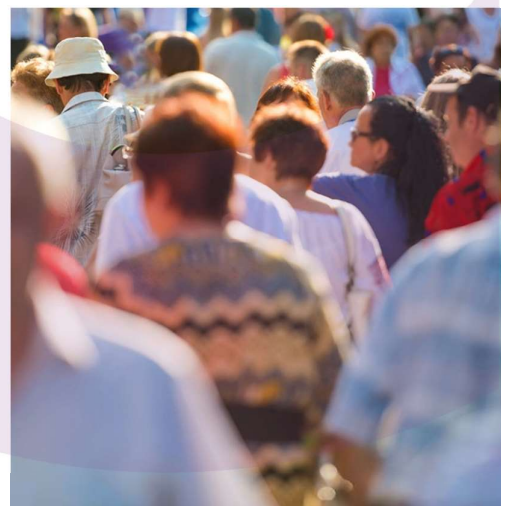
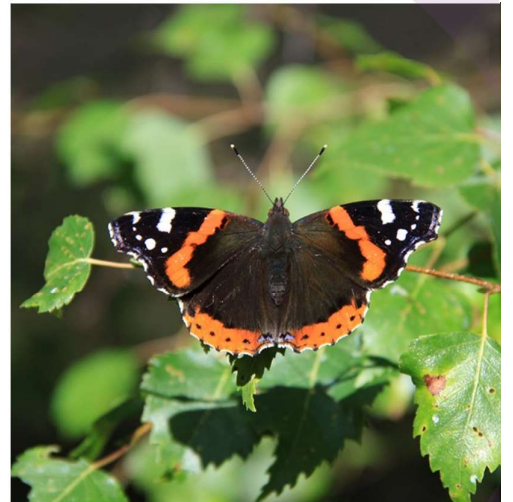


RWE Renewables UK Developments UK

## Lorg Wind Farm Section 36 Application

Scoping Report



## Report for

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## Document revisions

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# Executive Summary

## Purpose of this Report

This report sets out the proposed scope of the Environmental Impact Assessment (EIA) for the proposed Lorg Wind Farm (The 'Proposed Development'), the findings of which will be presented in an EIA Report. The purpose of this document is to serve as a formal request to the Scottish Ministers to provide a Scoping Opinion under Regulation 12 of The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

This scoping request will inform the EIA of a forthcoming planning application under Section 36 of the Electricity Act 1989 (as amended) for Section 36 consent and deemed planning permission to construct and operate Lorg Wind Farm. The Proposed Development would comprise up to 12 wind turbines with tip heights up to 200 metres, and an installed capacity in excess of 50 Megawatts.

## Summary Findings of the Scoping Report

The EIA will focus on any significant effects likely to arise during the construction, operation, and decommissioning of the Proposed Development. This Scoping Report draws on baseline information to identify where significant effects are likely as a result of the Proposed Development.

The following environmental topic areas are proposed to be included in the EIA:

- Noise (Chapter 6);
- Landscape and Visual (Chapter 7);
- Historic Environment (Chapter 8);
- Ecology (Chapter 9);
- Ornithology (Chapter 10);
- Geology, Hydrology and Hydrogeology (Chapter 11);
- Traffic and Transport (Chapter 12);
- Socio-economics (Chapter 13); and
- Infrastructure and Other Issues including shadow flicker (Chapter 14).

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# 1. Introduction

## 1.1 Overview

- 1.1.1 RWE Renewables UK Developments Ltd (hereafter referred to as the “Applicant”) received planning consent in 2019 under the Town and Country Planning (Scotland) Act 1997 to develop a nine turbine wind farm (anticipated to be up to 32.4 Megawatts (MW)) at Lorg in Dumfries and Galloway and is now investigating the possibility of developing a larger wind farm on the same site (although the site boundary has been slightly expanded). This wind farm would generate >50 MW, so it would be necessary to make an application under Section 36 of the Electricity Act 1989.
- 1.1.2 The proposed site (the “Development Site”) of Lorg Wind Farm (the “Proposed Development”) is in the same general location as the Consented Development and is located ~12.3 kilometres (km) south west of Sanquhar and ~11km north east of Carsphairn. The National Grid Reference (NGR) for the Development Site centre is 266700 600800 and it encompasses land within Dumfries and Galloway and East Ayrshire, though the greater part of the Development Site (and 10 of the 12 wind turbines) are located within Dumfries and Galloway. **Figure 1.1** in **Appendix A** shows a site location map in the wider landscape; and **Figure 1.2** in **Appendix A** shows the Development Site boundary.
- 1.1.3 The Applicant is proposing to submit a planning application under Section 36 of the Electricity Act 1989, as amended, seeking consent to construct and operate the Proposed Development, currently anticipated to comprise up to 12 wind turbines, with a generating capacity in excess of 50 MW, together with access tracks, crane hard standings, battery storage area, an electricity sub-station, at least one permanent anemometer mast and a temporary construction compound. An initial site layout will be developed to inform the preliminary environmental assessments and for the purpose of identifying scope, a maximum tip height of 200 metres (m) has been assumed.
- 1.1.4 The development falls under Schedule 2 of The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (the “EIA Regulations”) as a generating station (Schedule 2(1)). A Schedule 2 development constitutes EIA development if the development is likely to have significant effects on the environment by virtue of factors such as its nature, size or location as set out in Schedule 3 of the EIA Regulations.
- 1.1.5 In recognition of the scale and nature of the Proposed Development, the Applicant will undertake an EIA to assess potentially significant environmental effects. Under Section 36 of the Electricity Act 1989, as amended, the Proposed Development would require authorisation from the Scottish Ministers as it would be a power generating station in excess of 50 MW.

## 1.2 Contents of this Report

- 1.2.1 This report sets out the proposed scope of the EIA, which is to be submitted to the Scottish Ministers as a formal request for a scoping opinion. A scoping opinion is defined under the EIA Regulations as “an opinion adopted by the Scottish Ministers as to the scope and level of detail of information to be provided in the EIA Report”. The purpose of this Scoping Report is therefore to:
- Define the Proposed Development being considered (**Chapter 2**);
  - Describe the consenting and EIA requirements in relation to the Proposed Development (**Chapter 3** and **Chapter 4**); and



- Outline the aspects of the Proposed Development that could potentially result in significant environmental effects (**Chapter 3**) and, where potentially significant effects may result, the methodologies that will be used to assess potential impacts (**Chapter 5 – 14**).

## 1.3 The Applicant

1.3.1 RWE Renewables is one of the world's leading renewable energy companies. With around 3,500 employees, the company has onshore and offshore wind farms, photovoltaic plants and battery storage facilities with a combined capacity of approximately 9 gigawatts. RWE Renewables is driving the expansion of renewable energy in more than 15 countries on four continents. From 2020 until 2022, RWE Renewables targets to invest €5 billion net in renewable energy and to grow its renewables portfolio to 13 gigawatts of net capacity. Beyond this, the company plans to further grow in wind and solar power. The focus is on core markets in Europe such as Scotland, the Americas, and the Asia-Pacific region.

## 1.4 The Agent

1.4.1 Wood Group Limited, part of the international Wood brand supplying consultancy, engineering and project management services across the globe, has been commissioned to prepare this Scoping Report.

1.4.2 Wood includes one of the UK's largest multidisciplinary environmental and engineering consultancies within the Environment & Infrastructure Solutions UK business (previously Amec Foster Wheeler, Amec and Entec UK prior to acquisitions) and operates from 12 office locations. With skills ranging from development planning and design through an array of environmental and engineering disciplines, Wood has a comprehensive service portfolio and applied experience in a wide range of markets.

1.4.3 The EIA will be carried out by Wood to standards that comply with quality standards identified by the Institute of Environmental Management and Assessment (IEMA). The EIA Quality Mark scheme was introduced in 2011 and Wood (through its previous entities Amec Foster Wheeler, Amec and Entec UK) was a founder member, holding continuous membership since then. Each year, Wood is required to show that it meets seven commitments relating to EIA management, team capabilities, regulatory compliance, EIA context and influence, EIA content, and improving EIA practice. Wood's approach to these matters is examined by IEMA through several methods, including reviewing EIA reports Wood produces, interviewing staff, and publishing case studies provided for IEMA and presentations made at conferences.

1.4.4 Wood requests a 'Scoping Opinion' from the Scottish Ministers in relation to a proposal to construct and operate a wind farm of up to 12 wind turbines and an anticipated capacity in excess of 50 MW.

## 1.5 Application History

1.5.1 In December 2015, a planning application for a 15 turbine wind farm, comprising a cluster of six turbines in the west of the Development Site and nine turbines in the east was submitted to Dumfries and Galloway Council (DGC) (reference 15/P/2/0337) and East Ayrshire Council (EAC) (reference 15/0935/PP) under the Town and Country Planning (Scotland) Act 1997 (as amended). The Development Site straddles the administrative boundary between the council areas, with all the turbines being located in Dumfries and Galloway and approximately 2.1km of access track being located in East Ayrshire

- 1.5.2 In order to address issues raised by consultees and other stakeholders in response to the planning applications, which were primarily in relation to Landscape and Visual effects, the 15 turbine layout was amended, with the deletion of the complete western cluster and with the positions of the remaining 9 turbines being amended to produce a more cohesive layout that avoided the constraints identified during the original Environmental Impact Assessment (EIA), and which reduced the environmental impacts that were of concern to key stakeholders as far as reasonably possible. This layout was granted consent by DGC and EAC in 2018.
- 1.5.3 The applicant undertook an exercise to optimise the output of the consented layout and it was concluded that with a relatively modest increase in height of six of the consented turbines from up to 130m tip height to up to 149.9m (with the other three turbines already consented at 149.9m) and an increase in the rotor diameter of all nine consented turbines from a maximum of 112m to a maximum of 133m, a 33% increase in generation capacity could be achieved in the order of 43.2MW of renewable energy. A section 42 application was therefore submitted to DGC in June 2019.
- 1.5.4 In September 2020 DGC wrote to the applicant stating that as a result of decisions reached by the Court of Appeal for England and Wales (*Finney v Welsh Ministers & Ors*) and a Reporter appointed by the Scottish Ministers at Larbrax, Stranraer, for the increase in tip height of 8 wind turbines it would be unable to proceed with the application favourably without conflicting with these decisions. The Applicant therefore took the decision to withdraw the application.
- 1.5.5 The new application presents the opportunity to look afresh at the full site area in the context of a less generous subsidy mechanism and in response to a wider range of renewable technologies and potential mitigation measures in order to develop a proposal that maximises the energy while balancing this with the landscape management potential of the Development Site location and the need to minimise and mitigate environmental impacts as far as possible.

## 2. Project Description

### 2.1 The Development Site

- 2.1.1 The Development Site (centred at National Grid Reference E266700, N600800 and shown on **Figure 1.1** in **Appendix A**) for the Proposed Development is located ~12.3km south west of Sanquhar and ~11km north east of Carsphairn straddling the boundary of Dumfries and Galloway and East Ayrshire.
- 2.1.2 The 'Lorg Trail' footpath joins the Southern Upland Way (SUW) just north of the Development Site. The SUW continues to the east of the Development Site, before running along part of the eastern and southern site boundaries.
- 2.1.3 The Development Site covers an area of approximately 1,243 hectares (ha) of mainly moorland with no tree cover, with the primary land use being grazing sheep. The elevation of the Development Site is approximately 255m to 640m Above Ordnance Datum (AOD).
- 2.1.4 The Water of Ken runs through the Development Site from the north east to the south west, it continues to run southwards roughly parallel with the C class road between the Development Site boundary and the B729. The Development Site is divided into two areas by the steep-sided valley formed by the Water of Ken, with Lorg House located on the relatively flat land found north of the river and alongside the Lorg Burn. The valley of the Lorg Burn in the north west of the Development Site is steeply sloped and surrounded by a semi-circle of high ridges and peaks, including Ewe Hill, Alwhat, Meikledodd Hill and Lorg Hill.
- 2.1.5 The south east of the Development Site is defined by the north-flowing Pulmulloch Burn and surrounding peaks of Altry Hill, Craigstewart, Coranbae Hill, Cairn Hill, Black Hill, High Countam and Fortypenny Hill. This valley is less steep than that of Lorg Burn.
- 2.1.6 In addition to the Water of Ken and the Lorg Burn, a number of other small burns cross the Development Site.
- 2.1.7 The nearest residential properties to the Development Site are at Polskeoch approximately 650m from the Development Site boundary and Upper Holm of Dalquhairn approximately 730m from the Development Site boundary. There is also a bothy located at Polskeoch, approximately 380m from the Development Site boundary.

### 2.2 Historic and Current Development Site Uses

- 2.2.1 The Development Site is owned by several landowners, with the historic and current land use primarily comprising the grazing of sheep. There is no forestry within the Development Site boundary.

### 2.3 Development Description

- 2.3.1 The Proposed Development would comprise the following main elements:
- Up to 12 wind turbines with tip heights up to 200m;
  - Access tracks connecting infrastructure elements;
  - A small expansion of the existing vehicular access point from the public highway;

- Hard standing areas e.g. crane pads;
- Potential borrow pit(s);
- At least one anemometer mast;
- A potential battery storage area;
- Temporary working areas e.g. construction compound; and
- Control building and substation, and electrical cabling between this and the turbines.

2.3.2 The indicative turbine locations are shown in **Table 2.1** and are shown on **Figure 1.2** in **Appendix A**.

Table 2.1 Indicative Turbine Locations

Component	Maximum Height (m)	Location (NGR)
Turbine 1	200	E 267803, N 599820
Turbine 2	200	E 268156, N 599030
Turbine 3	200	E 268120, N 600538
Turbine 4	200	E 268307, N 600119
Turbine 5	200	E 268040, N 599485
Turbine 6	200	E 268597, N 599650
Turbine 7	200	E 268687, N 600618
Turbine 8	200	E 268754, N 599195
Turbine 9	200	E 268887, N 600235
Turbine 10	200	E 268581, N 601085
Turbine 11	200	E 263943, N 601088
Turbine 12	200	E 264456, N 601744

## 3. EIA Process and Consultation

### 3.1 EIA Overview

- 3.1.1 EIA is a systematic process that must be followed for certain categories of project before they can receive development consent. It aims to identify a project's likely significant effects through the scoping process, scoping out those unlikely to be significant, and then assessing those effects in an EIA Report. This helps to ensure that the importance of the predicted effects, and the scope for mitigation measures to reduce them, are properly understood by the public and, in this instance, the Scottish Ministers before they make their decision.
- 3.1.2 The EIA process should be systematic, analytical, impartial, consultative and iterative, allowing opportunities for environmental concerns to be addressed in the design of a project. Typically, a number of design iterations take place in response to environmental constraints identified during the EIA process prior to the final design being reached.
- 3.1.3 The EIA should be based upon recognised good practice and guidelines specific to each technical area and identify the likely significant environmental effects arising from a proposed development. Consultees are also encouraged to provide confirmation of agreement to the proposed scope in terms of what is included and excluded, the methodology, and the receptors identified.

