

7 Ecology and Nature Conservation

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7 Ecology and Nature Conservation

7.1 Executive Summary

- 7.1.1 An assessment of terrestrial ecology effects arising from the construction, operation and decommissioning of the Proposed Development was undertaken, based on the current Proposed Development layout and turbine dimensions. A range of ecological studies were undertaken, to identify the terrestrial ecological interests of the Proposed Development site and to establish the ecological baseline for the ecological impact assessment (EclA). This included identification of existing wildlife records and nearby sites designated for nature conservation and survey of the habitats and faunal interests of the site. Field surveys were undertaken for: habitats, both Phase 1 habitat survey and NVC, including consideration of groundwater-dependent terrestrial ecosystems (GWDTEs); badger; otter; bat species; and fish (additional species covered for the main site access included red squirrel, pine marten and water vole).
- 7.1.2 The Proposed Development site is primarily open hill livestock grazing on the edge of an area upland moor (primarily sheep on the northern area and a mix of sheep and cattle to the south of the glen). The habitat is one of primarily MG10 grassland, though the most north-eastern locations of the Proposed Development infrastructure is on the edge of the moorland blanket bog, which is relatively shallow at this point. Much of the Skelmorlie Glen is covered by a mix of W7 (wet) and W11 (oak) woodland, with oak woodland extending up the Rigg hill and Fank burns, with the Skelmorlie Water flowing through a gorge for much of its length within the application boundary. The woodland is classed as *Ancient (of semi-natural origin)* on the Ancient Woodland Inventory (AWI), and carries a Special Site of Scientific Interest (SSSI) designation for a large expanse and has Local Nature Conservation Site (LNCS) status to either side of the SSSI; a further section of AWI-designated W7/W11 riparian woodland lines the Meigle Burn (also part of the same LNCS designation as the Skelmorlie Glen woodlands).
- 7.1.3 Otter use of the Skelmorlie Water catchment was found to be extremely limited, partially explained by unpassable gorge waterfalls preventing migratory fish access to the upper catchment, though a resident brown trout population has been identified. Badger use of the Skelmorlie Glen area has also been established.
- 7.1.4 Bat species have been identified to be using the area, primarily the edge habitat of the glen woodland. Potential roosting features have also been identified on the route of the main site access to Barr Farm from the public road network.
- 7.1.5 No other protected or otherwise notable species have been recorded using the site.
- 7.1.6 Important Ecological Features (IEFs) were identified and either scoped-out or taken forward for assessment. IEFs taken forward to assessment include:
- Skelmorlie Glen and Fardens Glen LNCS;
 - Ancient Woodland Inventory designated woodlands;
 - Blanket bog;
 - Running water;
 - Groundwater-dependent terrestrial ecosystems;
 - Badger; and
 - Bat species.
- 7.1.7 Assessment indicates that no significant impacts are predicted to habitats or species, though a long-term minor change is predicted for the upper section of the LNCS and negligible adverse effects are predicted for the short to long term, for the terrestrial IEFs.

- 7.1.8 No significant residual effects are predicted.
- 7.1.9 No cumulative effects on the site terrestrial ecological interests are predicted from in-combination interaction between the Proposed Development and wind farms in the surrounding 10km study area.

7.2 Introduction

- 7.2.1 This chapter describes the non-avian ecological baseline and considers the likely effects on Important Ecological Features (IEFs) during the construction and operation phases of the Proposed Development. The chapter relates entirely to non-avian ecology; please refer to Chapter 6: Ornithology for all avian baseline details and assessment.
- 7.2.2 The Chapter is supported by the following Figures and Appendices:
- Figure 7.1: Ecological Designated Sites Within 5 km;
 - Figure 7.2: National Vegetation Classification;
 - Figure 7.3: Phase 1 Habitats;
 - Figure 7.4: Confidential Badger Survey Results;
 - Figure 7.5: Otter Survey Results;
 - Figure 7.6: Bat Static Detector Locations and Roost Potential Trees;
 - Appendix 7.1: Ecology Desk Study;
 - Appendix 7.2: Habitat Survey Reports;
 - Appendix 7.3: Badger Survey Report;
 - Appendix 7.4: Otter Survey Report;
 - Appendix 7.5: Bat Survey Reports; and
 - Appendix 7.6: Fish Survey Report.

7.3 Legislation, Policy and Guidelines

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

Legislation

- 7.3.2 Relevant legislation includes:
- 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); and
 - The Protection of Badgers Act 1992 (as amended).

Planning Policy

7.3.3 Relevant planning policy includes:

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

Guidance

7.3.4 The assessment has also been undertaken with cognisance of the following best practice guidelines and reference documents:

- Planning Advice Note (PAN) 60: Planning for Natural Heritage provides guidance relevant to this assessment and the Proposed Development;
- The Scottish Biodiversity List (SBL; Scottish Government, 2013);
- The Ayrshire Biodiversity Action Plan (Biodiversity in Ayrshire, 2008);
- The North Ayrshire Draft Local Biodiversity Action Plan 2019-2031 (North Ayrshire Council, 2019b).
- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018);
- Environmental Impact Assessment Handbook (SNH, 2018);
- Good Practice during Wind Farm Construction 4th Edition (SNH, 2019a);
- Planning for development: What to consider and include in Habitat Management Plans (SNH, 2016); and
- Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems (SEPA, 2017).

7.3.5 Where appropriate, more detail relating to specific legislation, guidance or policy is provided in the Appendices supporting this chapter (i.e. Appendices 7.1 to 7.6).

7.4 Consultation

Scoping

7.4.1 In August 2019, a scoping report was submitted to North Ayrshire Council accompanying a request for a Scoping Opinion under Regulation 15 of the EIA Regulations 2017. The Scoping report included for consideration of ecology (undertaken by ITP Energised Ltd., Whytock Ecology Ltd. and Echoes Ecology Ltd.).

7.4.2 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 7.1 summarises relevant consultation responses and outlines how they have been addressed.

Table 7.1 – Table Consultation Responses

Consultee	Response	Applicant Action
North Ayrshire Council (NAC)	<p>The EIA Report to include baseline protected species surveys, including bats. All surveys to have been carried out within 18 months prior to the submission of any planning application. Surveys to be carried in accordance with best practice methodology. The surveys should include the potential impacts arising from access routes and borrow pit.</p> <p>The EIA report to include an assessment of potential impacts on the Skelmorlie Glen SSSI, the Skelmorlie Glen & Fardens Glen Local Nature Conservation Site.</p>	<p>Site subjected to a range of surveys to assess the ecological baseline (see Section 7.6).</p> <p>With the exception of the Fisheries Report (Appendix 7.6), all surveys are within 18 months of this submission. The fisheries report, while old is for a habitat which is considered unlikely to change in any significant way due to the physical characteristics of the Skelmorlie Water.</p> <p>The assessment includes consideration of these designated sites (see Sections 7.7 and 7.9)</p>
Scottish Natural Heritage (SNH)	<p>In relation to the bat surveys agreed that the work was undertaken prior to the recent change in best practice methodology. In this circumstance, it is recognised that the data collected under the previous best practice advice remains valid. However, if there is a substantial delay in the submission of the completed EIA, it may be necessary to re-survey following the current approved methodology.</p> <p>Advised to ensure, where possible, that there is a 50m buffer between turbine blade tips and the habitat that bats normally forage close to (woodland edge, hedgerows or watercourses).</p>	<p>Bat assessment follows the previously applied standard, as per this agreement, noted in May 2019 (see Sections 7.6, 7.7 and 7.9 and Appendix 7.5). Surveys were initially undertaken in 2016 but updated in 2018.</p> <p>Design iterations have ensured that this buffer has been applied (see Section 7.8)</p>
Scottish Environment Protection Agency (SEPA)	The site layout to be designed to avoid impacts upon the water environment. Where activities such as watercourse crossings, watercourse diversions or other engineering activities in or impacting on the water environment cannot be avoided	Iterative design process has reduced watercourse crossings as far as possible (see Chapter 3 Proposed Development);

Consultee	Response	Applicant Action
	<p>then the submission must include justification of this and a map showing:</p> <ul style="list-style-type: none"> • All proposed temporary or permanent infrastructure overlain with all lochs and watercourses. • A minimum buffer of 50m around each loch or watercourse. If this minimum buffer cannot be achieved each breach must be numbered on a plan with an associated photograph of the location, dimensions of the loch or watercourse and drawings of what is proposed in terms of engineering works. <p>GWDTE are protected under the Water Framework Directive and therefore the layout and design of the development must avoid impact on such areas. The following information must be included in the submission:</p> <p>A map demonstrating that all GWDTE are outwith a 100m radius of all excavations shallower than 1m and outwith 250m of all excavations deeper than 1m and proposed groundwater abstractions. If micro-siting is to be considered as a mitigation measure, the distance of survey needs to be extended by the proposed maximum extent of micro-siting. The survey needs to extend beyond the site boundary where the distances require it.</p> <p>If the minimum buffers cannot be achieved, a detailed site specific qualitative and/or quantitative risk assessment will be required. SEPA is likely to seek conditions securing appropriate mitigation for all GWDTE affected.</p>	<p>See Chapter 10 Geology, Peat, Hydrology, Hydrogeology and Figure 10.7 for details;</p> <p>50m buffers have been achieved within this design (see Chapter 3 Proposed Development);</p> <p>Figure 10.5 displays the potential GWDTE within the Site. Further assessment is provided in Chapter 10 Geology, Peat, Hydrology & Hydrogeology where stands are concluded to be surface water fed</p>
Scottish Wildlife Trust (SWT)	Noted that the site chosen for this wind farm project is within the Clyde Muirshiel Regional Park and overlapping or adjacent to areas	

Consultee	Response	Applicant Action
	<p>with natural heritage designations.</p> <p>The Skelmorlie Glen SSSI is designated as one of the best examples of semi-natural woodland in the area, including the richness of its ground flora. The EIA will need to assess the current state of the area (which overlaps with a Wildlife Site) and detail any potential threats to the trees or ground flora. The Wildlife Site was also designated for its acid and neutral grassland and flush areas. The risks to these will also need to be quantified.</p>	<p>The presence of the designated areas of Skelmorlie Glen (SSSI, LNCS and AWI) are identified in: Section 7.6 (and Table 7.4); Section 7.8 (and Table 7.7) and the subsequent assessment</p>

7.5 Assessment Methodology and Significance Criteria

Ecological Desk Study

- 7.5.1 The ecological desk study (see Appendix 7.1) included data obtained from third parties; additional desk study data is included within the Appendix reports, as appropriate. This data was used to confirm the presence of statutory and non-statutory nature conservation designations, areas of ancient woodland and legally protected or otherwise notable species (i.e. those species of conservation concern, either nationally or within the North Ayrshire LBAP, ranging to 2km of the site).

Field Studies

- 7.5.2 Ecological studies were undertaken to establish the site baseline for habitats and a range of protected or otherwise notable species. Habitat surveys were initially undertaken in 2013 comprising a Phase 1 habitat survey and National Vegetation Classification (NVC) study; and a further study was done in 2014. With a revised application area and identification of an access route from the public road network, an NVC study of the full application area was completed in October 2019 and a general ecological study (i.e. extended Phase 1 habitat survey and bat roost potential) for the access route was conducted in October 2019. Protected or otherwise notable species surveys also commenced in 2013 (i.e. the fisheries study) and the programme extended through to the October 2019 assessments of the main access route. The survey areas for these studies have varied, depending upon the feature being investigated, and comprised the site and a variable additional survey buffer area.

- 7.5.3 The ecological baseline presented in this chapter is derived from the following technical studies:
- Habitat surveys conducted in October-November 2018: to a 50m survey buffer for the main access route Phase 1 habitat survey; and to a 250m survey buffer around the site and access route for the NVC study, to ensure adequate consideration of habitats supporting potential groundwater-dependent terrestrial ecosystems (see Appendix 7.2);
 - Badger survey conducted in September 2018 to a 50m buffer around the site (see Confidential Appendix 7.3);
 - Otter survey conducted in September 2018 to a 250m survey buffer to either end of the watercourse reaches studied (see Appendix 7.4);

- Bat surveys were completed to a 50m survey buffer for the main access route (roost assessment, October 2018) and to the site boundary for the activity (transects and static detectors used throughout the 2016 active season) and static studies conducted across the 2018 active season (see Appendix 7.2 for the main access and Appendix 7.5 for the site and also Figure 2). The 2016 static detector survey used six detectors placed in a range of habitats and distributed across the site; the 2018 static detector survey used six detectors placed across the site at the same locations, April-September 2018; and
- Fisheries survey completed in 2013 and targeted to investigate representative, accessible locations within the river systems of the study (Appendix 7.6). They covered the original wider study area, which included the Noddsdale Water, Kelly Burn and Skelmorlie Water. With the site reduced and now entirely within one river catchment, only the Skelmorlie Water results are of relevance to this Proposed Development. The habitat was assessed and two sites on the Skelmorlie Water and one on the Meigle Burn were electro-fished on the main river channel, with sites chosen for their accessibility, to facilitate repeat surveys. Invertebrate samples were also taken for these locations (See Appendix 7.6 for further details of the methodology).

