether the objectives of the HMP are being obtained. Proposed monitoring includes for the establishment of a minimum of 30 permanent quadrats within modified bog in the HMP Units, totalling approx. 52 ha, with a combination of vegetative, substrate and water level (through permanent dipwell installations at each quadrat) data being recorded across defined years following the construction phase. The peatland restoration works undertaken as part of the proposed Development are expected to have a positive impact on the overall site condition of the SAC and SSSI through the restoration of degraded and modified bog to active bog. Please refer to **Technical Appendix 8.7** for further details on the HMP, monitoring methodology.

8.6.5 Residual Construction Effects

8.6.5.1 Kirkcowan Flow SAC and SSSI

180. Effects on Kirkcowan Flow SAC and SSSI during construction are considered to be of **Negligible** and **Not Significant** magnitude. Although no unmitigated significant effects are predicted for the features, the inclusion of standard in-built mitigation and adoption of good practice, as detailed in the project assumptions above (see **Section 8.6.1**), will further reduce the risk of any adverse effects. Effects therefore remain **Negligible** and **Not Significant** under the terms of the EIA Regulations

8.6.5.2 Habitats

181. Effects on wet modified bog during construction are considered to be of **Medium Spatial** and **Long-term Temporal** magnitude. The inclusion of standard in-built mitigation and adoption of good practice, as detailed in the project assumptions above (see **Section 8.6.1**), will limit the risk of adverse effects. However, an HMP will be implemented to compensative for impacts on wet modified bog through habitat restoration within the adjacent Kirkcowan Flow

SAC that will significantly compensate for the predicted impacts. Please refer to **Technical Appendix 8.7** for specific details on the HMP. Following this, effects will be **Negligible** and **Not Significant** under the terms of the EIA Regulations.

182. Effects on blanket mire during construction are considered to be of **Negligible Spatial** and **Long-term Temporal** magnitude. Although no unmitigated significant effects are predicted for blanket mire habitat, the inclusion of standard in-built mitigation and adoption of good practice, as detailed in the project assumptions above (see **Section 8.6.1**), will further reduce the risk of any adverse effects. Effects therefore remain **Negligible** and **Not Significant** under the terms of the EIA Regulations.

8.6.6 Summary

183. **Table 8.11** below summarises the significance of construction effects on wet modified bog and blanket mire and the residual significance after mitigation measures are considered.

Predicted Construction Effect	Significance	Mitigation and Compensation	Significance of Residual Construction Effect
Drying of designated peatland - Kircowan Flow SAC and SSSI	Negligible	None other than standard in-built mitigation and adoption of good practice	Negligible
Habitat loss - Wet modified bog	Medium	Standard in-built mitigation and adoption of good practice. Habitat Management Plan to improve the condition of 52 ha of wet modified bog.	Negligible (Low beneficial)
Habitat loss - Blanket mire	Negligible	None other than standard in-built mitigation and adoption of good practice	Negligible

Table 8.11: Summary of predicted construction effects

8.6.7 Potential Operational Effects

184. This section provides an assessment of the likely effects during operation of the proposed Development upon the scoped-in IEFs.

8.6.7.1 Kirkcowan Flow SAC and SSSI

185. All potential effects on blanket bog and depressions on peat substrates within Kirkcowan Flow SAC and SSSI are considered in the construction effects section above. Any effects from drainage would commence when drains are first installed during the construction phase and then continue during the operation phase; the moment when any effects might start to be measurable within the SAC and SSSI could be during the operational phase. However, for completeness and ease of assessing impacts, they are considered together in the construction effects section. No additional negative impacts on the designated site are predicted during the operational phase, and following the proposed management measures within the SAC, as described in the HMP (see **Technical Appendix 8.7**), there are positive impacts anticipated through the improvement of habitat condition.

8.6.7.2 Habitats

186. All likely direct and indirect effects on wet modified bog and blanket mire have also been considered in the construction effects section above. Indirect habitat losses from drying of peat will commence when drains are first installed during the construction phase and then continue during the operation phase; the moment when vegetation change and drying impacts may become measurable is difficult to predict but may be delayed and therefore not occur until the operational phase. However, for completeness and ease of assessing impacts, they are considered together in the construction effects section. No further negative impacts on wet modified bog and blanket mire are predicted during the operational phase. However, an improvement is predicted in the quality of approx. 52 ha of wet modified bog during the operational phase is associated with the restoration of habitat to blanket mire within the proposed HMP Units.

8.6.7.3 Bats

187. Impact: During the operational phase, there is a potential for bats to collide with turbine blades or to suffer 'barotrauma' when flying in close proximity to rotors. For the purposes of this assessment, impacts from barotrauma are assumed to be the same as for collision risk, owing to the paucity of published empirical evidence in causes of bat fatalities around windfarms and the difficulties in determining whether bat fatalities are caused by collisions or barotrauma.