### 3.2 EIA Terminology

#### Impacts and Effects

- 3.2.1 EIA is concerned with the identification of likely significant effects on the environment. However, the terms *impact* and *effect* are often used synonymously and this can lead to confusion. For clarity, the convention used in this assessment is to use 'impacts' within the context of the term EIA, which describes the process from scoping through EIA Report preparation to subsequent monitoring and other work. Otherwise, this document uses the word 'effects' when describing the environmental consequences of the Proposed Development. For example, such effects may come about as a result of the following:
- Physical activities that would take place if the development were to proceed (e.g. vehicle movements during construction operations);
  - Environmental changes that are predicted to occur as a result of these activities (e.g. loss of vegetation prior to the start of construction work or an increase in noise levels). In some cases one change causes another change, which in turn results in an environmental effect.
- 3.2.2 The predicted environmental effects are the consequences of the environmental changes for specific environmental receptors. For example, with respect to bats, the loss of roosting sites or foraging areas could affect the bats' population size; with regard to people, an increase in noise levels could affect amenity.
- 3.2.3 This assessment is concerned with assessing the significance of the environmental effects of the Proposed Development, rather than the activities or changes that cause them. However, this requires these activities to be understood and the resultant changes identified; often based on predictive assessment work.

## Type of Effect

3.2.4 The 2017 EIA Regulations (Schedule 4, Part 5) require consideration of a variety of types of effect, namely direct and indirect, secondary, cumulative, positive and negative, short, medium and long-term, and permanent and temporary. In the EIA Report that will follow this Scoping Report, effects are considered in terms of how they arise, their nature (i.e. whether they are positive or negative) and duration. Each will have a source originating from the development, a pathway and a receptor and may fall into one of several categories:

- Direct effects are readily identified because of the physical connection between some element of the development and an affected receptor;
- Indirect effects require some additional pathway for the effect to arise. For example, a listed building may not be directly affected by any elements of a development, but its setting may be if the development is visible in views from it or when looking towards it; in which case there would be an indirect effect;
- Secondary effects would typically require further pathway connections, for example, an effect on a receptor population (A) could have a secondary effect on receptor population B, if B was itself dependent on A in some way, as, for example, a food source; and
- Cumulative effects arise when the receptors affected by one development are also affected by other developments resulting in the aggregation of environmental effects or the interaction of impacts.

3.2.5 Most predicted effects will be obviously positive or negative, and will be described as such. However, in some cases it is appropriate to identify that the interpretation of a change is a matter of personal opinion, and such effects will be described as 'subjective'.

## Temporal and Spatial Scope

3.2.6 In its broadest sense, the spatial scope is the area over which changes to the environment would occur as a consequence of the development. In practice, an EIA should focus on those areas where these effects are likely to be significant.

3.2.7 The spatial scope varies between environmental topic areas. For example, the effect of a proposed development on the landscape resource and visual amenity is generally assessed within a zone of up to 35km from the wind turbines (and potentially up to 70km for cumulative effects), whilst noise effects are assessed within a much smaller area encompassing those representative properties close to a development site.

3.2.8 The temporal scope is stated where known and effects are typically described as:

- Temporary – likely to be related to a particular activity and will cease when the activity finishes. The terms 'short-term' and 'long-term' may also be used to provide a further indication of how long the effect will be experienced; and
- Permanent – this typically means an unrecoverable change.

3.2.9 Effects are generally considered in relation to the following key stages of a proposed development:

- Construction – the effects may arise from the construction activities themselves, or from the temporary occupation of land. Effects are often of limited duration although there is potential for permanent effects. Where construction activities create permanent change, the effects will continue into the operational period;

- Operation – effects may be permanent, or they may be temporary, intermittent, or limited to the life of a proposed development until decommissioning (as in the case of wind power developments which gain planning permission for a defined and finite number of years); and
- Decommissioning – effects may arise from the decommissioning activities themselves, or from the temporary occupation of land. The effects would generally be temporary and of limited duration. Additional permanent change would normally be unlikely unless associated with restoration.

### 3.3 EIA Scoping

3.3.1 The results of the EIA process are reported in an EIA Report and Schedule 4(4) of the EIA Regulations specifies that it should describe:

*"... the factors... likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape."*

3.3.2 Regulation 4(2) of the EIA Regulations requires the interaction between these factors to be considered. In addition, Regulation 4(4) requires EIA Reports to consider:

*"... the expected effects deriving from the vulnerability of the development to risks, so far as relevant to the development, of major accidents and disasters."*

3.3.3 Establishing which aspects of the environment are likely to be significantly affected by a particular project is captured in the EIA scoping process, which aims to identify those aspects of the environment and associated issues that need to be considered when assessing the potential effects resulting from a proposed development. This recognises that there may be some environmental elements for which the project is unlikely to have a significant effect and hence where there is no need for further investigation to be undertaken as part of the EIA.

3.3.4 The proposed scope of the EIA for the Proposed Development with respect to the following environmental topics is set out in Chapters 6 to 14 of this report and comprises:

- Noise (Chapter 6);
- Landscape and Visual (Chapter 7);
- Historic Environment (Chapter 8);
- Ecology (Chapter 9);
- Ornithology (Chapter 10);
- Geology, Hydrology and Hydrogeology (Chapter 11);
- Traffic and Transport (Chapter 12);
- Socio-economics (Chapter 13); and
- Infrastructure and Other Issues including shadow flicker (Chapter 14).

3.3.5 The scope and assessment methodologies proposed in this Scoping Report are based on recognised good practice and guidelines specific to each topic area. Baseline conditions have been determined through desk-based studies and survey work undertaken to date. The environmental

topic chapters identify where significant effects are anticipated as a result of the Proposed Development and take into account:

- The baseline data;
- The description of the Proposed Development;
- Relevant guidance on assessment methodologies; and
- Any cumulative effects, which may arise.

### 3.4 Cumulative Effects

3.4.1 Cumulative effects can arise from the interaction between a proposed development and other developments already built or proposed. In line with standard practice, for the purpose of the EIA, other wind farm developments which are operational, subject to planning approval or subject to a full and validated planning application will be included in the consideration of potential cumulative effects (subject to a cut-off point to allow assessments to be undertaken). It should be noted that not all of the cumulative developments would necessarily have a cumulative effect in respect of any particular environmental topic.

### 3.5 Mitigation

3.5.1 Some mitigation measures to avoid, reduce or offset the consequences of the Proposed Development would be embedded within its design whilst others may require adherence to particular constraints on construction methodology or mode of operation. The final assessment of significance will take into account the mitigation measures and constraints that have been incorporated into the Proposed Development (i.e. it will be the assessment of residual effects).

3.5.2 It is likely that the following draft management plans will be submitted as part of the EIA or to satisfy the requirements of a post-consent condition:

- Construction Environmental Management Plan (CEMP);
- Habitat Management Plan (HMP) and Species Protection Plans (SPPs);
- Peat Management Plan (PMP); and
- Traffic Management Plan (TMP).

### 3.6 EIA Methodology

3.6.1 The EIA Report will identify the assessment methodologies, based on recognised good practice and guidelines specific to each of the relevant environmental topic areas where the Proposed Development could result in significant effects. In general terms, the technical studies undertaken for each topic area and chapter included in the EIA Report to accompany the planning application would include:

- Collection and collation of existing baseline information about the receiving environment and surveys to fill any gaps in knowledge or to update any historic information, together with identification or any relevant trends in, or evolution of, the baseline;
- Consultation with experts and relevant consultees as necessary;



- Consideration of the potential effects of the Proposed Development on the baseline, followed by identification of any additional mitigation measures to seek to avoid or reduce any predicted adverse effects;
- Assessment and evaluation of any residual significant effects after mitigation measures have been implemented; and
- Compilation of the EIA Report chapter.

## 3.7 Consultation

3.7.1 Consultation is an essential element of the EIA process and will be reported within the EIA Report and supporting documentation as necessary.

3.7.2 The Applicant is committed to promoting dialogue with statutory and non-statutory consultees and the local community, seeking to engage with all those with an interest in the Proposed Development to provide transparency during the process.

## 4. Planning Policy Context

### 4.1 Introduction

- 4.1.1 The EIA will be progressed taking account of applicable legislation, policy and guidance. This chapter of the EIA Report will outline the planning policy framework followed by an overview of further legislation, policy and guidance pertinent to the Proposed Development.
- 4.1.2 The Section 36 application will be accompanied by a Planning Statement, which will set out the planning case for the Proposed Development with regards to national and local policies and other material considerations.

### 4.2 Regulatory Framework

- 4.2.1 The application for the Proposed Development would be made pursuant to Section 36 of the Electricity Act 1989 (as amended), as a generating station with capacity exceeding 50 MW.
- 4.2.2 The EIA Regulations provide the requirements for undertaking EIAs for developments to be consented under the Electricity Act 1989 (as amended). The EIA Report would be prepared in accordance with Schedule 4 of the Regulations.

### 4.3 Scottish Planning Policy and Guidance

- 4.3.1 There are legal, policy and advice documents which would be material considerations in the determination of the Section 36 application for the Proposed Development, including those noted in the following sections:

#### National Planning Framework 3 (NPF3)

- 4.3.2 NPF3 (June 2014) provides the statutory framework for Scotland's long-term spatial development. It sets out the Scottish Government's spatial development priorities over a 20 to 30-year period and what is expected of the planning system and the outcomes it must deliver. NPF3 reaffirmed the Scottish Government's commitment, at the time of publication, to renewable energy targets (30% of overall energy demand from renewable sources by 2020) and recognises the important role of onshore wind in achieving these targets. The Framework supports the deployment of appropriately located onshore wind energy development.

#### Scotland's Fourth National Planning Framework Position Statement

- 4.3.3 Scotland's Fourth National Planning Framework Position Statement (Position Statement) was published in November 2020. It does not set out policy but outlines the Scottish Government's current thinking and aims to help inform further discussion. The Position Statement sets out a number of key opportunities to help achieve net zero emissions by 2045, including supporting renewable energy developments.
- 4.3.4 A consultation draft of the National Planning Framework 4 (NPF4) is currently anticipated in the Autumn 2021.

## Scottish Planning Policy (SPP)

- 4.3.5 SPP (June 2014) sets out national planning policies that reflect the priorities of the Scottish Ministers for the operation of the planning system and the development and use of land through sustainable economic growth. The SPP recognises that renewable energy generation, including onshore wind, will contribute to more secure and diverse energy supplies and support sustainable economic growth. The commitment to increase the amount of electricity generated from renewable sources including onshore wind is a vital part of the response to climate change.
- 4.3.6 As part of the Scottish Government's planning reform process, the NPF4 will incorporate SPP and will form part of the statutory development plan.

## National Planning Advice, Circulars and Advice Sheets

- 4.3.7 National planning policy is supported by Planning Circulars, Planning Advice Notes (PANs) and Specific Advice Sheets, and Ministerial / Chief Planning Letters to Planning Authorities, which set out detailed advice from the Scottish Government in relation to a number of planning issues. The PANs and Specific Advice Sheets considered relevant to the Proposed Development include:
- PAN 1/2011 Planning and Noise, March 2011;
  - PAN 2/2011 Planning and Archaeology, July 2011;
  - PAN 3/2010 Community Engagement, August 2010;
  - PAN 51 Planning, Environmental Protection and Regulation, October 2006;
  - PAN 60 Natural Heritage, January 2000;
  - PAN 61 Sustainable Urban Drainage Systems, July 2011;
  - PAN 75 Planning for Transport, August 2005;
  - PAN 79 Water and Drainage, September 2006;
  - Wind Farm Developments on Peat Land, May 2013;
  - Specific Advice Sheet: Guidance on Developments on Peat Land: Peatland Survey, 2017;
  - Draft Peatland and Energy Policy Statement, 2016
  - Specific Advice Sheet (updated 28 May 2014): Onshore Wind Turbines;
  - Spatial Planning for Onshore Wind Turbines – Natural Heritage Considerations, June 2015; and
  - Chief Planner Letter regarding Energy Targets and Scottish Planning Policy, 2015.

## 4.4 Local Planning Policy and Guidance

### Local Development Plan

- 4.4.1 In considering the overall legal framework within which the Proposed Development would be assessed, the development plan should be a key consideration. However, Section 25 of the Town and Country Planning (Scotland) Act 1997 is not engaged for applications pursuant to Section 36 of the Electricity Act 1989 (i.e. the development plan does not take primacy in the determination process).

## Dumfries and Galloway

4.4.2 The applicable development plan is the Dumfries and Galloway Local Development Plan (LDP2), adopted on 3<sup>rd</sup> October 2019. LDP2 is supported by Supplementary Guidance including 'Wind Energy Development: Development Management Considerations' (adopted February 2020) and the 'Dumfries and Galloway Wind Farm Capacity Study' (adopted February 2020).

4.4.3 It is considered the applicable policies of LDP2 are:

- Policy OP1: Development Considerations
- Policy ED10: Galloway and Southern Ayrshire Biosphere
- Policy ED11: Dark Skies
- Policy HE1: Listed Buildings
- Policy HE3: Archaeology
- Policy HE6: Historic Gardens and Designed Landscapes
- Policy NE2: Regional Scenic Areas
- Policy NE3: Areas of Wild Land
- Policy NE4: Sites of International Importance for Biodiversity
- Policy NE5: Species of International Importance
- Policy NE6: Sites of National Importance for Biodiversity and Geodiversity
- Policy NE11: Supporting the Water Environment
- Policy NE14: Carbon Rich Soil
- Policy NE15: Protection and Restoration of Peat Deposits as Carbon Sinks
- Policy CF4: Access Routes
- Policy IN1: Renewable Energy
- Policy IN2: Wind Energy
- Policy INF: Flooding and Development
- Policy IN8: Surface Water Drainage and Sustainable Drainage Systems (SuDS)

## East Ayrshire

4.4.4 The East Ayrshire Local Development Plan was adopted on 3<sup>rd</sup> April 2017. The LDP is supplemented by supplementary guidance and non-statutory planning guidance. Work on the second LDP for East Ayrshire is currently underway.