7.5.4 Full details of the methodologies applied are presented in each Appendix.

Evaluation Methods for Ecological Features

7.5.5 Table 7.2, below, lists the criteria used to determine the value of ecological features in a geographical context.

Table 7.2 - Geographical evaluation criteria

Value	Criteria	Examples
International	Nature conservation resource, i.e. designated nature conservation area, habitat or populations of species, of international importance. N.B. For designations, such as a Special Area of Conservation (SAC), 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.	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.

Value	Criteria	Examples
Council area (North Ayrshire)	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.

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

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

Impact Assessment Methods

7.5.8 The approach to the Ecological Impact Assessment (EclA) 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 of 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 that construction industry-standard mitigation is applied 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.

7.5.9 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.

Ecological Zone of Influence

7.5.10 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.

Temporal Scope

7.5.11 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 14 months to complete.

Characterising Ecological Impacts and Effects

7.5.12 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.

7.5.13 In accordance with the CIEEM guidelines (and slightly adjusted to conform to the terminology of the other chapters of this EIAR), when determining impacts on IEFs, reference is made to the following:

- Beneficial or adverse – 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.

7.5.14 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.

7.5.15 For the purposes of this assessment, the predicted impacts on an ecological feature are categorised as ‘no impact’, ‘negligible’, ‘minor’, ‘moderate’ or ‘major’, based on the definitions in Table 7.3, below.

Table 7.3 - Levels of impact

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.
Minor	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.
Moderate	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.
Major	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.
<p>The following definitions have been applied in respect to timescales:</p> <p>Immediate: Within approximately 12 months;</p> <p>Short-term: Within approximately 1-5 years;</p> <p>Medium-term: Within approximately 6-15 years; and</p> <p>Long-term: More than 15 years.</p>	

Determining Ecologically Significant Effects

- 7.5.16 An EclA 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 developments. Both adverse and beneficial impacts/effects are possible.
- 7.5.17 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.
- 7.5.18 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.
- 7.5.19 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.
- 7.5.20 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.
- 7.5.21 In addition to determining the significance of effects on valued ecological features, this chapter also identifies any legal requirements in relation to wildlife.

Survey Limitations

Habitats

- 7.5.22 The NVC surveys were carried out in the months of October and November, which is slightly later than is considered optimal for NVC surveys. As a result, some early flowering plants may have been missed due to the timing of the survey; however, this is unlikely to have affected the conclusions drawn from the results. See Appendix 7.2 for further details.

Badger

- 7.5.23 The 2018 survey was undertaken in September 2018, which is out with the optimal time of year (from February to April when there is typically a peak in territorial activity), and due to recent rapid growth of the woodland understory, it is possible that field signs, such as paths, dung pits and latrines were under-recorded. Additionally, there were several areas throughout the site that were not accessed to the full extent, due to thick understory and steep gorge sides. However, the majority of likely setting areas were accessible and these are focussed on the watercourse valleys, rather than the open upland of the Proposed Development, and these factors are not considered significant limitations to the survey, as field signs were sufficiently identifiable to permit survey confidence.

Otter and water vole

- 7.5.24 Site conditions were suitable, with no heavy rain preceding survey to potentially wash away otter or water vole field evidence; the lower gorge sections are also sheltered from the direct impacts of rainfall-washing of potential sprainting rocks. As such, no weather-related survey limitations were identified.
- 7.5.25 Several areas throughout the site could not be accessed due to fallen trees, deep pools, inaccessible gorge sections and steep banks; however, this is not considered a significant limitation to the survey, due to the total length of river reach surveyed and the locations that were possible to access (i.e. likely sprainting sites at burn confluences, on bankside boulders, etc.).

Bats

- 7.5.26 The full limitations to survey are identified within the reports of Appendix 7.5, however, the principal limitations relate to potential under-recording of species using the site, such as the ability of brown long-eared bats (*Plecotus auritus*) to forage without the use of echolocation, often making them undetectable with the use of echolocation recording devices. For this reason, this particular species of bat may have been under-recorded during surveys. As the peak frequencies of common pipistrelle and soprano pipistrelle (*Pipistrellus pygmaeus*) can overlap, calls with peak frequencies of 50-51 kHz were not identified to species level and were considered to be *Pipistrellus* species.
- 7.5.27 Additionally, there are a number of limitations related to the identification of bat species solely from sonograms:
- The quality of any recording is related to the proximity of the sound source to the detector and the presence of any obstructions, as such, faint and/or distorted calls may not be recorded in sufficient detail to allow identification;
 - All bats can vary their calls substantially according to their environment and the purpose of the call and therefore some calls may be atypical making identification unreliable; and
 - Passes do not necessarily equate to the number of bats on site, rather they are an index of bat activity. Multiple passes can be due to the same bat repeatedly calling in the vicinity of the recording device or multiple individual bats flying within an area simultaneously.

Fisheries

- 7.5.28 Surveys were conducted in 2013 and the data is therefore over six years old. However, as indicated by the results of the terrestrial survey programme, there has been little or no change in the catchment of the Skelmorlie Water in the intervening years, especially considering the geological conditions of the gorge and a series of falls which are impassable to migratory species heading upstream. The fisheries data are therefore deemed to remain valid. Fisheries assessment limitations generally relate to the electrofishing techniques used being specifically designed for assessing juvenile salmonid populations and therefore fish from other groups may not be quantified effectively. Additionally, while survey sites were chosen to be representative of the habitat, it is possible that if fish populations are low or have a clumped distribution, the survey data may not sample the full fish population in that area. The method also relies on depletion sampling (i.e. multiple passes until no further animals are caught) to enable a population to be estimated. See **Appendix 7.6** for full details.

7.6 Baseline Conditions

- 7.6.1 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.

Site Overview

- 7.6.2 The Proposed Development is to be located to the south-east on the upland behind the settlement of Skelmorlie, overlooking the Firth of Clyde. The area is characterised by upland peat moorland behind a narrow coastal margin. The open moor is drained by a network of small river systems, which descend to the coast via narrow valleys, which are generally wooded towards their lower ends. Narrow cleughs and gorges are common features found in these systems and this is the case for the reaches of the Skelmorlie Water and its major tributaries located within the site.

7.6.3 The lower hill slopes, through which the main access will pass, are a mix of agricultural grasslands (both improved and semi-improved), used for both cattle and sheep, interspersed with small deciduous woodland blocks and tree lines along field boundaries; while the higher areas and the moor beyond, are used primarily for grazing sheep.

Desk Study

Nature Conservation Designations

7.6.4 Statutory nature conservation designations are summarised in Table 7.4, below, and shown on Figure 7.1. For designations relating to ornithological qualifying features, please refer to Chapter 6 Ornithology for further information. No international designations are present within 10km of the Proposed Development, but four statutory nature conservation designations of national importance are present within this distance. No statutory local designation is present within 2km of the Proposed Development.

Table 7.4 – Statutory nature conservation designations within 10km of the Proposed Development

Site	Designation	Distance to Site	Description
Skelmorlie Glen	SSSI	Within site	The site is designated for the following: <ul style="list-style-type: none"> ▪ <i>Upland mixed ash woodland</i>
Shielhill Glen	SSSI	5km NE	The site is designated for the following: <ul style="list-style-type: none"> ▪ <i>Lowland mixed broadleaved woodland; and</i> ▪ <i>Fen meadow</i>
Cumbraes	Marine Consultation Area (MCA)	5.36km S	The channel between the Great and Little Cumbrae Islands, Bute and the mainland is over 50m deep. The tidal regime favours the development of rich algal and faunal communities on the shores. The red seaweeds <i>Chondrus crispus</i> and <i>Mastocarpus stellatus</i> are better developed here than at any other location in Britain. At Kames Bay, populations of the thin tellin <i>Angulus tenuis</i> have been monitored for over 60 years and constitute one of the longest series of observations on an intertidal species in the United Kingdom
Ballochmartin Bay	SSSI	7.28km S	The site is designated for: <ul style="list-style-type: none"> ▪ <i>Coastland</i> <p>The flora and fauna of the intertidal area have been intensively surveyed and studied, and the site is of considerable importance for research and the teaching of marine biology. The beach is backed by herb-rich grassland and roadside verges supporting slow-worms (<i>Anguis fragilis</i>) and a number of uncommon higher plant species.</p>

- 7.6.5 Figure 7.1 also shows non-statutory designations, and these designations are detailed in Appendix 7.1.
- 7.6.6 Three Local Nature Conservation Sites (LNCS), two proposed LNCS are located inside the site or within a 2km distance. The Slemorlie Glen & Fardens Glen LNCS designation covers three areas which comprise ancient and semi-natural woodlands and correspond to the boundaries of several Ancient Woodland Inventory (AWI) designated areas:
- 11.49ha extending north-east up the Skelmorlie Water from the upstream edge of the SSSI to beyond the wind farm application boundary;
 - 3.31ha covering the AWI woodland of the Meigle Burn; and
 - 12.44ha located around Skelmorlie Castle, outwith the site to the south-west.
- 7.6.7 Overall, 27 areas of AWI-listed woodland have been identified within 2km of the Application Boundary (the Skelmorie Glen designated areas are within the site and the Fardens Glen woodland immediately adjacent).

Species

Invasive Plant Species

- 7.6.8 As detailed in Appendix 7.1, the following invasive non-native plant species have been recorded within 2km of the site:
- Japanese knotweed (*Fallopia japonica*); and
 - Rhododendron (*Rhododendron ponticum*).
- 7.6.9 Japanese knotweed is classed as a controlled plant in the Wildlife and Countryside Act 1981 (as amended). Both Japanese knotweed and rhododendron are identified for control in Scotland by SNH (SNH, 2020).

Terrestrial Animals

- 7.6.10 Data obtained from the SWSEIC and Glasgow Museum included records of 15 protected or otherwise notable species within 2km of the site boundary; see Appendix 7.1 Table 4 for full details. Additional data was provided by previous site surveys (see Appendices 7.3-7.6) Species of potential relevance to the assessment include:
- Otter (*Lutra lutra*);
 - Badger (*Meles meles*);
 - Pine marten (*Martes martes*);
 - Red squirrel (*Sciurus vulgaris*);
 - Water vole (*Arvicola amphibius*);
 - Leisler's bat (*Nyctalus leisleri*);
 - Natterer's bat (*Myotis nattereri*);
 - *Myotis* bats (*Myotis* spp.);
 - Brown long-eared bat;
 - Common pipistrelle;
 - Soprano pipistrelle;
 - Brown hare (*Lepus europaeus*);
 - Salmonid fish species;

- Lamprey species;
- Common frog (*Rana temporaria*);
- Common toad (*Bufo bufo*);
- Palmate newt (*Lissotriton helveticus*); and
- Large heath butterfly (*Coenonympha tullia*).

Field Studies

Habitats

- 7.6.11 The results of the NVC survey recorded a total of 23 communities (see Appendix 7.2 and Figure 7.2). Where these communities were floristically distinct, they were assigned into corresponding sub-communities. The communities recorded during the survey were:
- Mires and flushes: M6, M10, M17, M18, M19, M20, M23, M25;
 - Wet heaths: M15;
 - Grasslands and bracken: U4, U5, U6, U20, MG6, MG7, MG10, MG12, MG13;
 - Woodland and scrub: W4, W7, W11, W23; and
 - Springs: M37.

7.6.12 It is important to note that some of these habitats occur in mosaic.

7.6.13 The following section, while referencing the NVC, has been ordered to reflect the general Phase 1 classifications; see Appendix 7.2 for more details. Phase 1 habitat are shown on Figure 7.3.