188. Findings of a study completed by Exeter University (DEFRA, 2016) found that most UK onshore windfarm bat fatalities consisted of common pipistrelle, soprano pipistrelle and noctule bats. The findings indicated that collision rates were proportionately higher than the calls recorded during ground-level, static detector surveys, but numbers were more affiliated to the recordings made at turbine hubs. Other findings of the study concluded that the risk presented to bats from onshore windfarms increased with the number of turbines as well as increased rotor size. Conversely, the hub height and the operational period of a given windfarm were not found to be significant in terms of the collision risk presented to bats from onshore windfarms.

189. As the proposed turbines have a tip height exceeding 150 m they are required to be equipped with aviation lighting, pursuant to Article 222 of the UK Air Navigation Order (ANO), 2016. Please see **Chapter 4: Development Description** and **Chapter 14: Other Issues** for more details on the aviation lighting specifications required. The lighting would be mounted on the hub of each turbine.

190. Voigt *et al.* (2018) presented recent evidence indicating that migratory pipistrelle bats may be attracted to red lights, which, the authors claim, may potentially lead to an increased risk of collision with wind turbines. It was noted in the paper, however, that bats were recorded as being attracted to red LED lighting but did note a lack of foraging activity once closer to the light source, indicating that the attraction of migratory bats to red light sources was not caused by foraging and was more likely a positive photoaxis response (Voigt *et al.* 2018). There is only a vague understanding of the migratory behaviour of bats in the UK, but the baseline study results (**Technical Appendix 8.3**) suggest that no significant migratory movements were likely to have occurred within the study area, and the potential for increased risk of turbine collisions associated with foraging bats being attracted to red lights is considered to be low.

Nyctalus Species

191. Nature Conservation Value and Conservation Status: *Nyctalus* species are considered to be of Council Nature Conservation Value (see **Table 8.8**). Following SNH *et al.* (2019), *Nyctalus* species are considered to be some of the rarest species with the highest collision risk and, therefore, have a high level of potential vulnerability within a Scottish context.

192. Magnitude: SNH *et al.* (2019) recommends a two-stage process to enable the assessment of potential risk to bats presented by an onshore windfarm development. Stage 1 considers potential risk through consideration of the habitats within a site and development-related features (i.e. size and number of turbines). Stage 2 is then undertaken by completing an overall assessment of risk is then informed by considering the results in relation to the bat activity output from the Ecobat software tool (or equivalent analysis tool) while also taking into account the relative vulnerability of individual species of bat at the population level.

193. Following the initial scoping visit and habitat assessment, the Site was assessed as having Low habitat risk, as there are no potential roost features within the Site, the foraging habitat is of low quality and there are no prominent linear features connecting the Site with the wider landscape. Due to the size and number of proposed turbines, the project size has been assessed as medium. As such, following SNH *et al.* (2019), the site risk level has been assessed as low (out of five categories: lowest, low, medium, high and highest).

194. The SNH *et al.* (2019) guidance recommends Stage 2 is followed by using the Ecobat software analysis tool to categorise the recorded activity levels by each deployment season. As discussed in the limitations section (**Section 8.4.9**), significant issues were experienced with the Ecobat software, in terms of misallocation of data (i.e. the loss of 2.4% of data from the analysis), the exclusion of periods where no bats were recorded in to the activity output (i.e. exclusion of 53.5% of deployment time with no recorded activity, or 230 nights where no bat passes were recorded compared to 200 nights with confirmed passes) resulting in a heavily skewed assessment of activity levels for the Site.

195. The impact assessment was completed as per the SNH *et al.* (2019) guidance, which provide an overall risk for median and maximum bat activity by multiplying site risk with Ecobat activity category. The outputs, which were limited as per the above, placed maximum risk for all scoped in bat species as medium at all detector locations except for one, and during all survey months. The median risk was more variable, although for each species there was medium risk when the whole site was analysed. Following the Ecobat software analysis, generally the risk at detector locations in open habitats (D2, D3, D4, D5 and D6) was low, whereas risk at detectors closer to features of bat interest was higher (D8, D9 and D10).

196. As subsequent Site layouts progressed, detectors D7, D8, D10 and D11 were located away from turbine locations (630 m, 355 m, 1.1 km and 1.9 km, respectively) along features of interest to bats (riparian corridors, woodland edges, etc.). Given the homogenous and open nature of the remaining Site and where turbines are to be located, the remaining detectors are considered to provide an adequate representation of bat activity levels across the proposed Development area as a whole and, therefore, indicating that there is a low risk presented to bats given the open nature surrounding all proposed turbine locations.