4.4.5 It is considered the applicable policies of the East Ayrshire LDP are:

- Policy OP1: Overarching Policy;
- Policy IND3: Business and Industrial Development in the Rural Area;
- Policy TOUR4: The Dark Sky Park
- Policy TOUR5: Galloway and Southern Ayrshire Biosphere

- Policy RE3: Wind energy proposals over 50 metres in height
- Policy RE5: Financial Guarantees
- Policy T4: Development and Protection of Core Paths and Natural Routes
- Policy ENV1: Listed Buildings
- Policy ENV2: Scheduled Monuments and Archaeological Resources
- Policy ENV6: Nature Conservation
- Policy ENV7: Wild Land and Sensitive Landscape Areas
- Policy ENV8: Protecting and Enhancing the Landscape
- Policy ENV10: Carbon rich soils
- Policy ENV11: Flood Prevention
- Policy ENV12: Water, air and light and noise pollution

4.4.6 There are applicable supplementary guidance documents in the LDP Supplementary Guidance, in particular Planning for Wind Energy, adopted in December 2017.

## 5. Renewable Energy Policy, Carbon Balance and Peat Management

### 5.1 Introduction

5.1.1 The EIA will be progressed taking account of applicable legislation, policy and guidance in relation to renewable energy. This section of the EIA Report will set out the policy and energy target context for renewable energy projects from a European, UK and Scottish perspective as well as providing the carbon balance assessment.

### 5.2 Renewable Energy and Climate Change Policy Framework

5.2.1 The following legislation and policy are relevant to the Proposed Development and would be considered in the EIA Report:

- Climate Change (Emissions Reduction Targets) (Scotland) Act 2019;
- The Renewable Energy Directive (2009/28/EC);
- The EU 2030 Climate & Energy Policy Framework;
- Climate Change (Scotland) Act 2009;
- Low Carbon Economic Strategy for Scotland 2010;
- Low Carbon Scotland – Meeting the Emissions Reductions Targets 2013-2027;
- The Scottish Government Renewables Action Plan June 2009 (latest update March 2011);
- Electricity Generation Policy Statement 2013;
- 2020 Renewables Routemap June 2011 (latest update September 2015);
- Intended Nationally Determined Contributions of the EU and its Member States (2015)
- The Chief Planner Letter to all Heads of Planning Chief Planner Letter regarding Energy Targets and Scottish Planning Policy, 2015;
- Paris Agreement (2015);
- The Fifth Carbon Budget (2016);
- The UK Industrial Strategy (2017);
- The UK Clean Growth Strategy (2017);
- The Scottish Energy Strategy 2017;
- Onshore Wind Policy Statement 2017;
- Special Report on Global Warming of 1.5°C (2018); Climate Change Plan 2018;
- Energy Statistics for Scotland; and
- 2030 Clean Energy Package.

### 5.3 Potential Contribution of the Proposed Development to Government Objectives

- 5.3.1 The Scottish and UK legislative and policy framework on climate change is shaped by international climate change legislation. This incorporates binding targets in the reduction of greenhouse gas emissions and in the generation of energy from renewable sources.
- 5.3.2 In 2019, the Scottish Government amended the Climate Change (Scotland) Act 2009 through the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019. The 2019 Act seeks to ensure Scotland achieves its ambition to reduce greenhouse gas emissions to a net-zero state by 2045. In order to achieve this ambition, Scotland will need considerably more renewable energy projects.
- 5.3.3 The Proposed Development would make an important and substantial contribution to achieving multiple existing targets regarding the deployment of renewable energy technologies and greenhouse gas emissions reduction in pursuit of climate change mitigation.

## 6. Noise

### 6.1 Introduction

- 6.1.1 The proposed scope of the noise assessment would consist of the assessment of construction and operational noise for the Proposed Development, including cumulative noise impacts from other relevant developments in the area.
- 6.1.2 This section seeks agreement from the Environmental Health Representatives at Dumfries and Galloway Council and East Ayrshire Council on the proposed approach to the assessment.

### 6.2 Baseline Conditions

#### Data Sources

- 6.2.1 The data sources most relevant to the assessment of noise from the Proposed Development are those detailed within the 2015 Lorg Wind Farm Environmental Statement (ES), namely the comprehensive background noise monitoring undertaken in 2013.
- 6.2.2 Review of the Development Site using current Ordnance Survey mapping and aerial photography has not identified any new sensitive receptors that would be considered in addition to those considered within the 2015 ES (Polskeoch is the closest property to a proposed turbine location (~1.2km away), this being a 2013 monitoring location). Use of the existing survey data is also considered appropriate as data would be less likely to be influenced by wind farm noise than if an updated survey was conducted in 2021.

#### Summary of Baseline Conditions

- 6.2.3 The Development Site is located in a semi-rural area with the most notable noise sources being natural in origin, from wind in the trees and watercourses.
- 6.2.4 It is likely that the prevailing baseline noise conditions have not changed significantly from those presented within the 2015 ES. The baseline identification used within the 2015 ES followed the latest accepted approach detailed in the Institute of Acoustic's *A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise* (IOA GPG) (IOA, 2013). It is considered more appropriate to use the existing baseline monitoring and analysis rather than update a survey which would be at risk of contamination from noise from wind farms built since 2013. The results of background noise monitoring, and the associated noise limits derived using methodology advocated within the IOA GPG remain applicable for the Proposed Development EIA.

### 6.3 Scope of Assessment

#### Construction

- 6.3.1 Whilst the Development Site will be at a large distance from residential receptors, they could potentially be disturbed by noise if impact piling or blasting are required for construction of the Proposed Development. Only piling would be scoped into an assessment of noise directly from site works with most other activities onsite very unlikely to result in adverse effects. It is anticipated that any blasting requirements later identified in the design process would be controlled via a blasting



management plan as part of a planning condition requirement. Blasting is therefore scoped out of the assessment.

- 6.3.2 Heavy vehicles for deliveries and large mobile items of plant are anticipated along the local road system. These vehicles could pass closely to residences, which would otherwise experience low levels of road traffic noise. Therefore, construction road traffic is proposed to be scoped into the assessment.

## Operation

- 6.3.3 When operational, wind turbines emit two types of noise – mechanical noise and aerodynamic noise. The main sources of mechanical noise are from internal components housed within the nacelle, such as the gearbox and generator. Mechanical noise from a modern wind turbine is negligible, as the nacelles are insulated to reduce noise emissions and the various mechanical components housed within the nacelle are acoustically isolated to prevent structure-borne noise.
- 6.3.4 Aerodynamic noise occurs from the movement of the blades passing through the air. At higher wind speeds, aerodynamic noise is usually masked by the increasing sound of wind blowing through trees and around buildings. The level of masking determines the perceived audibility of the wind farm. The proposed impact assessment establishes the relationship between wind turbine noise and the natural masking of noise resulting from features of the surrounding environment and assesses noise levels against established standards.
- 6.3.5 Previous noise modelling for the Development Site has already identified that noise levels exceed the screening criteria at residences as stipulated in ETSU-R-97 *The Assessment and Rating Of Noise From Wind Farms* (ETSU-R-97) (The Working Group on Noise from Wind Turbines, 1996). As such, a full operational noise assessment will be included within the EIA for the Proposed Development.
- 6.3.6 A cumulative noise assessment will also be included within the EIA. This assessment will consider other wind farms up to 10 km from the Development Site boundary (operational, consented or subject to an application) that may impact on sensitive receptors together with the Proposed Development. A cut-off date for the assessment will be identified in the EIA Report and a list of wind turbine developments identified for the cumulative assessment will be created.
- 6.3.7 It is proposed that operational traffic noise during the operation of the Proposed Development is scoped out as the amount of traffic associated with operation would be minimal.

## Decommissioning

- 6.3.8 In terms of noise and vibration impacts during decommissioning, the effects on any sensitive receptors are likely to be similar in nature, but of lower magnitude (no potential for piling), than those during the construction phase. As a result, it is not proposed to assess the decommissioning phase of the Proposed Development in addition to that of the construction phase. Therefore, the decommissioning element has been scoped out.

## 6.4 Assessment Methodology

- 6.4.1 The main objective of the noise assessment is to compare current noise levels in the Development Site area to those that would pertain should the Proposed Development proceed and to determine acceptability for relevant receptors. In this case relevant receptors are considered to be restricted to those living in residential properties close to elements of the Proposed Development. The EIA Report Chapter will present a review of relevant policy and how it guides the assessment, the results of noise measurements, and finally the assessment of the noise predictions against the noise limits.

## Construction Noise

- 6.4.2 In order to undertake construction noise calculations, details of the construction programme, phasing of the works and types and numbers of plant are required. Such data would only become available once the contract(s) to construct the Proposed Development have been finalised. Notwithstanding the above, should impact piling be potentially used on site, a worst-case scenario for construction noise assessment, based upon experience of similar projects, will be presented in the EIA Report. Construction noise from piling would be predicted and assessed in accordance with 5228-1:2009 + A1:2014 *Code of practice for noise and vibration control on construction and open sites Part 1 – Noise*.
- 6.4.3 The impact of construction traffic along the local road system would be predicted using *Calculation of Road Traffic Noise* (Department of Transport, 1988) and assessed using the magnitude criteria within the *Design Manual For Roads and Bridges* (Highways England, 2020). The impact of construction traffic along the site access route and the interim access track will be predicted and assessed in accordance with BS 5228-1.
- 6.4.4 In most cases, construction noise (including construction traffic) is controlled through the implementation of mitigation measures (such as limiting hours during which construction can be undertaken) and undertaking construction works in accordance with good practices as described in BS 5228-1 (such as using well maintained and serviced plant, and the appointment of a site contact to whom complaints/queries can be directed).

## Operational Noise

- 6.4.5 The proposed operational noise assessment would be undertaken in accordance with ETSU-R-97 and the assessment methodology advocated within IoA GPG.
- 6.4.6 Planning conditions associated with the 2019 application for the site dated 18 July 2019 (15/P/2/0337) set noise limits based on ETSU-R-97 methodology. The final selection of turbine model for the Proposed Development would follow a competitive tendering process and would be required to comply with the noise criterion levels established by these planning conditions.
- 6.4.7 The majority of noise related guidance and standards (including the ETSU-R-97) are not directly related to the concepts of 'significant' and 'not significant' effects that underpin EIA. However, for the purposes of the assessment, the determination of effect significance for the operational phase of the Proposed Development is based upon compliance with the applicable noise limit i.e. a breach of the noise limits indicates a significant effect, whereas compliance with noise limits indicates an effect which is not significant.
- 6.4.8 Noise limits are defined separately for daytime (07:00-23:00) and night-time (23:00-07:00) based on measurement data. Using baseline data from quiet daytime periods (18:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays), noise limits are as follows:
- 5 dB above the background noise curve for wind speeds up to 12 m/s;
  - where background noise levels are below 30 – 35 dB LA90, 10 min, the lower limit should be fixed at 35 – 40 dB; and
  - For properties with a financial interest in the scheme, the lower limit is fixed at 45 dB.
- 6.4.9 For the cumulative assessment, a lower limit of 40 dB will be used to assess noise during the daytime at those wind speeds where the background noise level + 5 dB is lower than 40 dB.
- Using baseline data from night-time periods (23:00 – 07:00 every day), noise limits are as follows:

- 5 dB above the background noise curve for wind speeds up to 12 m/s;
- The lower limit is fixed at 43 dB; and
- For properties with a financial interest in the scheme, the lower limit is fixed at 45 dB.

6.4.10 Noise modelling would be undertaken using software adopting methodologies advocated by the IOA GPG. It has been assumed that the proposed wind turbines will not produce any tonal noise unless identified within manufacturer data used for the various candidate turbine options.

6.4.11 As noise levels exceeding the ETSU-R-97 noise limits are deemed to be significant, they would require further consideration where this the case; with a view to identifying appropriate mitigation to ensure compliance with the specified limits. The assessment would be undertaken on a worst case candidate turbine. Mitigation measures may include installing quieter turbines; reducing the power rating, and thus the noise emission of particular turbines in particular wind environments; or design of a noise management plan which varies the operation of the wind turbines dependent on the existing wind direction.

## 7. Landscape and Visual

### 7.1 Introduction

- 7.1.1 This chapter sets out the proposed scope of the Landscape and Visual Impact Assessment (LVIA) which will assess the likely significant effects, including cumulative effects of the Proposed Development on landscape and visual amenity receptors. The following related technical assessments would also be included:
- Night-time Lighting Assessment (where turbines are proposed  $\geq 150\text{m}$  to blade tip); and
  - Residential Visual Amenity Assessment (RVAA).
- 7.1.2 Consultees are requested to confirm the scope of this assessment and in particular comment on other known wind farm developments which should be included in the assessment (**Table 7.1**), the proposed viewpoint locations (**Table 7.2**), the assessment methodology (**Section 8.6**) and matters that are proposed to be scoped out of this assessment (**paragraph 8.5.13**).
- 7.1.3 The chapter is supported by **Figures 7.1-7.3** in **Appendix A** and should be read in conjunction with **Chapter 2: Project Description**.

### 7.2 Relevant Planning Policy and Technical Guidance

- 7.2.1 The LVIA process takes account of national and local planning policy in relation to wind farm development, including the national planning requirements for those areas identified for wind farm development to be suitable for use in perpetuity. The LVIA would take into account the following:
- Dumfries and Galloway Council (DGC) *Local Development Plan 2 (LDP2)*, *DGC Wind Energy Development: Development Management Considerations Supplementary Guidance*, and *Appendix 'C' Dumfries & Galloway Wind Farm Landscape Capacity Study Supplementary Guidance* (DGWLCS); and
  - East Ayrshire Council (EAC) *Local Development Plan*, *EAC Supplementary Guidance: Planning for Wind Energy*, and the *Non-Statutory Planning Guidance: East Ayrshire Landscape Wind Capacity Study* (EALWCS).