Mires and flushes

7.6.14 Mire and flush habitats were recorded towards the northern extents of the site, near the locations chosen for turbines 8-10, on the upper slopes of Rigg Hill as they grade into Ferret of Keith Moor. The following communities were recorded:

M6 Carex echinata - Sphagnum fallax/denticulatum mire

7.6.15 Two of the four described M6 mire sub-communities were recorded within the site: the M6c *Juncus effusus* sub-community and the M6d *Juncus acutiflorus* sub-community. Both were widely recorded throughout the survey area, but increased in frequency in the upland areas, particularly near T8, T9 and T10 (as shown on Figure 7.2). The M6c sub-community is rather species-poor with the nominate species dominating the vascular assemblage (see Appendix 7.2).

7.6.16 The M6 community is a soligenous mire found on peat and peaty gley substrates that are fed primarily by base-deficient water. These mires are situated in valley bottoms, sloping valley sides or channels within the site, where water flows slowly over a peaty surface.

M10 Carex dioica – Pinguicula vulgaris mire

7.6.17 A single area of M10a *Carex viridula* subsp. *oedocarpa* - *Juncus bulbosus* mire was recorded within the survey area on the southern side of the Rigg Hill Burn, close to the location of WTG9 (see Figure 7.2). The base-rich waters have influenced the vegetation found where M10 habitat has developed.

7.6.18 M10a sub-community is the most common and widespread of the three described sub-communities in the UK and is frequently found covering small areas in the uplands.

M17 Trichophorum germanicum - Eriophorum vaginatum blanket mire

7.6.19 This community was only recorded in one location within the survey area, close to the limit of the 250m survey buffer (see Figure 7.2; and Appendix 7.2 for more detail). Identification to sub-community was not possible.

M18 *Erica tetralix-Sphagnum papillosum* raised and blanket mire

- 7.6.20 M18 communities are found on areas of deep peat and contain a low sward of hare's-tail cottongrass (*Eriophorum vaginatum*), cross-leaved heath (*Erica tetralix*) and heather (*Calluna vulgaris*). Bog-mosses (*Sphagnum* spp) carpet the ground layer and contain many important peat-building mosses. The peat substrate is waterlogged, which maintains conditions for bog-mosses to grow and continue to form peat.
- 7.6.21 Two M18 sub-communities were recorded within the 250m survey buffer, outwith the site towards the north-western edge of the surveyed area (see Figure 7.2); these were found to be small in size and fragmented in nature and on level ground with a slightly drier plant assemblage than raised mires. The M18b *Empetrum nigrum* ssp. *nigrum* sub-community is commonly associated with blanket mires, whereas M18a *Sphagnum magellanicum* - *Andromeda polifolia* sub-community is more closely associated with raised mires.

M19 *Calluna vulgaris* – *Eriophorum vaginatum* blanket mire

- 7.6.22 This community occupies small distinct areas containing heather, hare's-tail cottongrass and thinly, but widely distributed common cottongrass (*Eriophorum angustifolium*). Bog-mosses are not as well represented in this community as either the M17 or M18 blanket mires; *Sphagnum capillifolium* is the most common species, though *S. papillosum* and *S. magellanicum* are locally distributed.
- 7.6.23 All the areas of M19 recorded within the survey area are located adjacent to, or beyond, the northern and southern edges of the site (see Figure 7.2) and conform to the M19a *Erica tetralix* sub-community. This sub-community is floristically similar to M17 *Trichophorum germanicum* – *Eriophorum vaginatum* blanket mire (see Appendix 7.2 for more detail).

M20 *Eriophorum vaginatum* blanket and raised mire

- 7.6.24 This community, containing thick tussocks of hare's-tail cottongrass, is found most frequently in the northern and eastern areas of the survey area, around the locations of turbines 8 and 9. As described in Appendix 7.2, this community type is located on gently sloping ground, where water collects but does not persist for long periods of time. Of the two sub-communities described in the NVC, only the M20b *Calluna vulgaris-Cladonia* sub-community was recorded. This sub-community has a more varied floristic composition than M20a.
- 7.6.25 M20 is characteristic of ombrogenous peatland habitats that have been negatively affected by long term grazing and burning management regimes.

M23 *Juncus effusus/acutiflorus* – *Galium palustre* rush pasture

- 7.6.26 The M23 community is widespread throughout the site and wider survey area and mainly occurs in valley bottoms and gently sloping ground with slow, constant water movement, including in the areas around the proposed locations for turbines 7 and 10. The community is dominated by rush (*Juncus*) species and is closely associated with M6 *Carex echinata* – *Sphagnum fallax* mire, but differs in having no or few bog-mosses.
- 7.6.27 Two sub-communities were recorded within the site: M23a is dominated by sharp-flowered rush (*Juncus acutiflorus*) and is the more floristically diverse of the two M23 sub-communities M23b contains a similar range of species, though they are often found in much lesser frequency. Soft-rush (*Juncus effusus*) is the dominant rush species within the site M23b, as opposed to sharp-flowered rush in M23a

M25 *Molinia caerulea* – *Potentilla erecta* mire

- 7.6.28 The M25 vegetation within the site aligns with the M25a *Erica tetralix* sub-community, which contains small amounts of heath and bog vegetation. Common cottongrass, deergrass (*Trichophorum germanicum*) and infrequent patches of bog-mosses were the most frequently recorded bog species.
- 7.6.29 This community occurs on moderately wet, shallow peat and is sparsely distributed within the upland areas of the wider survey area and is frequently in mosaic. Distinct areas occur in the north

of the site, between the proposed locations of turbines 7 and 8 and adjacent to the eastern edge of the site (see Figure 7.2).

M37 *Palustriella commutata*-*Festuca rubra* spring

- 7.6.30 Only one M37 community was recorded within the survey area, beyond the site boundary and within the adjacent Noddsdale Water catchment to the south of the Proposed Development; this is set within a mosaic of other communities, including M25, M23, U4 and U5. The total area covered by this spring amounts to only a few square meters, set over some flushed rocks where base-rich water collects. The community is dominated by curled hookmoss (*Palustriella commutata*), velvet bent (*Agrostis canina*), carnation sedge (*Carex panicea*), glaucous sedge (*Carex flacca*) and cuckooflower (*Cardamine pratensis*). Red fescue is present but occurs in greater frequency toward the edges of the spring rather than in the middle. There are no sub-communities associated with M37 springs.

Wet heaths

Wet dwarf shrub heath was recorded close to the north-western edge of the site, beyond the proposed turbine 10 location.

M15 *Trichophorum germanicum* – *Erica tetralix* wet heath

- 7.6.31 The M15 community occupies small, indistinct areas surrounded by other mire and bog communities within the survey area. Species present in high frequency include deergrass and heather. Two of the four described sub-communities were recorded within the survey area: The M15a *Carex panicea* sub-community occupies a smaller area than M15d. As shown on Figure 7.2, only the M15d is found within the edge of the site, to the north-west of the proposed turbine 10 location, while M15a is present in the wider study area to the north and east.
- 7.6.32 M15 occurs on shallow, ombrogenous peat substrates and has relatively few constant species associated with it. It is possible that some areas of M15 have been derived from blanket bog communities and still occur on deep peat. The change in vegetation may be derived from land management practices, such as grazing or burning. As M15 occurs on the upland fringes and is recorded where habitats are in transition from grassland to blanket bog, it is likely to be confined to shallow peat.

Grasslands and bracken

- 7.6.33 The site and main access track corridor include a range of grassland habitats, comprising primarily improved, with semi-improved acid grassland and some areas of both unimproved and semi-improved neutral grassland. Fardens Farm is surrounded by several fields of improved grassland, used for sheep grazing. Improved grassland was also recorded for the main access route into the Proposed Development, between the Largs-Meigle minor public road and Barr Farm; and the majority of the fields to the east of Barr Farm were also recorded as improved grassland, with this being used for both sheep and cattle grazing. A tract of semi-improved acid grassland was recorded adjacent north-east of Fardens Farm, with unimproved neutral grassland in compartments to the south-east of Fardens and along the Rigg hill Burn and further areas associated with some of the minor burns draining the slopes on the southern side of Skelmorlie Glen. An area of semi-improved neutral grassland was recorded close to the south-eastern edge of the site, east of the proposed location for turbine 1.
- 7.6.34 Continuous bracken was recorded in two areas: above the Skelmorlie Water at the southern edge of the Fardens area and on the eastern slopes above the confluence of the Rigg hill Burn and Skelmorlie Water

U4 *Festuca ovina* - *Agrostis capillaris* - *Galium saxatile* grassland

- 7.6.35 This community has a rather restricted distribution within the survey area, where frequent grazing maintains a short sward length. It is a grassland community dominated by sheep's fescue (*Festuca ovina*), common bent (*Agrostis capillaris*), Yorkshire fog (*Holcus lanatus*) and sweet vernal-grass (*Anthoxanthum odoratum*) though crested dog's-tail (*Cynosurus cristatus*) can also be locally

frequent in some stands. It is a typical habitat of moderate altitudes on free draining, slightly acidic soils. U4b was the only one of the five sub-communities to be recorded during the NVC survey, to the east of the proposed turbine 1 location.

U5 *Nardus stricta* – *Galium saxatile* grassland

7.6.36 U5 grasslands have a limited distribution within the survey area. Apart from a single area of U5a, which was floristically poor and dominated by mat-grass and common bent, U5 grassland could not be identified to the sub-community level. Few areas form pure stands, but several large stands are present in mosaic with other communities (see Figure 7.2). Mat-grass (*Nardus stricta*) is the most frequent grass and often grows in thick clumps. Other species recorded within the community include common bent, sheep's fescue with small quantities of wavy hair-grass (*Deschampsia flexuosa*) and sweet vernal-grass. Heath bedstraw (*Galium saxatile*) is locally frequent in some locations and is generally widespread throughout.

7.6.37 U5 is found at moderate altitudes on rather moist, acidic soils, often with a mix of peat substrates.

U6 *Juncus squarrosus* – *Festuca ovina* grassland

7.6.38 As noted in Appendix 7.2, U6 is scarcely distributed within the site and wider survey area, though there is one large homogenous stand located north and west of the proposed turbine 10 location (see Figure 7.2). Two sub-communities were recorded: U6a occurs on wet peat substrates and contains a range of common bog-mosses, though they only very rarely form any sort of hummock. It is likely that the U6a community has derived from blanket bog or wet heath communities, but has been altered through long-term grazing management. The U6c sub-community has a mix of wavy hair-grass and widely, but scarcely distributed shoots of bilberry (*Vaccinium myrtillus*). Bog-mosses are scarce within the U6c community, due to the drier ground conditions.

7.6.39 U6 is a grassland typical of mineral deficient, shallow, peaty substrates and is often formed through a combination of intensive grazing or burning practices.

U20 *Pteridium aquilinum* – *Galium saxatile* community

7.6.40 This bracken-dominated habitat is located in several areas, particularly on the right bank of the Skelmorlie Water, just upstream of Fardens Glen, and also above the confluence with the Riggill Burn and on the banks of the Riggill Burn from its confluence with the Fank Burn. Only the U20a sub-community (which includes a limited range of grasses in addition to bracken and heath bedstraw) was identified on site.

7.6.41 Where U20 occurs, fronds of *bracken* carpet much of the ground and smother most of the growth of other species; diversity therefore tend to be low.

MG6 *Lolium perenne* – *Cynosurus cristatus* grassland

7.6.42 MG6 grassland primarily occurs in southern and western parts of the survey area, beyond the edge of the site (see Figure 7.2). It is commonly found at low altitudes that are enriched with nutrients as a result of agricultural improvement. These areas are dominated by nutrient-demanding species, including perennial rye-grass (*Lolium perenne*), crested dog's-tail, daisy (*Bellis perennis*) and white clover (*Trifolium repens*). The habitats recorded also contain varying amounts of red fescue (*Festuca rubra*), creeping bent (*Agrostis stolonifera*) and creeping buttercup (*Ranunculus repens*). MG6 communities are very uniform in their species composition throughout the site and conform to the MG6a typical sub-community. This is a habitat which is of high value for grazing, but low in diversity.

MG7 *Lolium perenne* leys and related grasslands

7.6.43 Found along the route of the main access track, this is a species-poor grassland dominated by perennial rye-grass. Other species, such as greater plantain (*Plantago major*), daisy and annual meadow-grass (*Poa annua*), were recorded within this habitat, though they were often found in low frequency. *Trifolium repens* was found to be relatively frequent within the community. Two sub-communities were recorded within the survey area: MG7a *Lolium perenne*-*Trifolium repens* leys were the most common. They tend to have few associated species. MG7b *Lolium perenne*-*Poa*

trivialis leys are rare within the survey area. They are slightly more diverse, with cock's-foot (*Dactylis glomerata*), red fescue and common mouse-ear (*Cerastium fontanum*) all recorded in low frequency in small areas of the sub-community. Similar to MG6 communities, MG7 is of high value for grazing, but low in diversity.