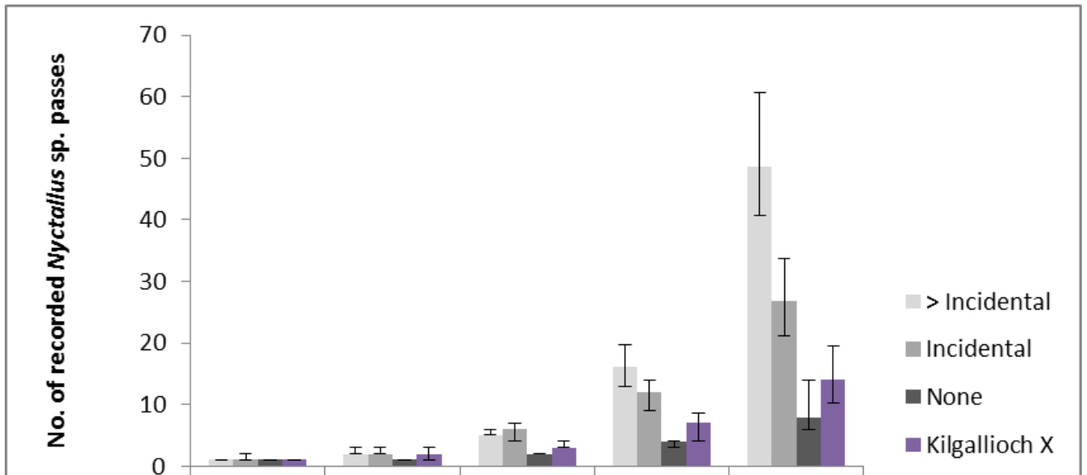
SPR Data Comparison

197. In order to have a more representative assessment of the potential risk presented to bats, a comparative assessment of activity levels was undertaken using data from windfarm monitoring projects in the wider area (for full details, please refer to **Technical Appendix 8.3**). SottishPower Renewables (SPR) have provided data to allow for a comparison of bat activity at the Site to data collected from operational projects within the same region (i.e. south west Scotland) which have a known rate of bat fatalities. SPR has conducted detailed acoustic and fatality monitoring at 10 operational windfarms and acoustic monitoring aligned to the current windfarm guidance (SNH, 2019a) at three development phase projects. This combined data set comprised data collected at 71 unique locations with static bat detectors deployed for a total of 1,710 nights, providing a total sample size of 9,367 detector nights of bat activity. Of these, 7,269 samples are from nine projects in south west Scotland and were used for the comparison analysis with the data obtained in relation to the proposed Development.

198. Carcass surveys have been undertaken at all 10 of the SPR operational windfarms using methods consistent with the DEFRA study (Mathews *et al.*, 2016). Of these, six were found to have zero bat fatalities, two had an incidental rate of fatality (considered to be less than two bat fatalities/turbine/year) and two had fatality rates greater than incidental (considered to be more than two bat fatalities/turbine/year).

199. That dataset can be used as 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 (confirmed through bat fatality monitoring following developments being commissioned, as described above). Due to a non-normal distribution of data, percentiles of bat activity (presented as number of bat passes, by species/species group) are used to ensure that distributional assumptions are not associated with the data comparison. By comparing the number of bat passes registered during baseline studies across the nine comparison sites with known levels of operational bat fatalities (i.e. none, incidental or >incidental), the level of activity recorded at the proposed Development can be assessed and categorised in terms of the potential risk for collision in terms of the baseline activity (or number of bat passes).

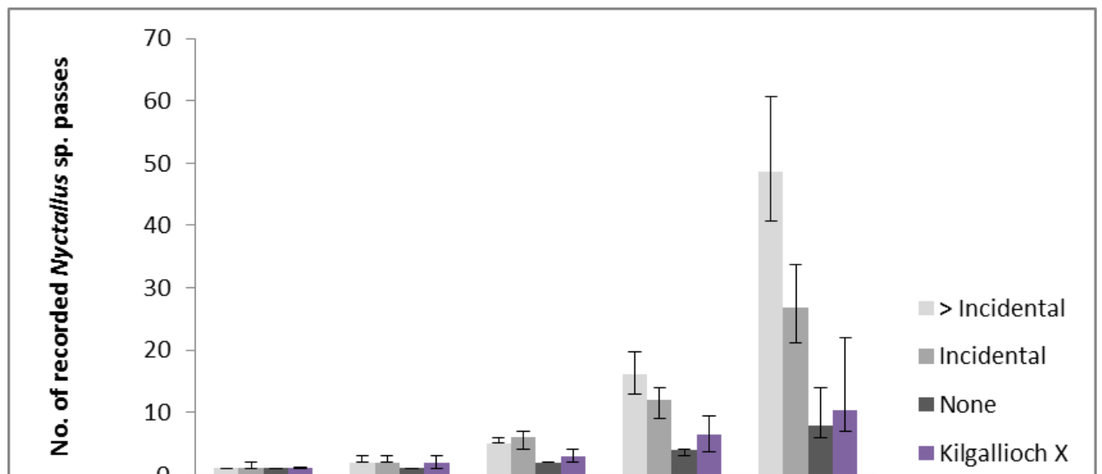
200. **Graph 8.1** shows the number of *Nyctalus* species bat passes per location per night at different percentiles, using all detectors deployed (D1 to D11) across the Site (data defined as “Kilgallioch X”), compared to the same values derived from the other operational SPR development projects with different categories of bat fatality used as a reference for comparison. For *Nyctalus* species, across all locations monitored, it can be seen that those monitored windfarms found to have no bat fatalities had 7.95 bat passes recorded. Of those Sites found to have an incidental fatality rate (i.e. <2 bat fatalities per turbine per year) had 26.75 recorded bat passes. From these data it is expected that the bat activity at the proposed Development (14) will generate a fatality rate between zero and incidental as the activity level falls between these two benchmarks at each percentile.