#### Wind Farm Capacity Studies

- 7.2.2 The DGWLCS and EALWCS provide a broad assessment of the sensitivity of landscape to wind farm development within Dumfries and Galloway, and East Ayrshire respectively. In making this assessment, both wind farm capacity studies take account of different landscape character types (LCTs) and a range of landscape constraints and opportunities for wind farm development that are relevant to particular LCTs. The Proposed Development lies predominantly within the *Southern Uplands with Forestry* LCT (19a) within Dumfries and Galloway, and the *Southern Uplands* LCT (20a) within East Ayrshire.
- 7.2.3 The DGWLCS and EALWCS provide guidance in terms of landscape constraints and opportunities relevant to the *Southern Uplands with Forestry* and *Southern Uplands* LCTs and advice on landscape sensitivity to very large turbines  $> 150\text{ m}$  to blade tip (DGWLCS) and  $> 130\text{ m}$  to blade tip (EALWCS).
- 7.2.4 Importantly, the DGWLCS and EALWCS note that they are non-statutory, strategic assessments and the judgements on sensitivity represent an average, across broad character types and units, within

which considerable variation can occur. In contrast, the LVIA would be specific to the Proposed Development and its location and is more directly relevant than the DGWLCS and EALWCS to the Proposed Development. That being said, the LVIA will draw heavily from the advice and guidance set out in the DGWLCS and EALWCS. The DGWLCS and EALWCS make no reference to the number of wind turbines or wind energy projects required in assessing the capacity of landscapes in the region. It presents more of a broad-brush relative appraisal of the sensitivity of landscapes in the region to different scales of wind turbine.

- 7.2.5 The DGWLCS, executive summary (page 3) advises that the "*greatest scope for additional development is in parts of the Southern Uplands with Forest*" within Dumfries and Galloway. The DGWLCS judges the overall sensitivity of the *Southern Uplands with Forest* LCT (Ken unit) to very large typologies (wind turbines >150m to blade tip) to be of '**High-Medium**' sensitivity (due in part to the presence of the Southern Upland Way and recreational routes) with a '**Medium-Low**' landscape value overall.
- 7.2.6 The DGWLCS notes that "*Repowering of some operational, under-construction and consented wind farms may, however, provide opportunities to accommodate much larger turbines in future.*" "*Some scope to replace more sensitively sited operational and consented wind turbines with turbines around 150m high ...*" is noted in respect of the Southern Uplands with Forestry LCT Ken unit, although the DGWLCS also notes that the scale of turbines up to 200 m to blade tip could dominate the scale of less extensive hills and adversely affect adjacent small-scale glens.
- 7.2.7 The summary at the front of the EALWCS advises that "*There is some scope to site additional wind farm development with turbines above 70m height within upland areas of East Ayrshire although this will be limited by potential cumulative and other landscape and visual constraints including effects on adjacent smaller scale settled valleys and lowland landscapes.*" The EALWCS judges the overall sensitivity of the *Southern Uplands* LCT to very large typologies (wind turbines >130m to blade tip) to be of '**High**' sensitivity.

## 7.3 Baseline Conditions

### Current Baseline

- 7.3.1 The Development Site is undesignated within Dumfries and Galloway, however the western end within East Ayrshire is located within the locally designated Afton Sensitive Landscape Character Area (SLCA) as illustrated in **Figure 7.2** in **Appendix A**. It lies within an area dominated by open moorland surrounded by commercial coniferous forestry. In addition, it is remote from major settlements which are located over 10km. The area is influenced by wind farm development with the closest existing wind farms being Afton, Windy Standard (and Extension), Windy Rig and South Kyle to the west, Whiteside Hill, Sanquhar and Hare Hill to the north, Wether Hill to the south and Twentyshilling Hill to the east. All of these areas comprise open moorland, rocky outcrops and forestry. Wind farm development most relevant to the cumulative assessment is likely to be within 10km which are listed in **Table 7.1**. However, all wind farms within the study area are illustrated on **Figures 7.1-7.3** in **Appendix A**. There are a small number of residential properties along the Water of Ken valley to the southwest, and northeast. The Southern Upland Way long distance footpath straddles the eastern edge of the Development Site with a number of local level recreational routes located in the immediate area. There are no nearby tourist attractions, however, the Striding Arches on nearby hill summits are located within 10km.

## Future Baseline

- 7.3.2 Further change to the baseline landscape is likely as a result of new applications and / or eventual decommissioning or repowering of existing wind farms and their associated grid connections, occurring over the next 10-20 years.
- 7.3.3 Forestry felling and re-stocking is also likely to change the nature of available views across this landscape from various receptors within the LVIA Study Area.

Table 7.1 Wind Farms relevant to the Cumulative Assessment (within 10km)

Reference	Name of Wind Farm	Number of Wind Turbines	Approximate Distance from Proposed Development (m)	Height to Blade Tip (m)	Status
E01	Afton	27	1,106	100/120	Existing
E02	Windy Standard	36	1,686	52	Existing
E03	Windy Rig (under construction)	12	1,756	125	Existing
E04	Windy Standard Extension	30	3,401	120	Existing
E05	Whiteside Hill	10	4,348	121.2	Existing
E06	Wether Hill	14	4,890	91	Existing
E07	Sanquhar	9	6,156	130	Existing
E08	Hare Hill Extension	35	6,402	70/75/81/86/91	Existing
E09	South Kyle (under construction)	50	6,526	149.5	Existing
E10	Hare Hill	20	7,486	63.5	Existing
E11	Twentysilling Hill (under construction)	9	9,849	125	Existing
E12	High Park Farm	1	9,918	75	Existing
C01	Pencloe	19	4,812	125	Consented
C02	Windy Standard Phase III	20	5,250	125/177.5	Consented
C03	Troston Loch	14	8,580	149.9	Consented
C04	Enoch Hill	16	8,636	130	Consented
C05	Sandy Knowe	24	8,728	125	Consented
C06	Benbrack	18	9,740	132/135/149.9	Consented
A01	Euchanhead	21	553	230	Application
A02	Sanquhar II	50	1,550	200 / 149	Application

Reference	Name of Wind Farm	Number of Wind Turbines	Approximate Distance from Proposed Development (m)	Height to Blade Tip (m)	Status
A03	Cornharrow	8	4,059	149.9	Application
A04	Pencloe Variation	19	4,812	149.9	Application
A05	Shepherd's Rig	19	5,803	149.9/125	Application
A06	Enoch Hill Variation	16	8,636	149.9	Application

## 7.4 Data Sources

7.4.1 A range of desk-based and site-based data will be sourced to undertake the LVIA and cumulative assessment, covering landscape and visual receptors and other cumulative wind farm development. The desk-based data will be drawn from Ordnance Survey maps and a range of document sources in addition to the relevant planning policy documents outlined in **Chapter 4: Planning Policy Context**.

### Preliminary LVIA Study Area

7.4.2 A preliminary LVIA Study Area for the Proposed Development is illustrated in **Figure 7.1** in **Appendix A** in accordance with NatureScot (previously SNH) guidance<sup>1</sup> for turbines up to 200 m blade tip height (turbines  $\geq 150$  m to blade tip).

### Landscape Receptor Data Sources

7.4.3 The landscape character of the Development Site and the proposed LVIA Study Area is described in the DGWLCS and EALWCS. This data source is used as an exception to the National Landscape Character Assessment<sup>2</sup> which covers the whole of Scotland and supersedes previous 1990s landscape character descriptions and mapping of the area. This is because the NatureScot website<sup>3</sup> advises that this data

*"...should be used for new development proposals, plans and strategies, and so on. Where current proposals or projects have analysis based on the 1990s LCT dataset that should still be used. It should be noted which dataset has been used. Where there are topic-specific landscape capacity or sensitivity studies, they would take precedence for informing that development type, e.g. wind farms."*

7.4.4 It may be noted that the DGWLCS and EALWCS are 'topic-specific landscape capacity or sensitivity, studies that present, at a high-level, the relative sensitivity of landscapes to inform wind farm development within Dumfries and Galloway and East Ayrshire.

7.4.1 There are no nationally designated landscapes within the proposed LVIA Study Area, but there are a number of locally designated landscapes. These local designated landscapes and the special landscape qualities for which these areas are protected would be sourced as follows:

<sup>1</sup> Scottish Natural Heritage, February 2017. *Visual Representation of Wind Farms: Good Practice Guidance, Version 2.2*, page 12.

<sup>2</sup> Scottish Natural Heritage, 2019. *National Landscape Character Assessment*.

<sup>3</sup> <https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/landscape-character-assessment-scotland>

- Regional Scenic Areas in Dumfries and Galloway: *Local Development Plan 2, Regional Scenic Areas Technical Paper*<sup>4</sup>, 2018;
- Scenic Areas in South Ayrshire: *South Ayrshire Local Landscape Designations Review*, 2018<sup>5</sup>. It is noted that the Main Issues Report for South Ayrshire Council's Local Development Plan 2 proposes a review of Scenic Areas in favour of creating new 'Local Landscape Areas' to conform with Scottish Planning Policy<sup>Error! Bookmark not defined.</sup>, paragraph 197;
- Sensitive Landscape Areas in East Ayrshire Council: *East Ayrshire Local Development Plan Background Paper: Sensitive Landscape Areas*, 2015<sup>6</sup>; and
- Special Landscape Areas in South Lanarkshire: *South Lanarkshire Local Development Plan, Supplementary Guidance 9: Natural and Historic Environment*.<sup>7</sup>

7.4.2 Other areas of landscape interest include the Merrick Wild Land Area, the Galloway Forest Dark Sky Park; and Gardens and Designed Landscapes. The data for these receptors will be sourced from the following:

- Merrick Wild Land Area No.1<sup>8</sup>;
- Guide Map to Galloway Forest Dark Sky Park<sup>9</sup>, Guide Map to Galloway Forest Park<sup>10</sup> and *Local Development Plan 2 Dark Skies Friendly Lighting Supplementary Guidance*, 2020<sup>11</sup>; and
- *Historic Environment Scotland, Inventory of Gardens and Designed Landscapes*<sup>12</sup>.

### Visual Receptor Data Sources

7.4.3 Visual receptors, included in the LVIA are settlements and residential properties, transport routes and recreation routes such as the Core Path Network and outdoor community recreational facilities or places and tourist / visitor attractions and destinations. The locations of these will be sourced from Ordnance Survey maps, site survey information and the following sources:

- Scotland's Great Trails<sup>13</sup>;
- Sustrans Cycle Network<sup>14</sup>;
- Core Path Network and other promoted recreational routes;
- Historic Environment Scotland, National Trust and other sites open to the public<sup>15</sup>;
- Walk Highlands Website<sup>16</sup>; and

<sup>4</sup> Dumfries and Galloway Council (2018). *Local Development Plan 2 Regional Scenic Areas Technical Paper*.

<sup>5</sup> South Ayrshire Council (2018). *Local Landscape Designations Review*.

<sup>6</sup> East Ayrshire Council (2015). *East Ayrshire Local Development Plan Background Paper: Sensitive Landscape Areas*.

<sup>7</sup> South Lanarkshire Local Development Plan (2015), *Supplementary Guidance 9: Natural and Historic Environment*

<sup>8</sup> Scottish Natural Heritage (2017). *Merrick Wild Land Area – Description of Wildland Area*. [online] Available at <https://www.nature.scot/sites/default/files/2017-11/Consultation-response-Description-of-Wild-Land-Merrick-July-2016-01.pdf>

<sup>9</sup> Forestry and Land Scotland (2020). *Galloway International Dark Sky Park*. [online] Available at <https://forestryandland.gov.scot/visit/forest-parks/galloway-forest-park/dark-skies> [Accessed 24/06/2020].

<sup>10</sup> Forestry and Land Scotland (2020). *Galloway Forest Park*. [online] Available at <https://forestryandland.gov.scot/visit/forest-parks/galloway-forest-park> [Accessed 24/06/2020].

<sup>11</sup> Dumfries and Galloway Council (2018). *Local Development Plan 2 Dark Skies Friendly Lighting Supplementary Guidance*.

<sup>12</sup> Historic Environment Scotland (2020). *Inventory of Gardens and Designed Landscapes*. [online] Available at <https://www.historicenvironment.scot/advice-and-support/listing-and-scheduling-and-designations/gardens-and-designed-landscapes/search-for-a-garden-or-landscape> [Accessed 24/06/2020].

<sup>13</sup> <http://www.snh.gov.uk/enjoying-the-outdoors/where-to-go/routes-to-explore/scotlands-great-trails/>

<sup>14</sup> <http://www.sustrans.org.uk/ncn/map/national-cycle-network/using-network/route-numbering-system>

<sup>15</sup> <http://www.historic-scotland.gov.uk/>

<sup>16</sup> <http://www.walkhighlands.co.uk>



- Other printed or web-based sources of tourist / recreational literature.
- 7.4.4 Cumulative information on other existing and consented wind farms and planning applications for other wind farm developments would be sourced from local authority and developer sources.

### Other Technical Guidance

- 7.4.5 In addition, other technical and supporting guidance includes, but is not limited to the following:
- Landscape Institute and IEMA *Guidelines for Landscape and Visual Impact Assessment*, 3rd Edition (GLVIA 3);
  - NatureScot, *General pre-application and scoping advice for onshore wind farms - Guidance*, September 2020.
  - NatureScot, *Visual Representation of Windfarms*, Version 2.2, February 2017;
  - NatureScot, *Siting and Designing Windfarms in the Landscape*, Version 3a, August 2017;
  - NatureScot, *Guidance: Assessing the Cumulative Impact of Onshore Wind Energy Developments*, 2012;
  - University of Newcastle for NatureScot: *Visual Assessment of Windfarms: Best Practice*, Commissioned Report F01AA303A, 2002;
  - Landscape Institute, *Residential Visual Amenity Assessment: Technical Information Note*, 15 March 2019;
  - Landscape Institute, *Visual Representation of Development Proposals Technical Guidance Note 06/19*, September 2019;
  - NatureScot, *Guidance: Spatial Planning for Onshore Wind Turbines – natural heritage considerations, Version 3a*, June 2015;
  - CAA, *Article 222 of the UK Air Navigation Order (ANO) 2016*;
  - CAA Policy Statement, *Lighting of Onshore Wind Turbine Generators in the United Kingdom with a maximum blade tip height at or in excess of 150m Above Ground Level*; and
  - DGC, *Local Development Plan 2 Dark Skies Friendly Lighting Supplementary Guidance*, February 2020.

### Field Surveys / Modelling

- 7.4.6 Field surveys will be undertaken to observe, assess and record landscape and visual receptors and provide a photographic record of each assessment viewpoint in accordance with NatureScot, *Visual Representation of Wind Farms: Good Practice Guidance, Version 2.2*. The field studies will include documented visits to all relevant landscape and visual receptors to assess the likely effects of the Proposed Development in the field, checking data, 'ground truthing' and examining landscape elements, characteristics / character and views / visual amenity.
- 7.4.7 Computer modelling of the landscape / landform, other cumulative development and the Proposed Development will be undertaken using a variety of software to support the LVIA and cumulative assessment.