MG10 *Holcus lanatus* – *Juncus effusus* rush-pasture

7.6.44 This community is one of the most common within the survey area. Soft rush tussocks are the most obvious feature of this community and are frequent throughout. Between these tussocks is a species-poor sward of Yorkshire fog, creeping bent and rough meadow-grass (*Poa trivialis*). It is distinct from other rush-dominated communities by the higher frequency of grasses that are frequently grazed, which maintains the open, short sward of the grass pasture between the tussocks of rush species.

7.6.45 Despite covering a relatively large area, this community is uniform and all habitats on site conform to the MG10a typical sub-community. This particular sub-community has no distinguishing features of itself, but is defined by the lack of species contained within the other MG10 sub-communities.

MG12 *Festuca arundinacea* grassland

7.6.46 True MG12 communities are exclusively coastal and are maintained by periodic inundation by brackish water. There is a single community recorded just within the eastern corner of the site, beyond the proposed location for turbine 6, which forms a mosaic with MG6 grassland and represents a mixed sward together with MG6 grassland. Although the area of MG12 is not directly set on the coast, or subjected to brackish water, the community is found on free-draining soils and will be subjected to small amounts of salt spray during stormy conditions, due to the site's relatively close proximity to the coast, albeit in an upland habitat. It is not a typical MG12 community and cannot be considered representative of its type within the UK, but rather MG12 is the closest fit to the habitat. Tall fescue (*Festuca arundinacea*) is frequent within the stand with other associates including creeping bent, red fescue, sweet vernal-grass, smooth meadow-grass (*Poa pratensis*) and creeping thistle (*Cirsium arvense*). The presence of Yorkshire fog and lack of a typical range of halophytes aligns this closer to the MG12a *Lolium perenne* – *Holcus lanatus* sub-community; however, as it is a poor fit to the sub-community, it has not been assigned.

MG13 *Agrostis stolonifera* – *Alopecurus geniculatus* grassland

7.6.47 This community occurs as a small linear stand, mixed with M23a rush-pasture, adjacent to the west of Fardens Farm (well outwith the turbine envelope), following a small drainage ditch that periodically flushes the surrounding soils. As the ground surrounding the drainage ditch maintains a wet substrate, species such as creeping bent, marsh foxtail (*Alopecurus geniculatus*), creeping buttercup and floating sweet-grass (*Glyceria fluitans*) are frequent. There are no sub-communities associated with MG13 grasslands.

Woodland and scrub

7.6.48 The lower Skelmorlie Glen and Fardens Glen are characterised by ash and alder-dominated wet woodland. The Meigle Burn, crossed by the proposed access route, has a similar riparian woodland to either side of the burn channel. A small area of birch-dominated woodland is present at the upper end of Fardens Glen; birch-oak woodland is present around the confluence between the Fank and Rigg hill burns. In addition, a number of tree lines are present around Fardens and close to Barr Farm, primarily comprising mature beech. The following NVC communities are present:

W4 *Betula pubescens* – *Molinia caerulea* woodland

7.6.49 W4 woodland occurs in one area, at the upper end of Fardens Glen and just outwith the site. Downy birch (*Betula pubescens*) is the dominant tree species, with only very small numbers of alder (*Alnus glutinosa*) and grey willow (*Salix cinerea*) present. The ground flora is moderately wet underfoot and contains a species-poor sward of tufted hair-grass (*Deschampsia cespitosa*), purple moor-grass (*Molinia caerulea*), soft-rush, Yorkshire fog and occasional broad buckler-fern (*Dryopteris dilatata*).

Due to the waterlogged conditions of the ground, bog-mosses are common and form a carpet within the tussocks of vascular plants.

- 7.6.50 This habitat has been assigned to W4b *Juncus effusus* sub-community, which is a woodland of base-poor, acidic mire conditions. The vascular plants within the ground flora are often tussock forming species, though tussocks are rather rare within this woodland stand, due to grazing which reduces the formation of tussocks.

W7 *Alnus glutinosa* – *Fraxinus excelsior* – *Lysimachia nemorum* woodland

- 7.6.51 This community was only recorded in mosaics with W11 woodland. Alder is normally dominant or co-dominant with ash (*Fraxinus excelsior*), though the composition of the canopy species varies considerably in some places and forms very few distinct stands. Rowan (*Sorbus aucuparia*), silver birch (*Betula pubescens*), grey willow and hazel (*Corylus avellana*) are frequent associates within the community. Eared willow (*Salix aurita*) and rowan tend to occur in greater frequency closer to the upland fringes of the survey area. The ground flora is equally as varied as the canopy and includes a variety of forbs and grasses (see Appendix 7.2). Non-native species are also a prominent feature in the W7 woodland, with rhododendron, sycamore (*Acer pseudoplatanus*), beech (*Fagus sylvatica*) and bird cherry (*Prunus padus*). These non-natives occur widely throughout the woodland and significantly reduce the diversity of ground flora in some locations, particularly where rhododendron and beech are present.

- 7.6.52 As the W7 woodlands occur in mosaics with W11 woodland and have a varied species composition, none of the W7 communities can be assigned to a sub-community.

W11 *Quercus petraea* – *Betula pubescens* – *Oxalis acetosella* woodland

- 7.6.53 This is one of the most abundant woodland communities within the survey area, where it often forms complex mosaics with W7 woodland. Pure stands are present in some areas, but they are small in size and limited in distribution. The woodland canopy is dominated by a large range of native species, including sessile oak (*Quercus petraea*), pedunculate oak (*Quercus robur*), downy birch, ash and alder. The lower canopy is dominated mainly by hazel, but lower numbers of wych elm (*Ulmus glabra*) and rowan are also present.

- 7.6.54 Non-native species are a dominant feature within all areas of this community and may in many cases undermine the rationale for classing this woodland as semi-natural. Sycamore, beech and rhododendron are particularly prevalent within some areas of the community. The dominance of these non-native species has a number of negative effects, including crowding and shading of the ground flora. This has reduced the native species diversity both in the canopy and at ground level.

W23 *Ulex europaeus* – *Rubus fruticosus* agg. scrub

- 7.6.55 One small area of this community is located south of Barr Farm and outwith the site. The stand is small in size and the scrub is a very dense mix of gorse (*Ulex europaeus*) and bramble (*Rubus fruticosus* agg.), with few other species notable. The density of the scrub does not allow light to reach the understory and as such is quite bare. Sweet vernal-grass and common bent are the only vascular plants that occur frequently, though these are largely restricted to the edges of the scrub where light levels are greater.

Non-NVC habitats

- 7.6.56 A number of habitats that are not classified within the NVC system were encountered during the survey. The following habitats were recorded:
- Running water;
 - Standing water;
 - Broadleaved plantation woodland;
 - Conifer plantation;
 - Bare ground;
 - Buildings; and
 - Gardens.
- 7.6.57 A number of tributary burns and drains were recorded across the site, in addition to the Skelmorlie Water Fardens Glen Burn, Riggill Burn, Fank Burn and Meigle Burn. Many of these watercourses are particularly minor, draining the marshy grassland slopes to either side of the main watercourse channels.
- 7.6.58 Standing water is present in the form of a small pond located to the south of the proposed main access route and some bog pools are found in the northern part of the site, associated with wet moorland habitats.
- 7.6.59 One mature broadleaved plantation, located to the southern side of the survey area and outwith the site, south of Barr Farm, does not conform to any described NVC community. This is comprised of beech and was likely planted as a shelterbelt for livestock. The woodland has a loose, open canopy with a short grassy sward on the ground that is maintained through grazing. A small area of coniferous (monoculture) plantation was also noted outwith the site, at the western edge of the study area, close to Meigle.
- 7.6.60 Bare ground, buildings and some garden areas were noted, but not described fully, as being private land outwith the main access route and proposed turbine location areas. These include both the Fardens and Barr farms; and several residential properties and the holiday park of the main access route.

Groundwater-Dependent Terrestrial Ecosystems

- 7.6.61 GWDTEs are classified according to SEPA (2017), defining each NVC community on their potential dependency on groundwater. Groundwater dependency is often linked to wetlands that contain flora that is dependent upon the chemical composition of the water fed from a groundwater source. SEPA defines the habitats with regard to their potential for groundwater dependency, therefore not all communities listed may be truly groundwater dependent. See Chapter 10 Geology, Peat, Hydrology & Hydrogeology for further details of the assessment of groundwater dependency.
- 7.6.62 Table 7.5 lists the NVC communities that have a potential for groundwater dependency (see Appendix 7.2a and its Annex B Figures 1 and 2). The table categorises each habitat type according to whether they are likely to be moderately or highly groundwater dependent, as defined by SEPA (2017). In total, there are four communities listed as moderate and six communities listed as high potential for groundwater dependency. These are shown on Figure 10.5.

Table 7.5 - Potential GWDTE Recorded on Site

NVC code	NVC community name	GWDTE potential
M15	<i>Trichophorum germanicum</i> - <i>Erica tetralix</i> wet heath	Moderate
M25	<i>Molinia caerulea</i> - <i>Potentilla erecta</i> mire	Moderate
MG10	<i>Holcus lanatus</i> - <i>Juncus effusus</i> rush pasture	Moderate
U6	<i>Juncus squarrosus</i> - <i>Festuca ovina</i> grassland	Moderate
M6	<i>Carex echinata</i> - <i>Sphagnum fallax/denticulatum</i> mire	High
M10	<i>Carex dioica</i> - <i>Pinguicula vulgaris</i> mire	High
M23	<i>Juncus effusus/acutiflorus</i> - <i>Galium palustre</i> rush pasture	High
M37	<i>Palustriella commutata</i> – <i>Festuca rubra</i> spring	High
W4	<i>Betula pubescens</i> - <i>Molinia caerulea</i> wet woodland	High
W7	<i>Alnus glutinosa</i> – <i>Fraxinus excelsior</i> – <i>Lysimachia nemorum</i> woodland	High

7.6.63 Chapter 10 Geology, Peat, Hydrology & Hydrogeology includes a hydrological assessment of these wetlands; it concluded that all are surface water fed.

Species

Badger

7.6.64 As described in the confidential Appendix 7.3, the site surveys, found evidence of badger within the site and wider study area. Evidence included both active and inactive setts (a number of defunct setts were also recorded), with associated evidence including a dung pit, badger hair, latrine, snuffles and mammal paths (see Confidential Figure 7.4). Three active badger setts (two main and one outlier sett) were identified in the 2018 survey: Fresh excavation, extracted bedding and footprints indicated that the setts were in current use. Several other setts were identified, but these were disused or defunct (see Appendix 7.3 for further details).

7.6.65 A badger skeleton and fur were also found, in close proximity to both a disused and an active sett.

7.6.66 The site, in particular the areas of gorge woodland, contains a network of mammal paths and some areas of recent digging on the woodland floor. However, there was a heavy presence of livestock, as well as deer throughout the site. Any pathways or areas of digging (except for one location close to an active sett) had no further evidence to suggest the presence of badgers; often sheep or deer prints were present.

7.6.67 Anecdotal evidence from the landowner at Barr Farm, in September 2018, noted that badgers commute across the area, although no evidence was recorded during turbine envelope site survey. No evidence of badger presence was recorded in the main site access track survey.

Otter

7.6.68 As described in Appendix 7.4, a total of three otter spraint sites were identified within the survey (see Figure 7.5). All three territory markings were identified as extremely old and one corresponded to findings in 2014 (see Appendix 7.4 for further details).

7.6.69 The age of the spraints indicates very occasional otter presence in the Skelmorlie catchment, with this likely a small part of a large territory. The location identified in 2014 appeared eminently suitable for use as a shelter; however, the results of the 2018 survey suggested no use made of this resting site in at least four years, despite the presence of fish prey (see *Fisheries*, below).

7.6.70 No evidence of otter use of the Meigle Burn was identified during survey of the proposed access route.

Bats

7.6.71 Preliminary investigations of bat presence in the original wind farm area were conducted in 2013. With an updated site boundary and a reduced application area, the original results were used to guide the 2016 survey programme (see Appendix 7.5) and subsequent 2018 re-survey. Bat roost potential assessment of the access track connecting the site to the public road network was conducted in October-November 2019. A further 11 trees were recorded on the access between Barr Farm and the proposed location for turbine 4.