	20%	40%	60%	80%	95%
> Incidental	1	2	5	16	48.7
Incidental	1	2	6	12	26.75
None	1	1	2	4	7.95
Kilgallioch X	1	2	3	7	14

Graph 8.1: Number of *Nyctalus* species bat passes per night per location at different percentiles, for all detector locations, compared to operational projects with a known category of bat fatality. Error bars are 95% CIs derived using bootstrap methods due to non-normal distribution of the datasets.

201. **Graph 8.2** presents the number of *Nyctalus* species bat passes per location per night for locations D1 to D6 (data for the Site defined as “Kilgallioch X”) only at different percentiles compared to the same values derived from operational projects with different categories of bat fatality. This indicates that removing the activity recorded at locations where turbines will not be sited (i.e. D7 to D11) lowers the number of bat passes and the fatality rate generated remains between zero and incidental at each percentile.



	20%	40%	60%	80%	95%
> Incidental	1	2	5	16	48.7
Incidental	1	2	6	12	26.75
None	1	1	2	4	7.95
Kilgallioch X	1	2	3	6.4	10.4

Graph 8.2: Locations D1 to D6 only: Number of *Nyctalus* species bat passes per night per location at different percentiles compared to operational projects with a known category of bat fatality. Error bars are 95% CIs derived using bootstrap methods due to non-normal distribution of the datasets.

202. Following the assessment above, the overall collision risk presented by the proposed Development to *Nyctalus* bats based on recorded activity was therefore determined to be **Low**.

203. When the Site risk level (Low) is combined with the activity level category (Low) and collision risk category (Low), the overall risk for *Nyctalus* species is considered to be **Low**.

Species	Site risk	Activity level	Collision risk	Overall risk
Nyctalus species	Low	Low	Low	Low

Table 8.12: Risk summary table for *Nyctalus* species

207. Based on the above consideration of Site risk, activity level and collision risk for *Nyctalus* spp., the magnitude of impact is assessed as **Low spatial** and **Long-term temporal**.

208. Significance of Effect: Given the consideration of sensitivity and magnitude, the effect significance of collision risk on *Nyctalus* bats is considered to be **Negligible** and **Not Significant** under the terms of the EIA Regulations.

Common and Soprano Pipistrelle

209. Nature Conservation Value and Conservation Status: Pipistrelle bats were determined to be of local Nature Conservation Value (see **Table 8.8**), with a likely stable conservation status at a regional and Scotland-wide level.