## 7.5 Scope of Assessment

### Zone of Theoretical Visibility and Viewpoint Analysis

- 7.5.1 The Zone of Theoretical Visibility (ZTV) analysis is used to assist the design and further define the scope of the assessment and is used to indicate the areas from where it may be theoretically possible to view all or some of the proposed turbines. The ZTVs have been calculated using ReSoft WindFarm computer software (Release 5) to produce an area of potential visibility of any part of the proposed turbines, calculated to turbine blade-tip and hub-height, or other selected infrastructure. The ZTV does not however take account of built development and vegetation, which can significantly reduce the area and extent of actual visibility in the field and as such provides the limits of the visual assessment Study Area. As a result there may be an over-estimate of the theoretical visibility with roads, tracks and footpaths in the wider setting which, although shown as falling within the ZTV, have restricted viewing opportunities since they are heavily screened or filtered by banks, walls and vegetation. The ZTVs therefore provide a starting point in the assessment process and accordingly tend towards giving an over-estimated or maximum theoretical visibility of the proposed turbines.
- 7.5.2 A preliminary ZTV map (**Figure 7.1 in Appendix A**) has been produced and is calculated to show the area of theoretical visibility of the proposed turbines based on an indicative 12 turbine layout of up to 200m height. This figure also illustrates the viewpoint locations. For the avoidance of doubt, areas outwith the coloured areas of the ZTV would have **no view** of the Proposed Development and landscape and visual receptors within these areas are consequently scoped out of the LVIA.

### Confirmation of LVIA Study Area

- 7.5.3 The LVIA Study Area for the Proposed Development (**Figure 7.1 in Appendix A**) is based on a 48,851m radius circle that allows a minimum of 45km distance from an indicative 12 turbine layout in accordance with NatureScot guidance<sup>17</sup>. It represents an over-estimated or maximum theoretical visibility of the Proposed Development. As illustrated in **Figure 7.1 in Appendix A** much of the area between 30-45km would have very limited visibility of the Proposed Development at long distance. For these reasons it is proposed to reduce the LVIA Study Area to 30km distance from the Proposed Development and to focus the assessment of likely and potential significant effects on receptors within this area and the extent of the blade tip ZTV.

### Confirmation of Cumulative LVIA Study Area

- 7.5.4 In accordance with NatureScot guidance<sup>18</sup> on cumulative assessment, information on existing and consented wind farms and other planning applications for other wind farm developments would be sourced from within a 'search area' of 60km in order to inform the cumulative assessment of effects on landscape and visual receptors within the 45km radius LVIA Study Area. As noted in paragraph 8.5.3 above, it is also proposed to reduce the cumulative search area to 30km in line with the LVIA Study Area. However, the cumulative wind farms relevant to the Proposed Development are likely to be within 10km.
- 7.5.5 The current cumulative situation within 10km is indicated in **Table 7.1** and all wind farms within 45km are illustrated in **Figures 7.1-7.3 in Appendix A**, showing the locations of wind farms that are operational, under construction, consented or which are at application stage and where the turbines are greater than 50m to blade tip. In line with NatureScot guidance, scoping stage wind farms have not been included.

<sup>17</sup> Scottish Natural Heritage, February 2017. *Visual Representation of Wind Farms: Good Practice Guidance, Version 2.2*

<sup>18</sup> Scottish Natural Heritage, March 2012. *Guidance: Assessing the Cumulative Impacts of Onshore Wind Energy Developments.*

## Viewpoint Selection and Visualisations

- 7.5.6 The proposed viewpoints, shown in **Table 7.2** and on **Figure 7.1**, are drawn from the LVIA reported in the 2015 ES and 2017 FEI of the Consented Development. Consultees are requested to confirm the viewpoint selection set out in **Table 7.2**, including requests to scope out viewpoints.
- 7.5.7 A total of 16 out of the 23 viewpoints from the original application are proposed to be included in the assessment. The remaining 7 viewpoints (in red) are proposed to be scoped out as set out in the table below.
- 7.5.8 Visualisations would be prepared for each of the 16 viewpoints to accord with NatureScot guidance<sup>19</sup> and include 90° baseline photographs and wirelines, and 53.5° photomontages (where applicable) and wirelines.

**Table 7.2 Proposed Assessment Viewpoints**

Viewpoint	Distance (m)	Comments	Included / Scoped Out	Wireline / Photomontage
1. The Striding Arches - Colt Hill	1,101	Assessed as Significant (Substantial) in 2015 ES and 2017 FEI	Included	Full Photomontage (Photograph, wireline and photomontage)
2. Southern Upland Way, north of Lorg	822	Assessed as Significant (Substantial / Moderate) in 2015 ES and 2017 FEI	Included	Full Photomontage (Photograph, wireline and photomontage)
3. Lorg Bridge	1,295	Assessed as Significant (Substantial / Moderate) in 2015 ES	Included	Full Photomontage (Photograph, wireline and photomontage)
4. Approach to Lorg (Lorg Trail)	1,625	Assessed as Significant (Substantial / Moderate) in 2015 ES and 2017 FEI	Included	Full Photomontage (Photograph, wireline and photomontage)
5. The Striding Arches - Benbrack	1,954	Assessed as Significant (Substantial / Moderate) in 2015 ES and 2017 FEI	Included	Full Photomontage (Photograph, wireline and photomontage)
6. Minor Road from Smittons Bridge to Lorg Bridge	2,590	Assessed as Significant (Substantial / Moderate) in 2015 ES	Included	Full Photomontage (Photograph, wireline and photomontage)
7. Blackcraig Hill	4,753	Assessed as Significant (Substantial / Moderate) in 2015 ES	Included	Full Photomontage (Photograph, wireline and photomontage)
8. The Striding Arches - Bail Hill	4,809	Assessed as Significant (Substantial / Moderate) in 2015 ES	Included	Full Photomontage (Photograph, wireline and photomontage)
9. Cairnmore of Carsphairn	5,450	Assessed as Significant (Substantial / Moderate) in 2015 ES	Included	Full Photomontage (Photograph, wireline and photomontage)
10. B729 East of Carsphairn	7,715	Assessed as Not Significant (Slight / Negligible) in 2015 ES and 2017 FEI. This viewpoint will be included as a precaution	Included	Full Photomontage (Photograph, wireline and photomontage)

<sup>19</sup> Scottish Natural Heritage, February 2017. *Visual Representation of Wind Farms: Good Practice Guidance, Version 2.2*

Viewpoint	Distance (m)	Comments	Included / Scoped Out	Wireline / Photomontage
		to illustrate views from road users to the south.		
11. Cairnkinna Hill	10,375	Assessed as Not Significant (Moderate) in 2015 ES and 2017 FEI. This viewpoint will be included as a precaution to illustrate views from within the Thornhill Uplands RSA.	Included	Full Photomontage (Photograph, wireline and photomontage)
12. B7000	12,827	Assessed as Not Significant (Slight) in 2015 ES and 2017 FEI. This viewpoint will be included as a precaution to illustrate views from the Galloway Hills RSA and Galloway Forest Dark Sky Park Buffer Zone.	Included	Full Photomontage (Photograph, wireline and photomontage)
13. Lochside Hotel	13,677	Assessed as Not Significant (Slight) in 2015 ES. This viewpoint will be included as a precaution to illustrate views from the north.	Included	Baseline Photograph and Wireline
14. Guffock Hill	14,920	Assessed as Not Significant (Slight) in 2015 ES. This viewpoint will be included as a precaution to illustrate views from the northeast.	Included	Baseline Photograph and Wireline
15. Keir Hills	17,447	Assessed as Not Significant (Slight) in 2015 ES. This viewpoint will be included as a precaution to illustrate views from within the Thornhill Uplands RSA.	Included	Baseline Photograph and Wireline
16. Corserine	19,929	Assessed as Not Significant (Slight) in 2015 ES. This viewpoint will be included as a precaution to illustrate views from the edge of the Merrick WLA.	Included	Baseline Photograph and Wireline
17. East Mount Lowther	21,166	Assessed as Not Significant (Slight) in 2015 ES. Considering the long distance and current cumulative baseline, the Proposed Development would be in the same field of view as other wind farm development and visible beyond the existing Sanquhar and Twentyshilling, and application Sanquhar II and Eucharhead wind farms. The effect is likely to remain Slight and Not Significant.	Proposed to be scoped out	N/A
18. Meikle Millyea	21,860	Assessed as Not Significant (Slight) in 2015 ES. Considering the long distance, current cumulative baseline and similar views from available from viewpoint 16, the viewpoint is proposed to be scoped out. The effect is likely to remain Slight and Not Significant.	Proposed to be scoped out	N/A
19. A76 North West of Auchinleck	23,390	Assessed as Not Significant (No View) in 2015 ES. There would be No View of the Proposed Development.	Proposed to be scoped out	N/A

Viewpoint	Distance (m)	Comments	Included / Scoped Out	Wireline / Photomontage
20. A76 North of Auchinleck	25,143	Assessed as Not Significant (Slight / Negligible) in 2015 ES. Considering the long distance and current cumulative baseline, the Proposed Development would be in the same field of view as other wind farm development and visible beyond the Windy Standard, Windy Rig, South Kyle, Afton and Hare Hill wind farms. The effect is likely to remain Slight / Negligible and Not Significant.	Proposed to be scoped out	N/A
21. A762 South of New Galloway	25,073	Assessed as Not Significant (No View) in 2015 ES. There would be No View of the Proposed Development.	Proposed to be scoped out	N/A
22. Kirriereoch Hill	26,001	Assessed as Not Significant (Slight) in 2017 FEI. Considering the long distance, current cumulative baseline and similar views from available from viewpoint 16, the viewpoint is proposed to be scoped out. The effect is likely to remain Slight and Not Significant.	Proposed to be scoped out	N/A
23. Queensberry	30,024	Assessed as Not Significant (Slight) in 2015 ES. Considering the long distance and current cumulative baseline, the Proposed Development would be in the same field of view as other wind farm development and visible beyond the existing Sanquhar, and application Sanquhar II and Eucharheadwind farms. The existing Minnygap and Harestanes wind farms are also located adjacent to this viewpoint which have the greatest visual effects. The effect is likely to remain Slight and Not Significant.	Proposed to be scoped out	N/A

## Potential Receptors

7.5.9 Landscape and visual receptors within the LVIA Study Area, most likely to be significantly affected tend to be those which are of higher sensitivity, located closest to the Proposed Development, incurring a direct and / or higher magnitude or level of effect. Viewpoint analysis and site survey, which includes an assessment of sensitivity and magnitude, will be used as part of the assessment to identify those receptors which are most likely to be significantly affected.

## Likely Significant Effects

- 7.5.10 The likely significant landscape, visual and cumulative effects that will be taken forward for assessment in the EIA Report are summarised in **Table 7.3**.
- 7.5.11 It is important to note that whilst some effects can be identified as likely to be significant at this pre-assessment stage, there is the potential for other receptors to be significantly affected, subject to further details of the LVIA and cumulative assessment.
- 7.5.12 Receptors which are unlikely to be significantly affected and may, subject to further assessment, be excluded from detailed assessment in the LVIA. These include most local landscape designations

and visual receptors (settlements, major transport routes, recreational routes and recreational / tourist and visitor destinations) beyond 10-15km distance from the Proposed Development.

Table 7.3 Likely Significant Landscape, Visual and Cumulative Effects

Stage of Development and Activity	Likely Significant Effect	Receptor
<b>Landscape and Cumulative Landscape Effects</b>		
Construction: Site preparation and construction of associated infrastructure (tracks, borrow pits, control buildings / sub-stations, contractors' facilities, site access and electrical cabling).	Direct localised effects on the host landscape character, characteristics and landscape elements may be significant.	Landscape character: <i>Southern Uplands with Forestry: Ken</i> (Dumfries and Galloway) <i>Southern Uplands</i> (East Ayrshire)
Construction and Operation: Turbine erection and operation.	Direct effects on the host landscape character, characteristics and potentially the landscape elements are likely to be significant within ~2km. Night-time effects resulting from aviation warning lights are also likely to be significant.	Landscape character: <i>Southern Uplands with Forestry: Ken</i> (Dumfries and Galloway) <i>Southern Uplands</i> (East Ayrshire)
	Indirect effects related to the visibility of the turbines and their effect on landscape character and perceptual characteristics have the potential to be significant. Night-time effects resulting from aviation warning lights are also likely to be significant.	Other Landscape character units: <i>Narrow Wooded Valleys: Ken</i> (Dumfries and Galloway)
	Indirect effects related to the visibility of the turbines and their effect on the special qualities of local landscape designations have the potential to be significant. Night-time effects resulting from aviation warning lights are also likely to be significant.	Afton SLCA (East Ayrshire)
Decommissioning: Removal of turbines and associated infrastructure such as control buildings / sub-stations.	Effects unlikely to be significant and will largely reverse the effects of turbine construction and operation.	
<b>Visual and Cumulative Visual Effects</b>		
Construction: Site preparation and construction of associated infrastructure (tracks, borrow pits, control buildings / sub-stations, contractors' facilities, site access and electrical cabling).	Effects on views and visual amenity resulting from visibility of the proposed wind turbines within ~2km distance, subject to detailed viewpoint analysis.	Residential properties Parts of the C35S (Class III road) Walkers along parts of the Southern Upland Way and other local recreational routes
Construction and Operation: Turbine erection and operation.	Effects on views and visual amenity resulting from visibility of the proposed wind turbines within ~5-10km distance, subject to detailed viewpoint analysis. Views of the proposed aviation warning lights and adverse effects on night-time views within ~5-10km distance, subject to detailed viewpoint analysis.	Residential properties Parts of the C35S (Class III road) Walkers along parts of the Southern Upland Way and other local recreational routes Local hill summits

Stage of Development and Activity	Likely Significant Effect	Receptor
Decommissioning: Removal of turbines and associated infrastructure such as control buildings / sub-stations.	A reduction in the operational effects on views and visual amenity resulting from <u>no</u> visibility of the proposed wind turbines.	Residential properties Parts of the C35S (Class III road) Walkers along parts of the Southern Upland Way and other local recreational routes Local hill summits

## Potential Effects Proposed to be Scoped Out of Further Assessment

- 7.5.13 As a result of the characteristics of the Development Site, baseline receptors and the Proposed Development, it is considered that some receptors would not be significantly affected in the context of the EIA Regulations. These receptors / effects can therefore be scoped out from further assessment in the EIA Report as follows:
- LVIA Study Area:
    - ▶ Limit LVIA Study Area for the landscape, visual and cumulative assessment to 30km as a result of the blade tip ZTV.
  - Cumulative Assessment:
    - ▶ Limit the cumulative baseline of all operational and consented wind energy development and other applications for wind energy development to within 30km of the Development Site to match the LVIA Study Area. However, as illustrated in **Figure 7.3** in **Appendix A**, the most relevant schemes to the LVIA are likely to be within 10km; and
    - ▶ Exclude other scoping stage and pre-application schemes in line with NatureScot guidance.
  - Receptors outwith the ZTV:
    - ▶ All receptors within the Study Area that are outwith the blade tip ZTV would have **no view** of the Proposed Development and should be scoped out.
  - Local / regional receptors beyond 10-15km distance:
    - ▶ Local / regional receptors beyond 10-15km distance from the Proposed Development, subject to viewpoint analysis should be scoped out. This would include local LCTs, other local landscape designations, main settlements, transport routes, 'B' and 'C' class roads, core paths / local recreational routes and local attractions. The viewpoint analysis and field survey will be used to confirm if a receptor can be scoped out and viewpoint analysis used to identify a conservative distance or 'threshold' for significant landscape and visual effects.
  - Wild Land Areas Assessment:
    - ▶ It has been assumed that a Wild Land Assessment of the Merrick and Talla – Hart Fell Wild Land Areas beyond 20km distance from the nearest proposed turbine would be scoped out.