Preliminary Roost Assessment

7.6.72 As described in Appendix 7.2, the survey for the access track route corridor, which will connect the site to the public road, indicated the presence of 16 trees with potential roost features (PRFs), eight of which were assessed to have Moderate potential for use, the remainder being assessed to have Low potential. Nine of these trees were climbed and fully inspected, but no evidence of bat use was identified. The remaining seven trees could not be fully inspected.

7.6.73 Several agricultural buildings, close to the main access, were also identified to have PRFs and were assessed as having Moderate potential for use.

Transect Surveys

7.6.74 A total of 866 passes were recorded during the transect programme, with both common and soprano pipistrelles (plus unidentified pipistrelles recorded at 50-51kHz) and *Myotis* species noted (N.B. *Myotis* species could only be identified to genus level).

Automated Bat Detector Surveys

7.6.75 A total of 7728 bat passes were recorded in 2016, identified as:

- Common pipistrelle (65.3% of passes);
- Soprano pipistrelle (25.6%);
- Unidentified pipistrelle (8.3%);
- Nathusius' pipistrelle (0.4%); and
- *Myotis* species (0.4%).

7.6.76 Data collected in Skelmorlie Glen provided the majority of the data, with 53.1% at Location 6 (downstream, by the western application boundary) and 37.5% at Location 3 (upstream by the eastern site boundary). The other locations returned 2.8%, 2.7%, 2.5% and 1.4% of the pass data (Locations 5, 4, 1 and 2, respectively). See Figure 7.6 and Appendix 7.5 for more details.

7.6.77 Of a total of 8510 passes in 2018, the majority were for the common and soprano pipistrelles: common pipistrelle was recorded most frequently, followed by soprano pipistrelle. Throughout the survey period, a total of three species and two genus was identified with certainty, with the following approximate percentages; common pipistrelle 49.7%, soprano pipistrelle 39.6%, brown long eared 3%, *Nyctalus* species 1.1% and *Myotis* species 5.3%. When compared to the 2016 bat survey, two additional species were recorded (*Nyctalus* and brown long eared bat), but Nathusius' pipistrelle was found to be absent in 2018. Unidentified pipistrelle bats registered at 50-51Khz accounted for 1.3% of the activity. The results of both the 2016 and 2018 static detector studies indicated that the majority of bat activity is associated with the closed, sheltered riparian and linear habitats around the Skelmorlie Glen SSSI. *Nyctalus* species bats were also recorded to favour the habitat of the west and south of the survey area, with the majority of activity recorded around the

woodland of Skelmorlie Glen. Additionally comparison to weather data suggests that bat activity across the site is higher at lower wind speeds.

Fisheries

- 7.6.78 The Skelmorlie Water has a steep gradient, with four upstream barriers to migratory fish species comprising a mix of waterfalls and cascades.
- 7.6.79 The fish survey found that most survey sites have some habitat suitable for a mixture of age classes of juvenile salmonids and the substrates found at the survey sites include the clean gravels that are necessary for successful spawning.
- 7.6.80 No Atlantic salmon were identified in the channel; however, high numbers of brown trout were recorded (with flounder in the tidal area). Results from the upstream sampling site indicated a resident trout population above the impassable barriers (N.B. impassable from the lower channel), with the presence of the sea trout possible in the reaches accessible from the coast.
- 7.6.81 No areas of potential habitat for lamprey ammocoetes were found; lamprey species tend to favour silt or sand deposits found at the margins of a channel – a feature generally absent from the Skelmorlie Water.

7.7 Evaluation of Recorded Features

- 7.7.1 For brevity, the assessment of features is summarised in Table 7.6, below. Ecological features of local and higher value are considered IEFs.

Table 7.6 - Summary of Value of Recorded Features

Feature	Evaluation	Value
Skelmorlie Glen SSSI	For designated sites, the value corresponds to the level of the designation	National
Shielhill Glen SSSI		National
Ballochmartin Bay SSSI		National
Cumbraes cMCA		National
Skelmorlie Glen and Fardens Glen LNCS		Council area
Clyde Muirshiel Regional Park		Council area
Noddsdale Water (Brisbane Glen) & Kilburn Glen Provisional LNCS		Council area
Kelly Glen and Reservoir LNCS		Council area
Knock Castle and Routenburn Provisional LNCS		Council area
Oakfield (Kellybank) LNCS		Council area
AWI Woodland		Council area
Broad-leaved Woodland	Woodlands contained within the designated areas are considered to be of the value assigned to the designation (see above). Old sessile oak woodlands: this Annex I habitat most closely aligns with the with SBL and Ayrshire LBAP woodland priorities	Old sessile oak woodlands: Local

Feature	Evaluation	Value
	Broad-leaved plantation, scattered trees/tree lines – a small shelter-belt plantation area was noted at the southern extent of the NVC survey area; scattered tress and several limited tree lines, present to both sides of the Skelmorlie Water. These areas do not align with the SBL or LBAP woodland descriptions. They are considered of limited ecological value on their own, though form part of a wider landscape resource	Broad-leaved plantation, scattered trees and tree lines: Less than Local
Coniferous plantation forestry	A small area within the NVC survey area; this does not align with the SBL or LBAP woodland descriptions and has low ecological value due to extent and monocultural nature	Less than local
Blanket bog/mires/flushes	M10, M17, M18, M19a, M20b and M25a mires are noted as potential Annex I habitat types, which are also listed on the SBL and come under the Ayrshire LBAP. M20 <i>Eriophorum vaginatum</i> blanket mire is a poor quality, degraded habitat. Although some stands are small and fragmented and lack peat-building species, most of the larger stands are likely to be active, as indicated by the presence of peat building mosses.	Local: M10, M17, M18, M19a and M25a Less than local: M20
Wet heaths	M15a and M15d are noted as Annex I habitats; Upland Heaths are also noted as of importance on the SBL and Ayrshire LBAP M15 habitat occurs in small fragmented stands throughout the survey area. The stands are often situated on shallow peat and have been modified through grazing and possibly burning; however, where the M15 communities form distinct stands, they are considered to be of high value. Though there are some areas set within mosaics, these are often diffuse in their floristic composition and are therefore not considered to be of Annex I quality (see Appendix 7.2 for further detail)	Local
Springs	Found in mosaic, but limited in extent; M37 <i>Palustriella commutata - Festuca rubra</i> spring (Annex I habitat) is associated with M23/M25 mosaic, on the track route beyond T9 (to T7 and T10). It most closely aligns with the with SBL and Ayrshire LBAP blanket bog priorities	Local
Marshy grassland	A widespread and common habitat type used as a grazing resource and therefore highly disturbed by livestock.	Less than local

Feature	Evaluation	Value
	M23 rush pastures are not identified as priorities on either the SBL or Ayrshire LBAP	
Semi-improved acid grassland	A relatively small component of the site grasslands recorded as the U4b NVC community to the south of the application boundary, within the next catchment. It is generally of low ecological value due to grazing, and aligns poorly to the SBL and LBAP Lowland dry acid grassland habitat descriptions	Less than local
Improved grassland	The majority of the application area is identified as MG10 grassland; used for livestock grazing, this is of agricultural value, but generally low ecological value	Less than local
Standing water	Standing water comes under the SBL and is on the LBAP priority habitats list; however, this is a very limited resource within the site and wider study area	Less than local
Running water	Skelmorlie Water and numerous small watercourses on site; <i>Rivers</i> are listed on the SBL and aligns with the LBAP priority habitat <i>Rivers and Streams</i>	Local
Bare ground	No identified ecological value	Less than local
Buildings	No identified ecological value	Less than local
Gardens	No identified relevant ecological value	Less than local
GWDTE	Large areas of potential GWDTEs are assessed in Chapter 10 Geology, Peat, Hydrology and Hydrogeology to be surface-water fed (see Figure 10.5).	Less than local
Badger	Present within the valleys and in relatively close proximity to the site infrastructure. Common and widespread, but protected due to historic persecution	Local
Otter	EPS, SBL-listed and an important species on a Council area level; however, no recent evidence of presence on site (only very old spraints recorded) suggesting no more than occasional presence otters now occur in most Scottish catchments	Less than local
Bats	EPS, SBL and LBAP species. Foraging/commuting habitat on site is used primarily by the common and soprano pipistrelles, with low numbers of brown long eared bat, <i>Nyctalus</i> species and <i>Myotis</i> species. Nathusius' pipistrelle was recorded in 2016 but not in the 2018 surveys.	Leisler's bat, common pipistrelle and soprano pipistrelle: Local

Feature	Evaluation	Value
	<p>SNH <i>et al.</i> (2019) (adapted from Wray <i>et al.</i> 2010) consider <i>Nyctalus</i> bats (either Leisler's bat or noctule) in Scotland to be of high risk to wind farms 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 <i>et al.</i> (2018) concluded that there was insufficient data to make a population estimate for <i>Nyctalus</i> species at the national level, although they estimated the Scottish population of Leisler's bat to number 6,100 adults. Work by Newson <i>et al.</i> (2017) 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) in southern Scotland overlaps with existing and approved wind farms, with 50% of this overlap concentrated at 10% of the wind farms, indicating that there are very localised risk areas for these species. The spatial modelling also predicted the distribution of <i>Nyctalus</i> species to be mainly in the south western (Leisler's bat) and south eastern areas (noctule); with <i>Nyctalus</i> bats within the area of the Proposed Development likely to comprise Leisler's only, but the area is well out with the core area for Leisler's bat. Considering this and the low abundance of <i>Nyctalus</i> bats on site, both species are given a less than local value.</p> <p>Soprano and common pipistrelles are considered to be of medium population vulnerability to Scottish wind farms, as they are common species, but individuals have a high risk of collision with turbines (SNH <i>et al.</i> 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 <i>et al.</i> 2018). The spatial modelling by Newson <i>et al.</i> (2017) predicted the distribution of pipistrelle species to be widespread across southern Scotland, 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.</p>	<p>Brown long-eared bat, <i>Myotis</i> and <i>Nyctalus</i> bats: Less than Local</p>

Feature	Evaluation	Value
	Brown long-eared bat and <i>Myotis</i> bat are considered to be of low population vulnerability to Scottish wind farms as they are medium-rare species, but individuals have a low risk of collision with turbines (SNH <i>et al.</i> 2019). Considering their low abundance within the site, both species are assigned a less than local value in the assessment	
Red squirrel	Not recorded as present on site; foraging mix is sub-optimal and grey squirrels are present	Less than local
Water vole	Not present on site	Less than local
Pine marten	Not present on site	Less than local
Reptiles	Not recorded on site, but potentially suitable habitat is present	Less than local
Amphibians	Not recorded on site, but potentially suitable habitat is present	Less than local
Great crested newt	Not present on site	Less than local
Fish	Migratory fish access to the upper catchment is blocked by high waterfalls within the gorge sections of the Skelmorlie Glen; Resident brown trout population identified within the wind farm site	Brown trout: Local Other species: Less than Local

7.8 Assessment of Potential Effects

7.8.1 This section provides an assessment of the likely effects of the Proposed Development on vulnerable IEFs (see Table 7.9 for a summary). 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.

7.8.2 The consent being sought for the Proposed Development is for 30 years. In the event of the development being decommissioned, the potential effects arising from decommissioning are considered to be the same or less significant than those arising from the construction phase.

Description of the Proposed Development

7.8.3 The Proposed Development will be accessed from the south-western corner of the site, initially following the route of the extant Barr Farm track up the southern side of the Skelmorlie Glen. This will be accessed from the public highway via a section of proposed new access road commencing from just south of Meigle.

7.8.4 The final layout comprises ten turbines (see Chapter 3 Proposed Development), and their associated infrastructure, including hardstanding, access tracks, substation and borrow pit, as shown in Figure 3.1 and described in Chapter 3 Proposed Development.