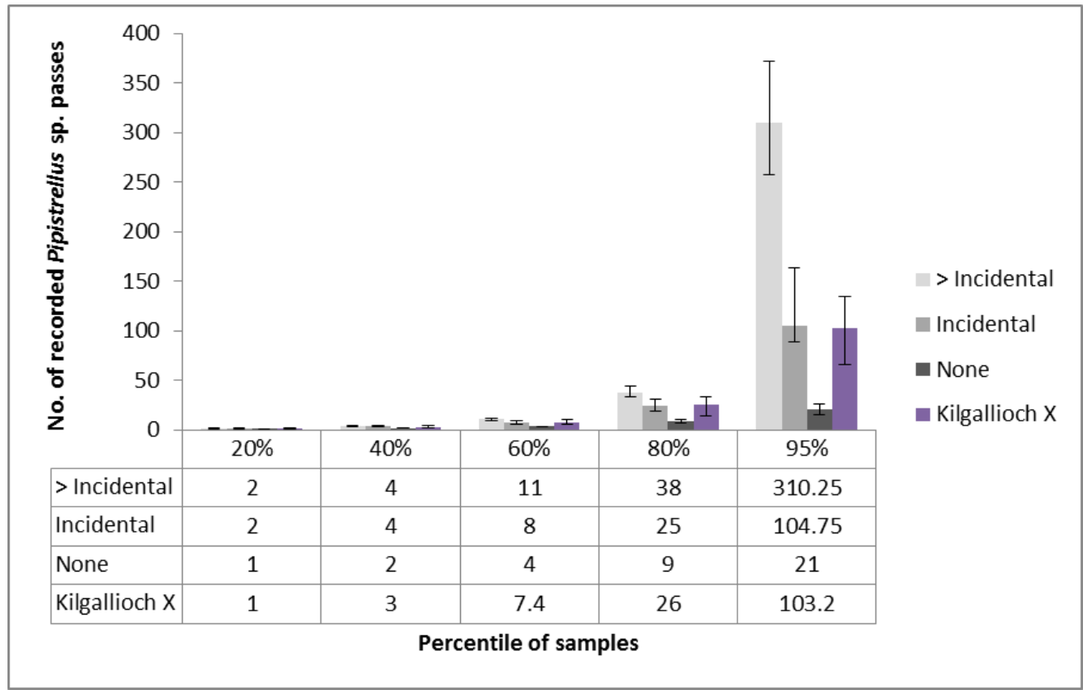
210. Magnitude: SNH *et al.* (2019) recommends a two-stage process to enable the assessment of potential risk to bats presented by an onshore windfarm development. Stage 1 considers potential risk through consideration of the habitats within a site and development-related features (i.e. size and number of turbines). Stage 2 is then undertaken by completing an overall assessment of risk is then informed by considering the results in relation to the bat activity output from the Ecobat software tool (or equivalent analysis tool) while also taking into account the relative vulnerability of individual species of bat at the population level.

211. Following the initial Site scoping visit and habitat assessment, the Site was assessed as having Low habitat risk. As such, following SNH *et al.* (2019), the site risk level has been assessed as Low.

212. As per the consideration for *Nyctalus* species, in order to have a more representative assessment of the potential risk presented to bats, a comparative assessment of activity levels was undertaken using data from windfarm monitoring projects in the wider area (see **Technical Appendix 8.3**). SPR provided data allowing for a comparison of bat activity at the Site to data collected from other operational projects within the same region (i.e. south west Scotland) which have a known rate of bat fatalities.

213. That dataset can be used as 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.

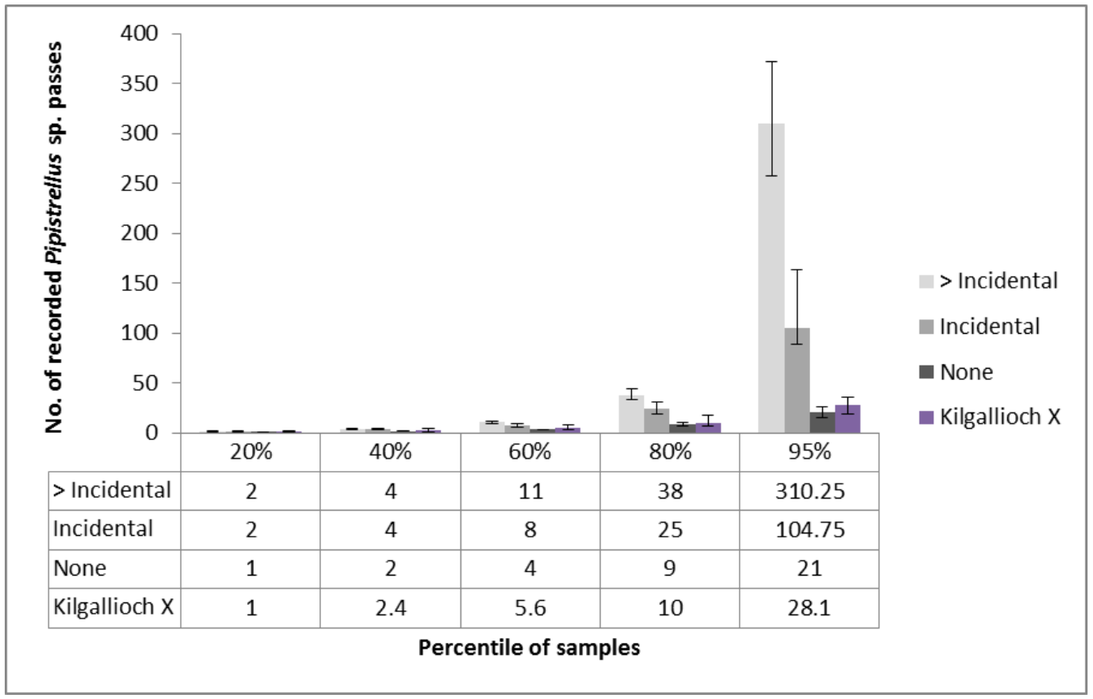
214. **Graph 8.3** shows the number of pipistrelle bat passes (soprano and common pipistrelle combined) per location per night at different percentiles, using all detectors deployed (D1 to D11) (data for the Site defined as “Kilgallioch X”), compared to the same values derived from operational projects with different categories of bat fatality. From these data it is seen that the bat activity at the proposed Development may generate a fatality rate between zero and incidental as the activity level falls between these two benchmarks at four of the five percentiles. At the 80th percentile the fatality rate is between incidental and greater than incidental.