## 7.6 Assessment Methodology

- 7.6.1 A summary of the proposed landscape, visual, Night-time Lighting Assessment, Residential Visual Amenity Assessment (RVAA) and cumulative assessment methodology is set out below.

## Integrated Design and Assessment

- 7.6.2 Design is an integrated part of the LVIA process as part of iterative design and assessment. In this case the LVIA and any associated design and mitigation would take into account the constraints and opportunities within the EALWCS and DGWLCS, and NatureScot guidance<sup>20</sup>, and realise opportunities where possible for landscape mitigation and enhancement.
- 7.6.3 The methodology for the LVIA would be undertaken in accordance with the Landscape Institute and IEMA *Guidelines for Landscape and Visual Impact Assessment*, 3rd Edition (GLVIA 3), and other best practice guidance.

## Assessment of Landscape Effects

- 7.6.4 Landscape Effects are defined by the Landscape Institute in GLVIA 3, paragraphs 5.1 and 5.2 as follows:
- "An assessment of landscape effects deals with the effects of change and development on landscape as a resource. The concern ... is with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character. ... The area of landscape that should be covered in assessing landscape effects should include the site itself and the full extent of the wider landscape around it which the proposed development may influence in a significant manner."*
- 7.6.5 The potential landscape effects occurring during the construction, operational and decommissioning periods may therefore include, but are not restricted to, the following:
- Changes to landscape elements: the addition of new elements (wind turbines) or the removal of existing elements such as trees, vegetation and buildings and other characteristic elements of the landscape character type;
  - Changes to landscape qualities: degradation or erosion of landscape elements and patterns and perceptual characteristics, particularly those that form key characteristic elements of landscape character types/areas or contribute to the landscape value;
  - Changes to landscape character: landscape character may be affected through the incremental effect on characteristic elements, landscape patterns and qualities (including perceptual characteristics) and the addition of new features, the magnitude of which is sufficient to alter the overall landscape character within a particular area; and
  - Cumulative landscape effects: where more than one wind farm may lead to a potential landscape effect.
- 7.6.6 Development may have a direct (physical) effect on the landscape as well as an indirect effect which would be perceived from the wider landscape, or other areas of landscape, outside the host landscape character type/area.

## Assessment of Visual Effects

- 7.6.7 Visual Effects are concerned wholly with the effect of the development on views, and the general visual amenity, and are defined by the Landscape Institute in GLVIA 3 **Error! Bookmark not defined.**, paragraphs 6.1 as follows:

*"An assessment of visual effects deals with the effects of change and development on views available to people and their visual amenity. The concern ... is with assessing how the surroundings of*

<sup>20</sup> NatureScot, *Siting and Designing Windfarms in the Landscape*, Version 3a, August 2017



*individuals or groups of people may be specifically affected by changes in the context and character of views.”*

- 7.6.8 Visual effects are identified for different receptors (people) who would experience the view(s) at their places of residence, during recreational activities, at work, or when travelling through the area. The visual effects may include the following:
- Visual effect: a change to an existing static view, sequential views, or wider visual amenity as a result of development or the loss of particular landscape elements or features already present in the view(s); and
  - Cumulative visual effects: the cumulative or incremental visibility of similar types of development may combine to have a cumulative visual effect.

### Cumulative Landscape and Visual Impact Assessment

- 7.6.9 The assessment of cumulative effects is essentially the same as for the assessment of the ‘solus’ landscape and visual effects, in that the level of landscape and visual effect is determined by assessing the sensitivity of the landscape or visual receptor and the magnitude of change. Cumulative assessment however considers the magnitude of change posed by multiple developments.
- 7.6.10 The cumulative assessment would accord with NatureScot guidance and will be prepared to ensure that, as well as the effects of the Proposed Development (LVIA), the ‘additional’ cumulative effects and the ‘combined’ cumulative effects (CLVIA) are also reported to account for two cumulative Scenarios as follows:
- Proposed Development:  
The ‘solus’ or ‘standalone’ effect.
  - Scenario 1: Existing + Consented + the Proposed Development:  
The additional and combined cumulative effects of the existing and consented wind energy developments with the Proposed Development will be assessed.
  - Scenario 2: Existing + Consented + Applications + the Proposed Development:  
The additional and combined cumulative effects of the existing and consented wind energy developments and live applications (which would include schemes at planning appeal), with the Proposed Development will be assessed.
- 7.6.11 In addition, the cumulative assessment will take account of the timescales for the operation of the existing and consented developments and assumes that these will be decommissioned within the operational life of the Proposed Development.

### Night-time Lighting Assessment

- 7.6.12 Aviation warning lights attached to turbine hubs and towers are required on all proposed wind turbines  $\geq 150$  m in accordance with Article 222 of the UK Air Navigation Order (ANO) 2016, subject to any proposed lighting mitigation strategy. A proportionate Night-time Assessment of the proposed aviation lighting will be undertaken to accord with the draft NatureScot guidance as undertaken for the Crossdykes Wind Farm Variation, consented by Dumfries and Galloway in June 2019 (and currently under construction). The assessment would be supported by maps indicating the ZTV of any proposed aviation warning lights and 3No. Night-time Viewpoints. The proposed Night-time Viewpoints have been selected as being representative of locations where there are likely to be people at night as follows:

- Viewpoint 4 – Approach to Lorg;
  - Viewpoint 6 – Minor road from Smittons Bridge to Lorg Bridge; and
  - Viewpoint 12 – B7000 (closest recommended dark sky viewing location within the Galloway Forest Dark Sky Park Buffer Area)
- 7.6.13 A night-time ZTV and light intensity ZTV of the turbine lighting positions would accompany the visualisations which would aid the assessment.
- 7.6.14 The extent of the study area is likely to be restricted to 10-15km from the outer turbine positions according to the technical criteria of the proposed candidate light fixtures.

### Residential Visual Amenity Assessment

- 7.6.15 Residential amenity is a planning matter that involves a wide number of effects (such as noise and shadow flicker) and benefits, of which residential visual amenity is just one component. A Residential Visual Amenity Assessment (RVAA) will be undertaken to assess effects on residential visual amenity likely to be experienced at residential properties within the same 3km study area as the Consented Development. The RVAA will accord with the advice in GLVIA 3, the Landscape Institute's *Residential Visual Amenity Assessment: Technical Guidance Note, 2019*.
- 7.6.16 As a minimum the visual effects on the views from each property included in the assessment will be illustrated by a wireline.

### Determining the Significance of Effects

- 7.6.17 Essentially, the level of landscape and visual effect (and whether this is significant) is determined by assessing the sensitivity of the landscape or visual receptor and the magnitude of change likely to be brought about by the Proposed Development. The time limited period for the assessment would cover the construction of the Proposed Development, its operation for a period of 30 years, and decommissioning. The assessment process would include iterative design and assessment, that would have regard to plan for the Proposed Development as though permanent and further assessment of any remaining, residual time limited effects that could not otherwise be mitigated or 'designed out'.
- 7.6.18 In accordance with the relevant EIA Regulations it is important to determine whether the predicted effects, resulting from the Proposed Development, are likely to be significant. Significant landscape and visual effects in most cases, relate to all those effects that result in a '**Substantial**' or a '**Substantial / Moderate**' effect. In some circumstances, 'Moderate' levels of effect also have the potential, subject to the assessor's opinion, to be considered as significant.
- 7.6.19 The type of effect is also considered and may be direct or indirect; temporary or permanent (reversible); cumulative; and positive, neutral or negative. The assessment unavoidably involves a combination of both quantitative and subjective assessment and wherever possible a consensus of professional opinion has been sought through consultation, internal peer review, and the adoption of a systematic, impartial, and professional approach.

## 8. Historic Environment

### 8.1 Introduction

8.1.1 The historic environment is a material consideration within the planning process as set out in Scottish Planning Policy, 2014. The historic environment chapter would aim to assess the potential impacts of the Proposed Development upon designated and non-designated assets that would be susceptible to substantial harm through:

- Direct Effects as a result of assets being disturbed or removed through construction activities;
- Indirect Effects as a result of the presence of the wind farm changing how an asset is experienced or understood; and
- Cumulative Effects occurring due to incremental changes within the setting of an asset and combined impacts resulting from two or more developments.

8.1.2 Any historic assets that may be subject to significant effects as a result of the Proposed Development, and would therefore likely require further consideration, would be identified and these potential impacts would be considered for its construction, operation and decommissioning phases.

### 8.2 Planning Policy and Technical Guidance

#### Planning Policy Context

8.2.1 In addition to those contained within Scottish Planning Policy (SPP) and the National Planning Framework 3 (NPF3), relevant national policies are contained within the Historic Environment Policy for Scotland (HEPS) and advice relating to archaeological matters is detailed within Historic Environment Scotland's (HES) *Managing Change in the Historic Environment* guidance note series.

8.2.2 Dumfries and Galloway Local Development Plan (LDP2), adopted on 3<sup>rd</sup> October 2019, and the East Ayrshire Local Development Plan adopted on 3<sup>rd</sup> April 2017 both contain policies relating to the historic environment. These are detailed further in **Chapter 4: Planning Policy Context**.

#### Technical Guidance

8.2.3 The Historic Environment Assessment would be undertaken with reference to guidance documents produced by Historic Environment Scotland and the Chartered Institute for Archaeologists (CifA). The documents that would be referenced include:

- **HES Guidance:**
  - ▶ Historic Environment Scotland Policy Statement (2016);
  - ▶ HES Environmental Impact Assessment Handbook (2018); and
  - ▶ Managing Change in the Historic Environment: Gardens and Designed Landscapes (2016).
- **CifA Guidance:**
  - ▶ Standard and guidance for archaeological advice by historic environment services (2014); and

- ▶ Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment (2014).

## 8.3 Baseline Conditions

### Data Gathering Methodology

- 8.3.1 The EIA Scoping exercise has been undertaken with reference to **Chapter 2: Project Description** as well as the previous Environmental Statement Historic Environment chapters (2015 ES; 2017 FEI; 2019 ES) for the site. This was supplemented by a number of data sources including:
- Designated historic environment spatial data and Historic Landuse Assessment (HLA) mapping from HES;
  - Non-designated historic environment spatial data, from West of Scotland Archaeology Service (WoSAS) and Dumfries and Galloway Historic Environment Record viewed online at the HES Pastmap<sup>21</sup>; and,
  - Historic mapping from National Library of Scotland (NLS).

### Current Baseline

- 8.3.2 The Proposed Development is located within an area of moorland and rough grazing, bounded to the east by forestry plantation.
- 8.3.3 Within the Proposed Development area there are no designated heritage assets. Within a 10km study area lie four scheduled monuments and six listed buildings, including the Category A Craighdarroch House 9.8km to the south east of the site boundary. All assets are over 5km from the site boundary. There are no Conservation Areas, Garden and Designed Landscapes, Historic Battlefields or World Heritage sites within the 10km study area.
- 8.3.4 Two Archaeologically Sensitive Areas (ASAs) are located within the 10 km study area. The Water of Deugh ASA, to the west and Stroanfreggan ASA to the south.
- 8.3.5 Within the site boundary lie a number of non-designated heritage assets. These predominantly relate to transport and agriculture from the medieval to modern periods.
- 8.3.6 Non-designated sites of potentially national important include cairns, lithic scatters and a hut circle, and all lie beyond 5km from the site boundary.

### Future Baseline

- 8.3.7 No changes are anticipated in the baseline condition prior to the Proposed Development being constructed and operated. The Development Site will continue to be managed as rough grazing with planted woodland at the periphery.

## 8.4 Consultation

- 8.4.1 It is anticipated that consultation with HES, WoSAS and the Dumfries and Galloway Local Planning Archaeologist will be undertaken during the course of the EIA (for example to agree upon the finalised selection of heritage assets for further assessment).

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<sup>21</sup> <https://www.pastmap.org.uk/>, last accessed 18/03/2020

## 8.5 Scope of Assessment

### Study Area

- 8.5.1 The study area for the Historic Environment chapter covers a buffer distance of 500m from the Development Site boundary to assess the potential for designated and non-designated heritage assets which may be subject to direct effects. An extended study area of 10km from the Development Site boundary would be used to identify designated and nationally important heritage assets which may be subject to indirect effects.
- 8.5.2 Up to date data on the historic environment would be obtained from:
- East Ayrshire Historic Environment Record, accessed through West of Scotland Archaeology Service (WoSAS);
  - Dumfries and Galloway Historic Environment Record;
  - Historic Environment Scotland spatial datasets of designated heritage assets and historic land-use assessment (HLA);
  - Relevant cartographic and documentary sources held by the National Archives of Scotland and National Library of Scotland where this is available for study;
  - Relevant published sources and internet sources; and
  - Aerial photography held at National Collection of Aerial Photography (NCAP).
- 8.5.3 Due to the availability of previous historic environment assessments (AMEC 2015 ES & 2017 FEI) and the nature of the historic landscape that may be affected, it is considered that a site walkover would provide very limited, if any, new information. As such, it is considered that a walkover would not be required for the purposes on informing the baseline situation at the Site.