- 7.8.5 The proposed locations of the turbines have been defined, in order to enable the EIA to fully describe the Proposed Development for which permission is being sought. The British National Grid coordinates denoting where the turbines are proposed to be located are given in Chapter 3 (Table 3.2).
- 7.8.6 The main elements of the Proposed Development which have the potential to impact on IEFs, both during construction and operation are:
- Cut track construction (effective running surface of 5m, with batters and drainage swales to a total of c.10m width), including bridging/culverting of watercourses and mobile plant traffic movements;
 - Turbine foundation creation (including excavation, steel work and concrete pouring, piling if required, etc.);
 - Crane pad construction;
 - Cable-laying and grid connection infrastructure (including a substations, control compound and a met mast);
 - Temporary lay-down and construction compound areas;
 - Temporary materials storage (soils);
 - Site water management; and
 - Site restoration (track batters, compounds, etc.).
- 7.8.7 The above activities have the potential to cause the following construction impacts to the IEFs identified for the site:
- Direct loss of habitat;
 - Direct loss of foraging habitat and/or breeding habitat for protected species;
 - Indirect loss of foraging habitats and/or breeding habitat for species, through displacement; and
 - Disturbance to habitats and species (including noise, vibration, pollution), due to track and turbine base construction, as well as turbine erection, heavy machinery, noise and human activity on the site. Disturbance of vegetation will potentially affect a 5 m zone around all infrastructure.
- 7.8.8 The potential operational impacts have been identified as:
- Habitat change (modification) over time, e.g. drying of peaty or marshy substrates which may affect areas up to 10m around cut track;
 - Direct and indirect loss of foraging or breeding habitat due to displacement or avoidance by site faunal species;
 - Bat collision or barotrauma from the operational wind turbines; and
 - Cumulative impacts of the Proposed Development in the context of other nearby wind farms (operational and consented).

Standard Mitigation

- 7.8.9 In line with current CIEEM guidelines (2018), the assessment of potential effects is carried out in the presence of any standard mitigation measures. As noted in Chapter 2 Design Iteration, current best practice guidance has provided a framework for the consideration of key design issues including

turbine size, layout composition and wind farm design in relation to landscape character and designing for multiple wind farms (SNH, 2014).

7.8.10 The design has gone through seven iterations (A to G) to arrive at the design which best fits the site and the various constraints identified within this EIAR (i.e. including, but not limited to, ecological considerations).

7.8.11 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:

- Adherence to current environmental protection policies and guidance, including but not limited to:
 - Good Practice During Wind Farm Construction (SNH, 2019a);
 - Constructed tracks in the Scottish uplands (SNH, 2015);
 - WAT-SG-75: Sector Specific Guidance: Construction Sites (SEPA, 2018);
 - A Practical Guide to the CAR Regulations (SEPA, 2019); and
 - LUPS-GU31: Guidance on Assessing the Impacts of Windfarm Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems (SEPA, 2017).
- Design mitigation has included the following measures:
 - Any trees requiring to be felled will be replaced (replacement species and size to be chosen as appropriate to the loss);
 - Adherence to a low site speed limit, to prevent potential collision with site wildlife;
 - Any watercourse crossings will be designed to enable passage by fish, i.e. will avoid perched invert and will be sufficiently large to facilitate fish passage and to avoid problems with flow rates being too fast for fish to swim against;
 - Electrical infrastructure cabling will be installed alongside tracks, wherever possible, to further minimise habitat loss;
 - Turbines have been sited at least 50m from standing water and watercourses;
 - Turbines and infrastructure have also been sited to avoid areas of deeper peat/blanket bog or heath habitat as far as practicable;
 - Application of a minimum buffer of 50m around badger setts;
 - Application of a minimum buffer of 85m around features suitable for foraging and commuting bats, e.g. woodland edges, to ensure a minimum 50m distance between rotor-swept areas and the bat features; and
 - Application of a no-disturbance buffer of at least 30m around trees with identified bat roost potential.
- The Applicant 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;

- Pre-construction ecological survey programme of habitats and watercourse crossing points, to identify any changes to other use of the channels, to feed into the final micro-siting process;
- Preconstruction survey for badger use of the site habitats, to confirm changes in use or creation of new setts. This will provide sufficient time for consultation with SNH, agreement of a way forward and to obtain the relevant disturbance licensing, should a sett be identified within the working area;
- Preconstruction survey for bat use of the site trees, to confirm changes in use. This will provide sufficient time for consultation with SNH, agreement of a way forward and to obtain the relevant disturbance licensing, should a tree roost be identified within the working area;
- 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 10 - Geology, Peat, Hydrology and Hydrogeology and will include:
 - For water crossings: identification of all Controlled Waters that may be affected by the works and temporary discharge points to these watercourses; the number of watercourse crossings have been minimised as far as possible; a 50m buffer implemented for all watercourses considered to have continuous flow throughout the year, except where watercourse crossings are required; the construction compounds and substation have also been located further than 50m from known watercourses
 - 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 North Ayrshire Council, in consultation with SNH and SEPA, post-consent but prior to development commencing.
- Site Water Management Plan (SWMP);
- Materials Management Plan (MMP; to include a Waste Policy/Management Plan);
- Definition of site plant/vehicular movement controls and speed limits to prevent RTA risk to livestock and wildlife; and
- Construction Method Statements to cover each operation and including standard measures such as covering pipes at end of day, providing escape ramps within excavations and establishing a site speed limit to reduce the potential for collisions with wildlife.

Receptors Brought Forward for Assessment

7.8.12 Taking into consideration the collated baseline data, design layout considerations, design mitigation and project assumptions, and using both professional judgement and available guidance, IEFs are either scoped in or out of the assessment. Table 7.7 details the rationale for doing this:

Table 7.7 – IEFs scoped in or out of the assessment

Feature	Value	Rationale	Scoped-in/out
Skelmorlie Glen SSSI	National	While the SSSI is downstream of proposed crossing points (the closest tributary crossing is c.180m away; the Skelmorlie Water crossing is over 1km away), its designated mixed ash woodland habitat is outwith the physical disturbance zone of construction activities, with the closest works area (the T3 location), being c.120m distant)	Out
Shielhill Glen SSSI Ballochmartin Bay SSSI	National	The Proposed Development lies within another catchment area and has no direct hydrological connection to either SSSI. Nor are the qualifying features of the SSSIs dependent on habitats or processes within the Proposed Development site boundary	Out
Cumraes cMCA	National	This is a marine designation and outwith a potential ecological zone of influence	Out
Skelmorlie Glen and Fardens Glen LNCS	Council area	The LNCS covers the upper reach of the wooded glen and includes AWI category 2a Ancient (of semi-natural origin) woodland to be crossed by the scheme's main spine access track The Meigle Burn crossing, through riparian woodland of 2b Long-established (of plantation origin) also has both LNCS and AWI designation	In
Clyde Muirshiel Regional Park	Council area	The Proposed Development lies within another catchment area and has no direct hydrological connection to the park. Nor are species and habitats within the park dependent on habitats or processes within the Proposed Development site boundary	Out
Noddsdale Water (Brisbane Glen) & Kilburn Glen Provisional LNCS Kelly Glen and Reservoir LNCS	Council area	The Proposed Development lies within another catchment area and has no direct hydrological connection to either LNCS. Nor are the features of the LNCSs dependent on habitats or processes within the Proposed Development site boundary	Out

Feature	Value	Rationale	Scoped-in/out
Knock Castle and Routenburn Provisional LNCS Oakfield (Kellybank) LNCS			
Lower Skelmorlie Glen AWI Woodland	Council area	The AWI woodland within the lower glen will be undisturbed by construction and operation of the Proposed Development. This includes the full extent of the category 1a woodland, which extends a short distance upstream of the SSSI-designated area	Out
Old sessile oak woodlands (outwith designations)	Local	W11 woodland is present in one undesignated area of the lower Fank Burn and Rigghill Burn valleys. At 35-40m distant, this is outside of the disturbance zone.	Out
Blanket bog/mires/flushe	Local	M17 and M18 are >550m distant and over the next watershed to the north; and the closest M19a mire is >100m uphill of the nearest infrastructure. These can therefore be scoped out of the assessment. Blanket bog IEF within the EZol includes M10 and M25 mire.	Out: M17, M18, M19 In: M10, M25
Wet heaths	Local	Wet heath – occurs >300m from the nearest part of the Proposed Development and will therefore not be disturbed	Out
Springs	Local	M37 springs associated with U4 grassland are >350m from the nearest part of the Proposed Development and will therefore not be disturbed. M37 springs associated with U5 grassland are >200m outwith the disturbance zone of the T8 location and will not be disturbed	Out
Running water	Local	Numerous burns are present within the Proposed Development and several will be crossed. However, following application of standard water crossing mitigations, significant impacts are not expected	Out
Badger	Local	This nationally protected species is found within the site, including within 100m of the scheme infrastructure. Badger therefore have the potential to be present within proximity to the construction works	In
Bats	Local	Potential roost features were within 30m from the access track. As described in Appendix 7.2, given the levels of disturbance	Out: Roosting bats, foraging

Feature	Value	Rationale	Scoped-in/out
		<p>already present, due to the active farm and existing farm track over the Meigle Burn, there is only potential for disturbance if works are to take place within 10m of a tree that could not be expected. Works areas will be designed to observe this buffer under the supervision of the ECoW, and impacts on roosting bats from construction machinery are therefore unlikely. There is no identified or potential roost within 250m of a turbine. As they are outwith 30m, the farm buildings, identified to have PRFs, will not be disturbed.</p> <p>Common and soprano pipistrelles comprise the largest group potentially vulnerable to impacts, due to their relative abundance within the Site and foraging behaviour along edge habitats.</p> <p>Leiser's bats are rare on the site and the few that were recorded were active in the lower Skelmorlie Glen, away from the proposed turbine locations.</p>	<p>or commuting Leisler's bats</p> <p>In: foraging or commuting common pipistrelle and soprano pipistrelle bats during operation</p>
Fish	Local	<p>Resident brown trout. The access track is to cross the upper reaches of the Skelmorlie Water and the Rigghill and Fank burns. Following application of standard water crossing mitigations, no significant impacts are expected</p>	Out

Potential Construction Effects

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

Designated Sites

Skelmorlie Glen and Fardens Glen LNCS

7.8.14 The Skelmorlie Glen and Fardens Glen LNCS corresponds to the AWI woodland areas of the Meigle Burn and upper Skelmorlie Water. Both of these designated areas will be crossed by the site access route. The Meigle Burn crossing will utilise an existing farm crossing, which will require upgrade to carry construction traffic and may require felling or pruning of trees, depending upon the width requirements of the turbine transports. The Skelmorlie Glen crossing point will involve a loss of habitat to the footprint of the access track crossing the watercourse gorge. These crossing points have been chosen to utilise existing infrastructure (Meigle Burn) or a narrow point (Skelmorlie Water) to traverse the riparian woodland and watercourse channels, in order to minimise the loss of trees to the land-take required for the track width and crossing foundations.

7.8.15 A conservative estimate for habitat loss has been based on the width of the AWI-designated area, which is wider than the actual wooded area and the track width plus a buffer of 2m; at 0.14ha for the Meigle woodland and 0.22ha for the upper Skelmorlie Glen crossing, this represents 1.32% of the total W7/W11 mosaic resource. Actual land-take will be determined by the final design of the crossings. Based on the percentage of the resource, the predicted loss of this woodland is

considered a low impact magnitude, **negligible** long-term **adverse** and therefore **not significant** effect under the EIA Regulations.

- 7.8.16 However, the primary impact of felling will be to the designated areas of the AWI/LNCS: Removal of trees from the upper part Skelmorlie Glen and Fardens Glen LNCS will be a long-term irreversible loss, with the scale of loss limited in extent. This is assessed to be a low impact magnitude, **minor** level long-term **adverse** and **not significant** effect under the EIA Regulations, to the designated area of the upper Skelmorlie Glen.
- 7.8.17 Loss of trees as a result of upgrade works to the Meigle Burn crossing will be limited to a narrow corridor either side of the existing crossing; this is assessed to be a low impact magnitude, **negligible** long-term **adverse** effect and **not significant** under the EIA Regulations, based on the scale of works and predicted loss of area.