	20%	40%	60%	80%	95%
> Incidental	2	4	11	38	310.25
Incidental	2	4	8	25	104.75
None	1	2	4	9	21
Kilgallioch X	1	3	7.4	26	103.2

Graph 8.3: Number of pipistrelle (common and soprano, combined) bat passes per night per location at different percentiles, for all detector locations, compared to operational projects with a known category of bat fatality. Error bars are 95% CIs derived using bootstrap methods due to non-normal distribution of the datasets.

215. **Graph 8.4** shows, for locations D1 to D6 only, the number of pipistrelle bat passes (soprano and common pipistrelle combined) per location per night at different percentiles (data for the Site defined as “Kilgallioch X”) compared to the same values derived from operational projects with different categories of bat fatality. It can be seen that removing the activity recorded at locations where turbines will not be sited (i.e. D7 to D11) lowers the number of bat passes greatly and the potential fatality rate generated reduces to between zero and incidental at each percentile.



	20%	40%	60%	80%	95%
> Incidental	2	4	11	38	310.25
Incidental	2	4	8	25	104.75
None	1	2	4	9	21
Kilgallioch X	1	2.4	5.6	10	28.1

Graph 8.4: At Locations D1 to D6 only: Number of pipistrelle bat passes per night per location at different percentiles compared to operational projects with a known category of bat fatality. Error bars are 95% CIs derived using bootstrap methods due to non-normal distribution of the datasets.

216. When the Site risk level (Low) is combined with the activity level category (Low) and the collision risk category (Low), the overall risk for common and soprano pipistrelle is considered to be **Low**.

Species	Site risk	Activity level	Collision risk	Overall risk
Soprano pipistrelles	Low	Low	Low	Low
Common pipistrelle	Low	Low	Low	Low

Table 8.13: Risk summary table for soprano and common pipistrelle

217. The spatial and temporal magnitudes of impacts on the populations of both common and soprano pipistrelle species across the Site are therefore considered to be **Low Spatial** and **Long-term temporal**.

218. Significance of Effect: Given the above consideration of Nature Conservation Value, Conservation Status and Magnitude, the effect significance of collision risk on common and soprano pipistrelle bats is considered to be **Negligible** and **Not Significant** in the context of the EIA Regulations.

8.6.8 Proposed Mitigation

219. Given that no significant effects are anticipated as a result of the proposed Development, no bat-specific mitigation is required.

8.6.9 Residual Operational Effects

220. Given that no significant effects are anticipated as a result of the proposed Development, no bat-specific mitigation is required and therefore there is no change in terms of residual effects.

221. Table 8.14 summarises the significance of operational effects for each receptor and the residual significance after mitigation measures are considered.

Species	Significance	Mitigation	Significance of residual effect
Bat species: Nyctalus species	Not Significant	None other than standard inbuilt mitigation through design	Not Significant
Bat species: Common and soprano pipistrelle	Not Significant	None other than standard inbuilt mitigation through design	Not Significant

Table 8.14: Summary of residual effects

8.7 Cumulative Assessment

222. The main reason for assessing cumulative impacts is to identify whether effects, which may not be significant from individual developments, are likely to be significant when combined with nearby existing or proposed schemes. The main projects likely to cause similar impacts to those associated with the proposed Development are other operational windfarms, those under construction or those consented. Several other windfarms are present within the wider area, in planning, under construction and operational.

223. Windfarm projects at the scoping stage have been scoped out of the cumulative assessment, because they generally do not have sufficient information on potential impacts to be included, as the baseline survey period is ongoing, or results have not been published. Projects that have been refused or withdrawn have also been scoped out.

224. Small projects with three or fewer turbines have also been excluded from the cumulative assessment, because such projects are generally not subject to the same level of detail of assessment; therefore, there are no directly comparable data.