### Direct Effects

- 8.5.4 Any previously recorded or previously unknown non-designated heritage assets within the HER that would be susceptible to disturbance as a result of the construction of the Proposed Development would be included within the assessment of effects.
- 8.5.5 Assessments of direct effects would also consider any available geotechnical data and peat investigations in order to assess the potential for further as yet unknown archaeological remains to be present and palaeoenvironmental potential.
- 8.5.6 Any previously recorded heritage assets within the HER or previously unknown non-designated heritage assets identified through assessment that would be susceptible to disturbance as a result of the construction of the Proposed Development would be included within the assessment of effects.

### Indirect Effects

- 8.5.7 Due to the nature of indirect effects being predominantly related to the visibility to, or from, a heritage asset, the full scope of indirect effects will be determined with reference to the finalised ZTV for the Proposed Development. This scope would also inform whether any further photomontage or wireframe visualisation not already incorporated into the LVIA assessment will be required to support the assessment of historic assets. The assets for inclusion in the assessment of indirect effects would be established in consultation with HES in addition to WoSAS and the Dumfries and Galloway Archaeologist where appropriate.

- 8.5.8 The closest designated heritage assets to the proposed site are over 5km from the Development Site boundary, at which distance it is generally only the most sensitive and significant heritage assets that have the potential to be significantly affected. Significant effects in these cases are only likely to occur where the proposed turbines intervene in specific views that make a substantial contribution to the significance of an asset. An assessment of how views of the Proposed Development may affect the understanding and experience of heritage assets will be undertaken and where views of, or from, these assets towards the Development Site could contribute to their setting, these would be assessed further and visited where possible.
- 8.5.9 The temporal scope of the assessment of Historic Environment effects is consistent with the period over which the Proposed Development would be carried out and therefore covers the preparation and construction periods, followed by care and maintenance and eventual decommissioning.

### Potential Receptors

- 8.5.10 It is anticipated that designated historic environment receptors that will require detailed assessment for indirect effects within the EIA will include as a minimum:
- Stroanfreggan Bridge, Cairn, (SM1043);
  - Stroanfreggan Craig, Hill Fort (SM1095);
  - Dumfries House Inventory Garden and Designed Landscape (GDL); and
  - Assets of national significance requested for further assessment by stakeholders.

### Likely Significant Effects

- 8.5.11 The likely significant effects that will be taken forward for assessment in the EIA Report are summarised in **Table 8.1**.

Table 8.1 Likely Significant Historic Environment Effects

Stage of Development	Potential Direct Effects	Potential Indirect Effects
<b>Construction</b>	Disturbance of archaeological remains within the Development Site through the construction of access tracks, turbines, movement of plant and associated infrastructure or borrow pits.	Visual and audible disturbance of nearby heritage assets through plant movement and construction operations
<b>Operation</b>	None	The Proposed Development would be a perceptual element in views from and to nearby heritage assets as listed at section 9.5.10.
<b>Decommissioning</b>	None	Visual and audible disturbance of nearby heritage assets through plant movement and decommissioning operations.

- 8.5.12 It is considered that designated heritage assets other than those listed within paragraph 9.5.10 do not have the potential to be subject to significant adverse effects and as such only the identified heritage assets will be assessed further in the EIA Report, subject to review where development proposals are amended.

## 8.6 Assessment Methodology

8.6.1 The proposed generic project-wide approach to the assessment methodology is set out in **Chapter 3**, and specifically in **Section 3.6**. However, whilst this will inform the approach that will be taken for the Historic Environment assessment, it is necessary to set out how this methodology will be applied, and adapted as appropriate, to address the specific needs of the Historic Environment assessment for the EIA. The judgement of whether an asset is at potential of disturbance will follow the criteria as set out in **Table 8.2** and **Table 8.3** and be applied to the EIA significance matrix.

Table 8.2 Categorisation of Importance

Importance	Rationale
<b>National and International</b>	<p>World heritage sites are designated on the basis of 'Outstanding Universal Value' and would normally be considered of international importance.</p> <p>By legal definition, scheduled monuments are considered as being of national importance. As the process of scheduling is ongoing and as scheduling is a representative designation, there are further assets which are not scheduled but which may be of equivalent importance.</p> <p>HES describes Category A listed buildings as buildings of national or international importance, either architectural or historic; or fine, little-altered examples of some particular period, style or building type (HES website - Categories of listed building).</p> <p>The SPP states that sites identified within the Inventory of Historic Battlefields and the Inventory of Gardens and Designed Landscapes are of national and/or international importance.</p> <p>Conservation areas rated by HES as of Outstanding quality (where such appraisals have been made) could be considered as being of national importance.</p>
<b>Regional</b>	<p>These include archaeological sites which do not merit scheduling but which are nevertheless of interest or which could make a substantial contribution to established regional research agendas.</p> <p>HES describes Category B listed buildings as buildings of regional or more than local importance; or major examples of some particular period, style or building type, which may have been altered (HES website - Categories of listed building).</p> <p>The principles of selection for designation of conservation areas do not explicitly include valuations of national, regional or local importance, although most examples would be of importance on a regional level.</p> <p>Designed landscapes that are recognised by local authorities but not included within the Inventory of Gardens and Designed Landscapes would usually be considered to be regionally important.</p>
<b>Local</b>	<p>The majority of non-designated assets would normally be considered of local importance.</p> <p>HES describes Category C listed buildings as buildings of local importance; lesser examples of any period, style or building type, as originally constructed or moderately altered; and simple, traditional buildings that group well with other listed buildings (HES website - Categories of listed building).</p>

Table 8.3 Potential Magnitude of Change

Magnitude	Definition
<b>High</b>	Loss of significance of an order of magnitude that would result from total or substantial demolition/disturbance of a heritage asset or from the disassociation of an asset from its setting.
<b>Medium</b>	Loss of significance arising from partial disturbance or inappropriate alteration of asset which will adversely affect its importance. Change to the key characteristics of an asset's setting, which gives rise to harm to the significance of the asset but which still allows its archaeological, architectural or historic interest to be appreciated.

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<b>Magnitude</b>	<b>Definition</b>
<b>Low</b>	Minor loss to or alteration of an asset which leave its current significance largely intact. Minor and short-term changes to setting which do not affect the key characteristics and in which the historical context remains substantially intact.
<b>Negligible</b>	Minor alteration of an asset which does not discernibly affect its significance. Minor and short-term or reversible change to setting which do not affect the significance of the asset.

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## 9. Ecology

### 9.1 Introduction

- 9.1.1 The Ecology chapter of the EIA Report will identify the baseline ecology of the Development Site and the surrounding area and will assess the potential effects on any ecological features that are considered to be important during the construction, operation and decommissioning of the Proposed Development. National and Local planning policies, best practice guidance, the outcome of consultation and any mitigation will be taken into account in the ecological impact assessment.

### 9.2 Baseline Conditions

#### Consultation

- 9.2.1 It is anticipated that consultation with Scottish Natural Heritage (NatureScot), Dumfries & Galloway Council (DGC), East Ayrshire Council (EAC) and Nith District Salmon Fishery Board (SFB) will be undertaken during EIA (for example to agree upon the finalised selection of ecology features for further survey if required, or assessment).

#### Data Sources

##### Desk-study

- 9.2.2 A desk-based data-gathering exercise will be undertaken to obtain existing information relating to relevant ecological features, these being: statutory and non-statutory biodiversity sites; habitats and species of principal importance as set out in the Scottish Biodiversity List (SBL); legally protected and controlled species; and other conservation notable species that have been recorded to inform previous assessments. The following data sources will be consulted as part of the desk-study undertaken in the assessment:
- NatureScot SiteLink Information Service<sup>22</sup> for designated sites;
  - Ecological data records will be sought from South West Scotland Environmental Information Centre (SWSEIC);
  - Lorg Wind Farm Environmental Statement (November 2015), and FEI (September 2017) Chapter 10 Ecology; and
  - Any other relevant Environmental Statements/EIA reports or technical reports from other developments or proposed developments in the local area.

##### Study Area

- 9.2.3 The following desk study area is proposed:
- Statutory sites designated under International conventions or European legislation; and available bat records - within the Development Site and a 10km study area buffer;

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<sup>22</sup> Scottish Natural Heritage (2020) SiteLink Information Service [online] Available at <https://sitelink.nature.scot>.

- Statutory sites designated under national legislation, locally designated sites, SBL species, Red-listed species<sup>23</sup>; and legally protected and legally controlled species - within the Development Site and a 2km study area buffer; and
  - The ecology desk study will include efforts to identify great crested newt habitat - within the Development Site and a 500m study area buffer.
- 9.2.4 Field survey areas will follow best practice guidance as set out in for the field survey proposals in Paragraphs 10.2.5 – 10.2.10.

### Field Surveys

- 9.2.5 **Extended Phase 1 Habitat Survey** – An extended Phase 1 habitat surveys was completed within the Development Site boundary following the standard habitat survey method described in the *Handbook for Phase 1 Habitat Survey: a technique for environmental audit*<sup>24</sup> (JNCC, 2010). Habitats within 250m of the Site boundary were mapped where accessible. The extended Phase 1 habitat survey characterised the habitats present on site and included an initial assessment of habitat suitability to support protected species, including badger, pine marten, red squirrel, herptile species, and a bat roost suitability assessment.
- 9.2.6 Due to inclusion of additional land to the western extent of the Development Site (west of Lagower Hill and the Afton Water), additional baseline survey coverage was undertaken for each feature where appropriate.
- 9.2.7 **National Vegetation Classification (NVC) Survey** – An NVC survey was undertaken to provide greater detail on the vegetation communities present within the Development Site and to identify the potential presence of vegetation communities of nature conservation importance. The identification and mapping of dominant NVC plant communities was carried out in accordance with standard guidance<sup>25</sup>. As per SEPA requirements, this included wetland habitats, such as marshy grassland and wet heath, which have potential to be Ground Water Dependent Terrestrial Ecosystems (GWDEs).
- 9.2.8 **Aquatic Mammal Survey** – Otter and water vole surveys will be undertaken along all watercourses and water bodies within the Development Site boundary (and up to a maximum of 250m outwith this area where accessible). The surveys will be carried out in accordance with standard methodologies (e.g. Chanin, 2003<sup>26</sup>).
- 9.2.9 **Fisheries - Watercourse evaluation Survey** – A number of watercourses are directly associated with the Development Site, including the Water of Ken and the Afton Water (both SEPA classified watercourses). A rapid watercourse evaluation will be undertaken alongside the aquatic mammal surveys, and will be scoped by one of Wood's Scottish Fisheries Co-ordination Centre (SFCC) accredited surveyors in order to identify the suitability of watercourses within the Development Site to support potential fisheries interest/risks (e.g. including salmon, lamprey, trout and aquatic invertebrates, including freshwater pearl mussel).

<sup>23</sup> Red listed species for the purposes of this assessment refer to those noted using IUCN criteria as being "Near Threatened", "Vulnerable", "Endangered" and "Critically Endangered", and those on present on local Red Lists in the categories "Nationally Scarce" and "Nationally Rare".

<sup>24</sup> Rodwell, J S (ed.) (1991a) *British Plant Communities, Vol. 1: woodlands and scrub*. Cambridge University Press, Cambridge; Rodwell, J S (ed.) (1991b) *British Plant Communities, Vol. 2: mires and heaths*. Cambridge University Press, Cambridge; and Rodwell, J S (ed.) (1992) *British Plant Communities, Vol. 3: grasslands and montane communities*. Cambridge University Press, Cambridge.

<sup>26</sup> Chanin, P. (2003). *Monitoring the Otter Lutra lutra. Conserving Nature 2000 River Monitoring Series No 10*. English Nature: Peterborough

9.2.10 **Bat Surveys** – Survey effort adhered to *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation* (2019) guidelines<sup>27</sup>. Areas with high bat potential within 250m of the Development Site boundary were investigated in order to identify potentially important roost sites. Where potential roost sites have been identified (for instance at Lorg Farmhouse), these were subject to internal roost surveys and/or external emergence surveys. Based on an initial site risk assessment, the scale of the development (and presence of other wind developments within 5km) identifies the Development Site as 'Medium' project size. The presence of known and potential roost features within the Development Site (e.g. Lorg Farmhouse) and the presence of known and potentially important foraging and commuting corridors along the Water of Ken, Lorg Burn and Alwhat Burn, lead to an assessment of 'Moderate' habitat risk. The Development Site is therefore assessed as being of Medium risk for bats. Ground based monitoring using full spectrum static (SM4) bat detectors was undertaken for a minimum of 10 consecutive nights during each of the Spring, Summer and Autumn seasons in accordance with stated best practice. Survey efforts focused in those parts of the Development Site where turbines are most likely to be located.

### Current and Historical Baseline

9.2.11 A detailed desk study will be undertaken as part of the baseline study, however, a preliminary search indicates that there are no known statutory sites designated for their nature conservation interest within 5km. There are several areas of Ancient Semi-Natural Woodland (ASNW) within 2km of the Development Site boundary.

9.2.1 Automated bat activity surveys, bat roost surveys, vegetation and further protected species field surveys were undertaken on the Development Site during 2020 in order to update historical baseline surveys.

9.2.2 The following provides a baseline summary from surveys undertaken between 2012-2015, 2017 and 2020:

- The Development Site is centred on the Water of Ken between Alhang and Alwhat Hills to the west and Altry and Coranbrae Hills to the east, which range up to 640m above mean sea level (AMSL). It is characterised by open upland grassland habitat used for sheep grazing with areas of acid grassland and blanket bog. There are no woodland habitats within the main survey area, although there are occasional trees at Lorg Farmhouse and scattered along tributary burns.
- The dominant habitats are dry modified bog, wet modified bog and marshy grassland, which have been affected by sheep grazing and artificial drainage, contributing to a reduction in their conservation value.
- No evidence of water vole was recorded; however, sections of watercourses, particularly where upland burns flow across relatively flat ground (including parts of Lorg Burn in the vicinity of Lorg Farm; and lower reaches of Small Cleugh and Rough Cleugh) are potentially suitable for this species.
- Signs of otter (only spraint sites) were recorded on the Water of Ken, Lorg Burn, Small Cleuch (a tributary of Lorg Burn), Altry Burn, Spout Burn and tributaries of the Water of Ken. Good foraging opportunities were present, with the Water of Ken providing habitat for salmon and trout, with suitable fish habitat to be found along most of the watercourses. However, no confirmed resting sites were recorded.
- Fish habitat surveys revealed suitable habitat for a range of species; Atlantic salmon were considered to be absent due to impassable barriers at Kendoon Dam, however, resident brown trout and potentially European eel were considered to be potentially present.