Habitats

- 7.8.18 Impacts on habitats may include permanent and temporary direct loss, such as habitat lost to the footprint of infrastructure or temporary loss to construction compounds. Indirect impacts can be experienced through increased habitat fragmentation, changes caused by pollution, or effects to supporting systems such as changed water-table levels which result in a habitat transitioning into another type.
- 7.8.19 The most obvious direct loss during the construction phase of the Proposed Development relates to the land-take of the access tracks, hard-standings, turbine bases and control compound (including the substation). Temporary laydown areas and construction compounds will be allowed to naturally regenerate, once the project has been completed. It is proposed that part of the temporary construction compound at the site entrance would become car parking for visitors wishing to access the site for recreational purposes.
- 7.8.20 Direct loss will be to the footprint of the infrastructure, while indirect loss refers to the disturbance zone around this infrastructure in damp or wet habitats, where a transitional habitat is likely to be formed between the infrastructure and the surrounding habitats. This zone has been defined as a worst-case 10m buffer around the infrastructure elements of the Proposed Development (in practice, transition strips are likely to be reduced for drier vegetation types). As detailed in Table 7.8, below, a total direct loss of 8.79ha of habitat would be lost to the infrastructure footprint (c.2.64% of the 332.97ha application area); of this area to be lost, 5.49ha is currently MG10 grazing land and a further 0.59ha is MG7 grazing. The remaining 2.71ha is comprised of a range of both wet and dry habitat types. Of these, W7, W11, M10, M20b, M25a and running water are considered IEFs.
- 7.8.21 There is potential for indirect habitat losses to wetland habitats, due to the hydrological changes caused by the footprint of infrastructure and the associated drainage effects. For the purposes of this assessment it is assumed that wetland habitat (i.e. mire, flushes and marshy grassland) losses due to indirect drainage will extend to 10m from infrastructure, i.e. in keeping with indirect drainage assumptions within the carbon calculator (as displayed in Table 7.8, below). 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.

Table 7.8 - Direct and indirect habitat loss by NVC habitat (including mosaics)

Phase 1 habitat type	NVC community or habitat types	Total extent in application area (ha)	Direct habitat loss (ha)	Direct habitat loss as a % of NVC community in study area	Direct & Indirect habitat loss (ha)	Direct & indirect habitat loss as % of type in application area
E1 Blanket bog	M10	0.06	0.01	16.67	0.02	33.33
D2 Wet heath	M15d	1.62	0	0	0	0
E1 Blanket bog	M20/M25	0.69	0	0	0	0
E1 Blanket bog	M20b	14.5	0.40	2.78	0.86	5.93
E1 Blanket bog	M20b/M25a	2.22	0.38	17.12	0.77	34.68
B5 Marshy grassland	M23a	5.38	0.26	4.83	0.61	11.34
B5/E1 Marshy grassland/Blanket bog	M23a/M25a	3.90	0.41	10.51	0.89	22.82
B5/E1 Marshy grassland/Blanket bog	M23a/M6	4.53	0	0	0	0
B5/E1 Marshy grassland/Blanket bog	M23a/M6c/M6d	4.74	0	0	0	0
B5/E1 Marshy grassland/blanket bog	M23a/M6d (M23b/M25a)	8.29	0.64	7.72	1.97	23.76
B5/B4 Marshy grassland/improved grassland	M23a/MG13	0.11	0	0	0	0
B5/C1.2/B4 Marshy grassland/scattered bracken/improved grassland	M23a/U20/MG6	0.22	0	0	0	0
B5 Marshy grassland	M23b	16.26	0.45	2.77	1.40	8.61
E1/B2.2 Blanket bog/semi-improved neutral grassland	M25/U5	0.56	0	0	0	0
E1 Blanket bog	M25a	3.07	0	0	0	0

Phase 1 habitat type	NVC community or habitat types	Total extent in application area (ha)	Direct habitat loss (ha)	Direct habitat loss as a % of NVC community in study area	Direct & Indirect habitat loss (ha)	Direct & indirect habitat loss as % of type in application area
E1 (B5) Blanket bog (marshy grassland)	M25a (M23b)	0.03	0	0	0	0
E1 Blanket bog	M6c	0.92	0.02	2.17	0.07	7.61
E1 Blanket bog	M6d	0.66	0.01	1.52	0.02	3.03
E1 Blanket bog	M6d/M23a	2.59	0.07	2.70	0.34	13.13
E1/B5 Blanket bog/marshy grassland	M6d/M23a (M20)	1.18	0	0	0	0
B4 Improved grassland	MG10a	186.8	5.49	2.94	(5.49)	2.94
B4 Improved grassland	MG12/MG6	4.14	0	0	0	0
B4 Improved grassland	MG13	0.02	0	0	0	0
B4 Improved grassland	MG6a	0.01	0	0	0	0
B4 Improved grassland	MG7	0.04	0	0	0	0
B4 Improved grassland	MG7a	11.45	0.59	5.15	(0.59)	5.15
B4 Improved grassland	MG7b	4.14	0	0	0	0
C1.1 Continuous bracken	U20a	3.79	0	0	0	0
B2.2 semi-improved neutral grassland	U4b	6.86	0	0	0	0
B4/B5/E1 Grass/marshy grassland/blanket bog	U5/M23a/M25a/U20	0.37	0.01	2.70	0.04	10.81
B1.2 Semi-improved acid grassland	U5a	0.11	0	0	0	0
B1.2 Semi-improved acid grassland	U6a	11.26	0.19	1.69	(0.19)	1.69
A1.1.1 Broad-leaved woodland (oak woodland)	W11	0.97	0	0	0	0

Phase 1 habitat type	NVC community or habitat types	Total extent in application area (ha)	Direct habitat loss (ha)	Direct habitat loss as a % of NVC community in study area	Direct & Indirect habitat loss (ha)	Direct & indirect habitat loss as % of type in application area
A1.1.1 Broad-leaved woodland (wet/oak)	W7 and W11 mosaics	27.13	0.36	1.33	(0.36)	1.33
Non-NVC habitats	Non-NVC habitats	4.35	0.08	1.84	(0.08)	1.84
Total		332.97	9.33	-	13.70	4.11

M10 mire

- 7.8.22 Only a small area of the M10 habitat type is predicted to be affected by the construction works: 0.02ha combined total direct and indirect loss, representing 33.33% of the total application area resource. This area corresponds to a small area identified close to the Riggill Burn and the access between T8 and T9. Identified as an Annex I habitat, this represents a very small area of the UK resource of an estimated UK total of 1,633ha which is 1.1% of the estimated 142,753ha European cover (ŠefferoVá Stanová *et al.*, 2008). No exact figures are available for the UK (JNCC, 2007), however the distribution shows a large component in Scotland. Overall condition is recorded as “*Unfavourable-Bad but improving*”. On a UK and Scottish national scale, this area is too small to be considered of significance.
- 7.8.23 With the application of good practice and environmental management techniques, including an appropriate drainage design, it is considered possible to reduce drainage impacts out to either side of infrastructure and thus reduce the transition zone from the assumed worst-case of 10m. When considering the likely direct and indirect habitat losses, the magnitude of impact within a local or regional context is considered to result in a low impact magnitude, **negligible**, long-term **adverse** effect which is **not significant** under the terms of the EIA Regulations.

M25 blanket mire

- 7.8.24 M25 mire, including mosaics dominated by M25 or any mosaic where M25 occurs with M20 mire, account for 5.88ha. There will be a combined total direct and indirect loss of 0.77ha, which represent 13.1% of the M25 blanket mire IEF, although this also includes degraded M20 mire. The total Scottish blanket bog cover is estimated at 1,759,000ha (JNCC, 2019) with the condition noted as stable. With only the M20/M25 habitat being impacted, applying good practice and environmental management techniques, including an appropriate drainage design, when considering the likely direct and indirect habitat losses, the magnitude of negative impact within a local or regional context is considered to be a low impact magnitude, **negligible**, long-term **adverse** effect and **not significant** under the terms of the EIA Regulations.

Running Water

- 7.8.25 Various burns are found across the application area, forming part of the Skelmorlie Water catchment. As an SBL and LBAP habitat, all channels have been considered within the iterative design process.
- 7.8.26 Habitat loss is of particular relevance to fish habitat (and salmonid spawning habitat, in particular). Design iteration has been used to identify crossing points to ensure fish habitat is not severed and potential spawning habitats are avoided. An upgrade of the existing crossing will be used for the Meigle Burn and an arch culvert for the Skelmorlie Water, leaving the channel bed unaffected, with

pipe culverting used on the minor channels. Any such losses of habitat due to use of pipe culverts would be limited to loss of a very small section of bed substrate. Fish habitat lost to pipe culvert installation would be an immediate low impact magnitude, **negligible** long-term **adverse** effect and the effect would therefore be **not significant** under the EIA Regulations.

Species

Badger

- 7.8.27 Given the proximity of badger habitat and active setts to the construction footprint, there is a possibility of presence on site outside of daylight working hours. However, all identified sett locations are outwith the 50m construction disturbance zone for works areas.
- 7.8.28 In the presence of standard mitigation (as noted in Section 7.8 Standard Mitigation, above), including a low site speed limit to avoid the potential for collision and provision of escape ramps in deep excavations, this construction disturbance is considered to be a low impact magnitude, short-term and **negligible adverse** level effect on this feature of local importance and therefore **not significant** under the IEA Regulations.

Potential Operational Effects

Designated Sites

- 7.8.29 No further impacts to the Skelmorlie Glen and Fardens Glen LNCS will be experienced during the operational phase of the wind farm. An assessment of **no impact** therefore applies during the operational phase.

Habitats

- 7.8.30 With habitat loss included under the construction phase of the Proposed Development, the primary effect of the operational phase will relate to the long-term changes of peatland habitats only, due to changes in the hydrological conditions immediately adjacent to the Proposed Development infrastructure. In the presence of standard mitigation, impacts on habitats on mineral soils as well as aquatic habitats are considered unlikely.
- 7.8.31 As the effects of changes to dry habitats have been considered within the construction phase analysis, an assessment of **no impact** therefore applies during the operational phase.

Blanket bog

- 7.8.32 Turbine T9 will be sited on the edge of M20/M25 mire, with a small component of the access track network (<120m) crossing similar mire habitat. The excavated base and sections of cut track will interrupt or deflect the water flow through adjacent peat, which may result in localised drying-out of the peat and the development of more heath-like community along track batters and around the turbine base (with changes likely be within to c.2-3m, a worst-case of 10m has been used for the habitat loss calculations). These changes have been included as construction phase impacts; however, the following identifies the changes that will result commencing from the construction and into the operational phase of the site.
- 7.8.33 Flows of water along the cable routes may result in both localised drying and localised pooling of water (depending upon topographical conditions). Such ongoing processes would result in a low impact magnitude, long-term **less than local** level impact magnitude with the transitioning into a different habitat type, for a very small component of the overall area. This is considered a long-term **negligible adverse** effect and **not significant** under the EIA Regulations.
- 7.8.34 Following the above reasoning, with the predicted degradation and disturbance to the blanket bog resource determined for a small area of the site resource, this change is considered to be of a low impact magnitude, resulting in a long-term **negligible adverse** effect and therefore **not significant** at the local area scale.

Species

Badger

- 7.8.35 Once operational, no significant impacts to the local badger population are likely, because any maintenance works will be conducted during daylight hours and with adherence to speed limits.
- 7.8.36 Following this reasoning, a low impact magnitude, resulting in a short-term, **negligible adverse** and therefore **not significant** effect under the EIA Regulations, applies for the operational phase.

Bats

- 7.8.37 Foraging and commuting use of the site is expected to continue against a new baseline of a slightly altered woodland component for the Meigle Burn crossing and a similar change for the Skelmorlie Water, and the glen will remain a significant feature for commuting and foraging bats during operation.
- 7.8.38 Overall, the data collected by static detectors illustrated that bats were recorded throughout the site, though activity peaked near Skelmorlie Glen. Bat activity was consistently highest by edge and linear features and dominated by common and soprano pipistrelle bats, which prefer such features.

Assessment of Potential Risk to Bat species

- 7.8.39 As noted in Table 7.1, in agreement with SNH this assessment follows the previous standard guidance (Mitchell-Jones and Carlin, 2012). Applying the criteria presented by Mitchell-Jones and Carlin (2012), common and soprano pipistrelle bats were identified as medium risk (low risk at population level). In studies conducted at European wind farms, it is notable that very few casualties have been found of common and widespread species, such as brown long-eared bats (0.09%) or of all *Myotis* spp. (0.6%) (Mathews *et al.*, 2016), whereas research suggests that species in the *Pipistrellus* genus and *Nyctalus* genus are likely to be most at risk from wind turbines.