8.7.1 Designated Sites

225. Effects of the proposed Development on Kirkcowan Flow SAC and SSSI are assessed as Negligible owing primarily to the very limited distance over which impacts are likely, as is the case for the nearby Operational Kilgallioch and Airies windfarms although infrastructure associated with these developments are located away from the SAC/SSSI boundary and separated by features separating potential connectivity (such as drainage ditches and existing forestry works). No other windfarm scheme borders the SAC and SSSI, although measures to mitigate for the acidification of the surrounding watercourses (through forestry management and operations (Rivers and Fisheries Trust of Scotland, 2014) in relation to Sitka spruce (*Picea sitchensis*) plantations in particular) appear to be contributing to the recovery of the mid-upper catchment (see **Technical Appendix 8.4**). Cumulative impacts on Kirkcowan Flow SAC and SSSI are therefore considered to be of **No Impact** and **Not Significant** in the context of the EIA Regulations.

8.7.2 Habitats

226. The loss of 20.88 ha of wet modified bog as a result of the proposed Development is assessed as Medium and significant, although due to the degraded condition of the habitat within the Site and the proposed HMP to restore an area larger than that lost to the proposed Development, the residual impact is considered to be negligible (Low beneficial). The contribution of the proposed Development to cumulative impacts on wet modified bog within the wider Natural Heritage Zone is therefore considered to be low (with an aim to being be of an overall benefit pending successful HMP outcomes) and an extensive cumulative impact assessment is not necessary. Cumulative impacts on wet modified bog are therefore considered to be **Low** and **Not Significant** in the context of the EIA Regulations.

227. The loss of 1.20 ha of blanket as a result of the proposed Development is assessed as Negligible due to the small extent, degraded and fragmented condition of the habitat within the Site. The contribution of the proposed Development to cumulative impacts on blanket mire within the wider Natural Heritage Zone is therefore considered to be negligible and an extensive cumulative impact assessment is therefore not necessary. Cumulative impacts on blanket mire are therefore considered to be **Negligible** and **Not Significant** in the context of the EIA Regulations.

8.7.3 Bats

228. Bats are most likely to be affected by windfarm development because of the distances travelled by some larger, faster flying species of bat and the cumulative risks to bat populations as a result of collision and/or barotrauma with operational turbines.

229. As discussed above (see **Section 8.5.5.4**), roosting bats were scoped out of this assessment given the limited potential for roosting bats within potential connectivity distance (i.e. approximately 450 m away from the nearest proposed turbine location and 150 m from other infrastructure). These are considered to be sufficient distances to avoid significant impacts on any roosting bats. As such, no contribution to cumulative effects on roosting bats is anticipated as a result of the proposed Development (**No Impact** and **Not Significant**).

230. Bat collision impacts have been minimised through the sensitive and considered design of the project layout and by implementation of standard good practice measures regarding buffer distances of turbines from forestry edges, commuting corridors and other bat features in order to minimise the potential for impacts on commuting and foraging bats and therefore the likelihood of cumulative construction impacts.

231. With a Negligible residual non-significant effect predicted on *Nyctalus* and Pipistrelle spp., cumulative impacts on *Nyctalus* and Pipistrelle species are considered to be **Negligible** and **Not Significant** in the context of the EIA Regulations.

232. All other bat species have been scoped out of the assessment and, as such, from the residual cumulative operational assessment given that no significant cumulative effects are predicted.

8.8 Summary

233. The proposed Development is located adjacent to the Tarf Water, which forms part of the River Bladnoch SAC, along the western and southern Site boundary, which is designated for supporting populations of Atlantic salmon. It is also bounded to the north by the Kirkcowan Flow SAC and SSSI, which is designated for supporting blanket bog and depressions on peat substrate habitats. Impacts on the Tarf Water are not anticipated due to the implementation of proposed mitigation and best practice during construction and monitoring of fish populations (complimenting the monitoring regime already in place for the Operational Kilgallioch Windfarm) forms part of the proposed species protection plans.

234. The footprint of the proposed Development does not overlap with the Kirkcowan Flow SAC and there will therefore not be any direct impacts on the SAC's features. However, there is potential for indirect negative changes to the hydrological regime of the qualifying features, through the drying of the underlying peat body. Although, due to the distance from proposed infrastructure and the SAC boundary as well as existing drainage features separating the SAC and Site, connectivity for indirect impacts are not expected.

235. Consideration of Habitats Regulations Appraisal for both the Bladnoch SAC and Kirkcowan Flow SAC are presented separately of this EcIA Report. In the absence of mitigation, the Appropriate Assessment has shown that significant adverse effects on salmon and the integrity of supporting habitats of the Bladnoch SAC cannot be ruled out. However, a range of standard and specific mitigation measures will be implemented following which no adverse effects are likely. In terms of the Kirkcowan Flow SAC, there is no potential for likely significant effect on either qualifying feature of the SAC and significant adverse effects have therefore been ruled out.

236. The proposed Development area was surveyed previously (in 2009) as part of the now Operational Kilgallioch Windfarm planning application, but due to the time elapsed all ecological baseline surveys were repeated with cognisance of the proposed Development. The baseline surveys included: extended NVC survey (back-worked to Phase 1 descriptions, also), protected mammal survey, bat survey and fish survey.

237. Habitats indicative of potential groundwater dependence were determined following the NVC survey, although the water catchment is considered likely to be predominantly surface water or rain fed partly due to the wider network of blanket bog habitats (which, by definition, are fed by precipitation) as well as the underlying geology being unconducive to groundwater flow. Hydrogeology mapping data from the British Geological Society shows the bedrock beneath the Study Area to comprise a low productivity aquifer in which flow is virtually all through fractures and other discontinuities. Also, till, where present, is anticipated to have relatively low permeability, thus inhibiting the potential for groundwater flow.

238. Of the habitats carried forwards to be assessed in terms of impacts, all likely direct and indirect effects on wet modified bog and blanket mire were considered. Indirect habitat losses as a result of drying peat are anticipated when drains are first installed during the construction phase and then considered likely to continue during the operation phase. No further negative impacts on wet modified bog and blanket mire are predicted during the operational phase. As such, a HMP is proposed with an aim to improving areas of habitat to blanket mire and, as such, an overall improvement is predicted in the quality of this habitat during the operational phase.

239. Signs of otter and water vole activity were identified during the protected mammal survey (with incidental signs for badger being found during subsequent survey) and appropriate mitigation is proposed in order to ensure no impacts are experienced by these species.

240. Bat surveys included site reconnaissance and habitat assessment, to determine site suitability for bats and potential for roosting. The habitat suitability was assessed as low and any potential roost sites are not located within potential connective distance of Site infrastructure. Static detector surveys were completed across three seasonal deployments. Following data analysis and species-specific risk assessments, *Nyctalus* species, Soprano pipistrelle and common pipistrelle species were carried forward and assessed as no significant impacts expected.

241. Fish surveys were completed along the Tarf Water and contributing watercourses flowing from within the Site. Although the Tarf Water does support salmon, the watercourses within the Site were found to only support non-salmonid fish. Measures outlined within the CEMP, species protection plans, best practice, as well as pollution protection guidelines, will ensure water quality is maintained and that no impacts will occur on the fish populations present.

242. As the access track connects with part of the upper route of the proposed Arecleoch Extension development (another SPR proposed Development currently in planning), all proposed ecological mitigation that supports the remaining access track route to where it joins the public road is honoured with respect to the proposed Kilgallioch Extension Development.

243. Cumulative impacts are considered against all receptors carried forwards through the impact assessment and no significant cumulative impacts are predicted.

244. Residual effects on all IEFs are considered to be at worst, Negligible Adverse and Not Significant and are summarised in Table 8.15.

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial / Adverse		Significance	Beneficial / Adverse
During Construction					
Kirkcowan Flow SAC/SSSI: indirect loss of habitat / hydrological flow	Negligible	Adverse	None required: distance form proposed Development >50m and therefore no potential for impacts on the habitats within the designated area.	Negligible	Adverse
Loss/Drying effect on habitat: wet modified bog	Medium	Adverse	Standard in-built mitigation (i.e 50m watercourse buffer) and adoption of good practice ECoW advising on micro-siting requirements to ensure impacts on modified bog are reduced further where possible. HMP will be implemented during the construction and operation phases that will focus on restoration of wet modified bog.	Low	Beneficial
Loss / Drying effect on habitat: blanket mire	Negligible	Adverse	Standard in-built mitigation (i.e 50m watercourse buffer) and adoption of good practice ECoW advising on micro-siting requirements to ensure impacts on blanket mire are reduced further where possible.	Negligible	Adverse
During Operation					
Kirkcowan Flow SAC	No impact	-	None required	No impact	-
Habitats: wet modified bog	Low	Beneficial	The HMP is predicted to improve the quality of the wet modified bog during the operational phase, associated with the restoration of habitat to blanket mire	Low	Beneficial
Nyctalus bats: collision/barotrauma risk	Negligible	Adverse	Minimum standoff distances from bat features and infrastructure exceeded.	Negligible	Adverse
Pipistrelle bats: collision/barotrauma risk	Negligible	Adverse	Minimum standoff distances from bat features and infrastructure exceeded.	Negligible	Adverse
Cumulative Effects					
Kikrcowan Flow SAC/SSSI	No impact	-	None required	No impact	-
Habitats	No impact	-	None required	No impact	-
Nyctalus bats	No impact	-	None required	No impact	-
Pipistrelle bats	No impact	-	None required	No impact	-

Table 8.15: Summary Table

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