Bat collision and barotrauma risk within an operational wind farm

- 7.8.40 Bat mortality at wind farms has been attributed to both direct collision with blades and barotrauma (i.e. lung damage) as a result of the extreme air pressure changes caused by a passing blade. Due to the long life span and slow reproductive rate of UK bats, increases in mortality due to wind turbine interaction has the potential to have a significant effect on the size of a local bat population.
- 7.8.41 Both NE (2014) and SNH (2019b) indicate that vulnerability to collision is likely to depend on bat activity relative to the location of turbines and that, due to the non-uniformity of bat activity across a site, risks are also not uniform. Design of the bat surveys, to provide good coverage by detectors, can be an important factor in assessing areas of greatest risk of collision/barotrauma from turbine siting. Risk also reduces with a greater distance from the foraging or commuting habitat; following the buffer calculation (NE, 2014; SNH, 2019b) a distance of at least 50m between a turbine blade tip and the suitable habitat is the minimum requirement to lower the risk of collision.
- 7.8.42 A review of studies of bat mortality on wind farms in north-west Europe (Rydell *et al.*, 2010) has indicated that the estimated annual bat mortality per turbine is lower on flat, open farmland away from the coast, higher in more complex agricultural landscapes, and highest at the coast and on forested hills and ridges. The species most affected are those which are particularly adapted to foraging in open areas, i.e. common and soprano pipistrelles. Additionally, mortality is associated with low wind speeds in late July to early October, with mortality increasing with turbine tower height and rotor diameter, but not associated with distance from the ground of the lowest blade tip or the number of turbines. There are relatively few scientific studies for the effect of large onshore wind turbines on bats in the UK; however, a study of 48 wind farms across the UK by Richardson (2015) indicates that UK mortalities follow a similar pattern to that identified by Rydell *et al.* (2010). The primary species impacted were identified as the common and soprano pipistrelles, with a higher mortality rate for the soprano pipistrelles, likely due to their more frequent hunting within the turbine swept area. Through modelling study data, Richardson (2015) suggests that increasing rotor cut-in speeds (from 3.5 to 5ms⁻¹) is a possible factor in reducing potential bat collision mortality (by a stated 76% for common pipistrelle). Bats may be attracted to turbines as foraging features (NE,

2014). From assessing insect presence, Richardson (2015) further indicates that bats are actually attracted to turbines: higher insect densities were recorded away from the turbines of the study.

- 7.8.43 Weather data suggests that bat activity across the site is higher at lower wind speeds. This potential trend concurs with research conducted by the University of Exeter (Mathews *et al.*, 2016) which suggests that most nights where bat casualties occurred at European wind farms had low mean wind speeds (≤ 5 m/s measured at the ground) and maximum night-time temperatures of $>10^{\circ}\text{C}$, with confidence that most nights with wind speeds >5 m/s will have no casualties.
- 7.8.44 All the turbines are to be located in the open, with a minimum distance of 85m between the turbine bases and the woodland edge. Of the three turbines sited near the woodland, i.e. T3, T4 and T7, only T4 is to be sited at this distance in an almost key-holed location within the woodland edge area (T3 and T7 are in excess of 100m from the woodland edge). Following the buffer calculation as defined by NE (2014) the minimum distance required to the edge is 82m for turbines of the size proposed. The risk to foraging and commuting bats is therefore not likely to be significant.
- 7.8.45 Following the reasoning presented above and in regards to the preferred foraging and commuting habitat (i.e. edge habitats), the potential for collision risk/barotrauma of common and soprano pipistrelle species with turbine blades is assessed as having a low impact magnitude resulting in a **negligible adverse** and therefore **not significant** effect under the EIA Regulations.

Decommissioning

- 7.8.46 The potential decommissioning phase impacts would be the same as those that might occur during the construction phase, but smaller in magnitude.

7.9 Additional Mitigation

- 7.9.1 While included in the Standard Mitigation in 7.9.3 the CEMP and its supporting documents permit the development of a site and species-specific approach to protecting and enhancing the IEFs. Specific habitat and species mitigation measures for the construction and operational phases of the Proposed Development will be defined within the CEMP, to include a Species Protection Plan (SPP) and planting schedule to guide the replacement tree planting programme. These documents are to be prepared in consultation with SNH, SEPA and NAC, prior to works commencing on site. The CEMP and its supporting documentation will be the key driver to protection of the IEFs. Additional mitigation measures for the construction phase include:

Habitats

- Identification of appropriate exclusion zones around sensitive features (wetlands, retained forestry edges, etc.), if applicable, to prevent construction vehicles tracking through these areas;
- Careful strip and retention of turves (with particular reference to marshy grassland vegetation), for re-use in the restoration of track and turbine batters;
- Operative awareness education, in the form of toolbox talks, to ensure the value of the habitat is understood;
- Careful wash-down of plant and other equipment will be mandatory prior to access to or egress from the Proposed Development site, to prevent potential biosecurity risks associated with plant movements; potentially contaminated materials will be identified and the handling of such strictly controlled; and
- Exclusion of livestock from the restored temporary borrow pit areas, to permit habitat recovery free from grazing pressure (which otherwise has the potential to degrade the surface).

Species

- General
 - Construction phase task lighting to be strictly controlled to avoid illumination of edge habitats of the woodland;
 - Controlled site lighting regime during the operational phase, should lighting be required, to reduce lighting impacts. Lighting to be designed to the Institution of Lighting Professionals Guidance Note 8: Bats and artificial lighting (ILP, 2018).
- Badger
 - Avoidance of working in the vicinity of badger habitat during the hours of darkness and within two hours after sunrise and two hours before sunset. This can be reduced to one hour between November and February, due to limited daylight;
 - Use of soft felling techniques, under an appropriate SNH disturbance licence, should an active sett be encountered within the crossing clear-felling area.

7.10 Residual Effects

Construction

- 7.10.1 Although no unmitigated significant effects were predicted for any IEF, the inclusion of management measures (CEMP, SPP and replacement tree planting schedule) and additional mitigation outlined in Section 7.11 will lead to positive effects.

Operation

- 7.10.2 It should be noted that wet habitat transition processes, assessed as a Construction effect, will extend into the operational phase of the Proposed Development, as these habitats reach a new equilibrium. This transitioning process will also apply to the changes caused by localised pooling/drying along cable routes, with a new baseline established in the long-term and thus remaining a low magnitude, **negligible adverse** and **not significant** effect under the EIA Regulations.
- 7.10.3 Embedded design mitigation measures for badger would mean no residual operational effects are anticipated.
- 7.10.4 Embedded design mitigation measures for bats would mean that the residual significance of operational effects (primarily collision risk) on pipistrelle bats are no more than a low magnitude, **negligible adverse** and **not significant** under the EIA Regulations.

7.11 Cumulative Assessment

- 7.11.1 The cumulative assessment of effects to terrestrial ecological receptors takes into consideration other developments within the vicinity of the Proposed Development: this includes consideration of the in-combination effects of operational, under construction and in-planning developments. This will also be added to a combined cumulative effects chapter. Only wind farm projects within 10km have been considered, with a focus on operational or consented wind farm developments
- 7.11.2 Two wind farms have been identified circa 10km from the Rigg Hill site: the 14-turbine Kelburn Wind Farm (operational since 2012) is just over 10km south of the site; the eight-turbine Greenock Wind Farm c.9km north-east of the site; construction commenced in September 2019. Both of these developments are located in different catchments, have a lack of connectivity for commuting bats (there are large areas of open moorland between these developments) and are considered sufficiently distant so as not to have any in-combination impacts with the Proposed Development on the western slopes of Rigg Hill and its terrestrial ecology.

7.12 Summary

- 7.12.1 An assessment of terrestrial ecology effects arising from the construction, operation and decommissioning of the Proposed Development was undertaken, based on the current Proposed Development layout and turbine dimensions. A range of ecological studies were undertaken, to identify the terrestrial ecological interests of the Proposed Development site and to establish the ecological baseline for the ecological impact assessment (EclA). This included identification of existing wildlife records and nearby sites designated for nature conservation and survey of the habitats and faunal interests of the site. Field surveys were undertaken for: habitats, both Phase 1 habitat survey and NVC, including consideration of groundwater-dependent terrestrial ecosystems (GWDTEs); badger; otter; bat species; and fish (additional species covered for the main site access included red squirrel, pine marten and water vole).
- 7.12.2 The site chosen for the Proposed Development is primarily open hill livestock grazing on the edge of an area upland moor (primarily sheep on the northern area and a mix of sheep and cattle to the south of the glen). The habitat is one of primarily MG10 grassland, though the most north-eastern locations of the Proposed Development infrastructure is on the edge of the moorland blanket bog, which is relatively shallow at this point. Much of the Skelmorlie Glen is covered by a mix of W7 (wet) and W11 (oak) woodland, with oak woodland extending up the Rigghill and Fank burns, with the Skelmorlie Water flowing through a gorge for much of its length within the application boundary. The woodland is classed as *Ancient (of semi-natural origin)* on the Ancient Woodland Inventory (AWI), carries a Special Site of Scientific Interest (SSSI) designation for a large expanse and has Local Nature Conservation Site (LNCS) status to either side of the SSSI; a further section of AWI-designated W7/W11 riparian woodland lines the Meigle Burn (also part of the same LNCS designation as the Skelmorlie Glen woodlands).
- 7.12.3 Otter use of the Skelmorlie Water catchment was found to be extremely limited, partially explained by unpassable gorge waterfalls preventing migratory fish access to the upper catchment, though a resident brown trout population has been identified. Badger use of the Skelmorlie Glen area has also been established.
- 7.12.4 Bat species have been identified to be using the area, primarily the edge habitat of the glen woodland. Potential roosting features have also been identified on the route of the main site access to Barr Farm from the public road network.
- 7.12.5 No other protected or otherwise notable species have been recorded using the site.
- 7.12.6 Important Ecological Features (IEFs) were identified and either scoped-out, or taken forward to the assessment. IEFs taken forward to assessment include:
- Skelmorlie Glen and Fardens Glen LNCS;
 - Ancient Woodland Inventory designated woodlands;
 - Blanket bog;
 - Running water;
 - Groundwater-dependent terrestrial ecosystems;
 - Badger; and
 - Bat species.
- 7.12.7 Assessment indicates that no significant effects are predicted to habitats or species, though a long-term minor change is predicted for the upper section of the LNCS and negligible adverse effects are predicted for the short to long term, for the terrestrial IEFs; see Table 7.9, below.
- 7.12.8 No significant residual effects are predicted, as shown in Table 7.9
- 7.12.9 No cumulative effects on the site terrestrial ecological interests are predicted from in-combination interaction between the Proposed Development and similar wind farms in the surrounding 10km;

while two schemes are either operational or under construction, these are c.9km distant and outwith an ecological zone of influence.

Table 7.9 – Summary of Effects

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Designated Sites					
Skelmorlie Glen and Fardens Glen LNCS: upper glen designation: loss of area	Minor and not significant	Long-term adverse	Implementation of CEMP, including compensatory replacement planting	Not significant	Long-term adverse
Skelmorlie Glen and Fardens Glen LNCS: Meigle Burn designation: loss of area	Negligible and not significant	Long-term adverse	Implementation of CEMP, including compensatory replacement planting	Not significant	Long-term adverse
Habitats					
Loss of habitat: M25 Blanket mire	Negligible and not significant	Long-term adverse	Implementation of CEMP	Not significant	Long-term adverse
Running water: fish habitat	Negligible and not significant	Long-term adverse	Implementation of CEMP. Careful wash-down of site plant	Not significant	Long-term adverse
M10 mire	Negligible and not significant	Long-term adverse	Implementation of CEMP. Protection of sensitive areas	Not significant	Long-term adverse
Species					

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Badger	Negligible and not significant	Short-term adverse	Implementation of CEMP. Control of task lighting; avoidance of sett areas; soft-felling in proximity to setts	Not significant	Short-term adverse
Operation					
Designated Sites					
Skelmorlie Glen and Fardens Glen LNCS	No impact	n/a	N/a	Not significant	n/a
Habitats					
M25 blanket mire: changes due to localised pooling/drying due to cable routes	Negligible and not significant	Long-term adverse	No additional measures required	Not significant	Long-term adverse
M25 blanket mire: transition (drying)	Negligible and not significant	Long-term adverse	No additional measures required	Not significant	Long-term adverse
Species					
Badger	Negligible and not significant	Short-term adverse	Daylight working and speed limits during maintenance works	Not significant	Short-term adverse

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Common and soprano pipistrelle bats: collision risk	Negligible and not significant	Long-term adverse	Design mitigation observing 82m standoff from rotors	Not significant	Long-term adverse
Decommission					
Habitats and species	Negligible and not significant	Short-term adverse	Application of a suitable works management plan	Not significant	Short-term adverse

7.13 References

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