<sup>27</sup> NatureScot (2019). *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation*.

- Bats from four genera were found to be present within the Development site: *Pipistrellus*, *Myotis*, *Plecotus* and *Nyctalus*. A small summer roost of soprano pipistrelle bats was confirmed to be present at Lorg farmhouse, and common pipistrelle and Daubenton's bat were also thought to use these buildings for roosting. The main river valleys of the Water of Ken, Lorg Burn, Altry Burn and Pulmulloch Burn were found to provide the highest quality foraging habitat with Lorg farmhouse and environs showing the highest levels of activity during seasonal automated detector surveys in 2012 and 2020; commuting routes were found to be limited to sheltered woodlands and watercourses. Automated bat activity surveys at two anemometry masts during 2013 returned low levels of bat activity from Leisler's bat, common and soprano pipistrelle and *Myotis* species and noctule may also have been recorded. Only one pass at height was recorded and in general, very low levels of bat activity were recorded with activity dominated by pipistrelle species.
- Evidence of badger activity was confirmed in an area outside of the Development Site. However, no badger setts were recorded within the development area during the surveys undertaken during 2012-2015, 2017 or 2020.
- Otter and water vole surveys will be undertaken in 2021 to keep the current baseline up to date for these species. Scottish Natural Heritage (NatureScot) advises that pre-application surveys remain valid for two years, and should be repeated if the application is delayed beyond that. Given the mobile nature of otter and water vole and the potential for delays on site due to the presence of these species, these surveys are proposed in order to update mitigation measures where required.
- No other surveys are proposed at this time as all other surveys are considered to be up to date.

### Future Baseline

- 9.2.3 There have been no significant changes to the land use within the Development Site since the Environmental Statement that was submitted in 2015. Sheep grazing continues to be the predominant activity, and it is unlikely that this land use and the associated land management will be altered in the foreseeable future in the absence of the Proposed Development. As such, the predicted future baseline is considered to be valid with the future baseline unlikely to change significantly from the current baseline conditions reported.

## 9.3 Scope of Assessment

### Potential Important Ecological Features

- 9.3.1 Based on an initial desk study appraisal, using historical data and professional judgment, the following features are likely to be taken forward for further detailed assessment: mire communities, GWDTE habitats, bats, badgers, otters, water vole and salmonids. Should any additional sensitive ecological features be identified during the course of surveys, these will be included within the assessment as appropriate.

### Likely Significant Effects

- 9.3.2 The likely significant Ecology effects that will be taken forward for assessment in the EIA Report are summarised in **Table 91**.

Table 9.1 Likely Significant Ecology Effects

Activity	Effect	Ecological feature
Construction and decommissioning activities (earthworks, excavation)	Direct and indirect effects arising from pollution events	Salmonids
Construction and decommissioning activities (earthworks, excavation)	Direct habitat loss	Mire communities
Construction and decommissioning activities (earthworks, excavation)	Changes to water flow regimes	GWDEs and salmonids
Works close to watercourses including watercourse crossings	Loss or damage to habitat	Otter and water vole
Construction and decommissioning activities (earthworks, excavation)	Loss or damage to habitat	Bats and badger
Operational wind turbines	Displacement, injury or death	Bats

## 9.4 Assessment Methodology

### Legislation, Policy and Guidance

9.4.1 The assessment will be undertaken in line with the following legislation and guidance:

- Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive)<sup>28</sup> implemented in Scotland by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland)<sup>29</sup>. The Conservation of Habitats and Species Regulations (2017) also applies in Scotland in relation to certain specific activities (reserved matters) for consents sought under Section 36 of the Electricity Act 1989;
- Natura 2000 Guidance Document 'Wind Energy Developments and Natura 2000'<sup>30</sup>;
- The Nature Conservation (Scotland) Act 2004 (as amended)<sup>31</sup>;
- The Wildlife and Countryside Act 1981 (as amended in Scotland)<sup>32</sup>;
- CIEEM (2019). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine<sup>33</sup>;
- The Dumfries and Galloway Local Biodiversity Action Plan (LBAP)<sup>34</sup>;
- Ayrshire LBAP<sup>35</sup>;
- The Scottish Biodiversity List<sup>36</sup>;

<sup>28</sup> European Commission (1992). *Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora*.

<sup>29</sup> <http://www.legislation.gov.uk/ukxi/1994/2716/contents/made>

<sup>30</sup> European Commission (2010). *Natura 2000 Guidance Document 'Wind Energy Developments and Natura 2000*. Brussels: European Commission

<sup>31</sup> *Nature Conservation (Scotland) Act 2004*.

<sup>32</sup> *Wildlife and Countryside Act 1981*. UK: The Stationery Office

<sup>33</sup> Chartered Institute of Ecology and Environmental Management (2018). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*. Winchester: Chartered Institute of Ecology and Environmental Management;

<sup>34</sup> Dumfries and Galloway Biodiversity Partnership (2009). *Dumfries and Galloway Local Biodiversity Action Plan*.

<sup>35</sup> [http://www.ayrshire-jsu.gov.uk/biodiversity\\_action\\_plan.html](http://www.ayrshire-jsu.gov.uk/biodiversity_action_plan.html).

<sup>36</sup> Scottish Natural Heritage (2005). *Scottish Biodiversity List*.

- Engineering in the water environment good practice guide: river crossings<sup>37</sup>;
- Land Use Planning System SEPA Guidance Note 4<sup>38</sup>;
- Habitats and Birds Directives, Nature Conservation; Implementation in Scotland of EC Directives on the Conservation of Natural Habitats and of Wild Flora and Fauna and the Conservation of Wild Birds ('the Habitats and Birds Directives')<sup>39</sup>;
- Environmental Impact Assessment Handbook<sup>40</sup>; and
- Research and guidance on restoration and decommissioning of onshore wind farms<sup>41</sup>.

## Methodology for Assessing Ecological Features

- 9.4.2 The generic project-wide approach to the assessment methodology is set out in **Chapter 3: EIA Process and Consultation**. This section describes how this methodology will be applied, and adapted as appropriate, in order to correspond with topic specific guidance (i.e. CIEEM, 2019<sup>33</sup>).
- 9.4.3 An Ecology EIA Report chapter will be produced that will summarise the findings of the desk study, surveys and consultation. This will form the baseline against which the potential impacts of the Proposed Development, alone and cumulatively with other wind farm developments would be assessed, based on both the importance of ecological features and the nature and magnitude of the impact from the Proposed Development. Any mitigation considered necessary will be identified and residual effects with this in place will be determined.
- 9.4.4 The significance of the effects resulting from the Proposed Development will primarily be determined by the value of a given ecological feature and the magnitude of change.
- 9.4.5 Adverse effects will be assessed as being significant if the favourable conservation status of an ecological feature would be lost as a result of the Proposed Development. Beneficial effects will be assessed as those where a resulting change from baseline improves the quality of the environment (e.g. increases species diversity, increases the extent of a particular habitat etc., or halts or slows down an existing decline).
- 9.4.6 Conservation status is defined as follows (as per CIEEM, 2019<sup>33</sup>):
- "For habitats, conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and typical species within a given geographical area;*
- For species, conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area".*
- 9.4.7 The decision as to whether the conservation status of an ecological feature would alter will be made using professional judgement, drawing upon the information produced through the desk study, field survey and assessment of how each feature is likely to be affected by the Proposed Development.

<sup>37</sup> SEPA (2010). *Engineering in the water environment good practice guide – river crossings*.

<sup>38</sup> SEPA (2010). *Land Use Planning System SEPA Guidance Note 4: Planning Guidance on on-shore windfarm developments*.

<sup>39</sup> Scottish Executive Rural Affairs Department (2000). *Habitats and Birds Directives, Nature Conservation; Implementation in Scotland of EC Directives on the Conservation of Natural Habitats and of Wild Flora and Fauna and the Conservation of Wild Birds* ('the Habitats and Birds Directives'). Revised Guidance Updating Scottish Office Circular No 6/1995.

<sup>40</sup> Scottish Natural Heritage (2018). *Environmental Impact Assessment Handbook - Version 5: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland*.

<sup>41</sup> Scottish Natural Heritage (2013). *Commissioned Report No. 591 Research and guidance on restoration and decommissioning of onshore wind farms*.

9.4.8 A similar procedure will be used where designated sites may be affected by the Proposed Development, except that the focus will be on the effects on the integrity of each site; defined as:

*"The coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified".*

9.4.9 The assessment of effects on integrity draws upon the assessment of effects on the conservation status of the features for which the site has been designated. Where these features are not clearly defined, which is often the case for non-statutory biodiversity sites, it will be necessary to use professional judgement to identify the interest features or obtain additional information about the interest features from NatureScot, SEPA, Scottish Wildlife Trust, DGC, EAC or those responsible for identifying these sites, so that sufficient information on which to base an assessment is available.

## 10. Ornithology

### 10.1 Introduction

- 10.1.1 The Ornithology chapter of the EIA Report will set out the desk study and survey work undertaken to define the baseline of the Proposed Development and the surrounding area. The results of this work will be summarised (with details presented in baseline reports appended to the EIA Report) and will provide the basis for the determination of potential effects on any important ornithological features. National and local planning policies, best practice guidance, the outcome of consultation and any mitigation identified will be considered in the ornithological impact assessment.
- 10.1.2 The ornithology assessment would be undertaken in accordance with legislation and best practice guidance including the following:
- Directive 2009/147/EC on the Conservation of Wild Birds (the codified version of Council Directive 79/409/EEC as amended) (the Birds Directive);
  - The Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations);
  - The Wildlife & Countryside Act 1981 (as amended);
  - The Nature Conservation (Scotland) Act (2004);
  - The Wildlife and Natural Environment (Scotland) Act 2011;
  - Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1 (CIEEM (2019));
  - Recommended bird survey methods to inform impact assessment of onshore wind farms (NatureScot, 2017);
  - Assessing significance of impacts from onshore wind farms outwith designated areas (SNH, 2018a);
  - Avoidance Rates for the onshore NatureScot Wind Farm Collision Risk Model (NatureScot, 2018b); and
  - Assessing the cumulative impacts of onshore wind farms on birds (NatureScot, 2018c).

### 10.2 Baseline Conditions

#### Desk Study

- 10.2.1 A desk study was undertaken in 2015 for the original EIA and updated in 2019 (Wood, 2019a<sup>42</sup> and Wood, 2019b<sup>43</sup>), to identify statutory ornithological sites within 20km of the Proposed Development (10km for ornithological Site(s) of Special Scientific Interest (SSSIs)), as well as to undertake data searches for notable or protected species such as Schedule 1 species nest site locations and black grouse lek sites. The desk-based exercise identified the following:

<sup>42</sup> Wood. 2019a. E.ON Climate & Renewables Lorg Wind Farm Baseline Ornithology Report – Non-breeding Season 2018/19. Doc Ref. 32964-WOOD-XX-XX-RP-OE-0001\_A\_P01.1.

<sup>43</sup> Wood. 2019b. E.ON Climate & Renewables Lorg Wind Farm Baseline Ornithology Report – Breeding Season 2019 – *Confidential Appendix A*. Doc Ref. 32964-WOOD-XX-XX-RP-OE-0002\_A\_P01.1.



- The Muirkirk and North Lowther Uplands Special Protection Area (SPA) is located c.13km from the Proposed Development. The SPA is designated for breeding and overwintering hen harrier, as well as breeding golden plover, short-eared owl, merlin and peregrine; and
  - Data searches undertaken with the RSPB and local Raptor Study Group (RSG) confirmed that black grouse were present in the surrounding area and that there are known nest sites of Schedule 1 raptor/owl species within the search area.
- 10.2.2 The desk study also included reviewing results of surveys previously undertaken at the site of the Proposed Development (as documented within the 2015 ES) in the non-breeding seasons of 2010/11, 2012/13 and 2013/14; and three breeding seasons of 2012, 2013 and 2014. The following is a summary of the results:
- Recorded target species activity was low throughout the survey periods, with key findings being the presence of:
    - ▶ low target species flight activity levels between 2010 and 2014;
    - ▶ very low densities of breeding waders within a 500m buffer of the Development Site (as documented within the 2015 ES), comprising golden plover, curlew, oystercatcher, snipe and common sandpiper;
    - ▶ an active barn owl roost site and an active peregrine territory within a 2km buffer of the Development Site in 2014 as documented within the 2015 ES); and
    - ▶ very low numbers of black grouse within a 1.5km buffer of the Development Site (as documented within the 2015 ES).
- 10.2.3 The desk study will be updated so that it accurately reflects local baseline information pertaining to ornithological receptors making it suitable to support a Section 36 application. This will include:
- reviewing available bird data from Environmental Statements and EIA Reports for those wind farm developments located in proximity to the Proposed Development; and
  - updated data searches will be undertaken with the RSPB and local RSG.

## Field Studies and Assessment

- 10.2.4 Bird surveys of the Development Site were undertaken during the 2018 and 2019 breeding seasons and 2018/19 and 2019/20 non-breeding seasons, representing a total of two years of survey effort. Surveys were also undertaken in the non-breeding seasons of 2010/11, 2012/13 and 2013/14 and breeding seasons of 2012, 2013 and 2014.
- 10.2.5 A brief summary of the methods used during ornithological surveys undertaken during the 2018 and 2019 breeding seasons and the 2018/19 and 2019/20 non-breeding seasons are provided below along with a brief summary of the results:
- Vantage point (VP) watches following the method outlined in NatureScot (2017) guidance were undertaken from four VPs between April 2018 and March 2020. These surveys are designed to collect flight activity data that can subsequently be used in Collision Risk Modelling (CRM) to estimate collision risk. A total of 42 hours of observation were undertaken from each of the four VPs during both the 2018 and 2019 breeding seasons (April to August) and also during both the 2018/19 and 2019/20 non-breeding seasons (September to March).
    - ▶ VP watches lasted for a maximum of three hours with a minimum 30 minute interval before a surveyor began a second VP watch. Flights were recorded at three heights bands throughout the surveys although these differed between seasons (0 – 30m, 30 – 150m and

150m+ in the 2018 breeding season; 0 – 15m, 15-150m and 150m+ in the 2018/19 non-breeding season; and 0 – 15m, 15-180m and 180m+ in the 2019 breeding season and 2019/20 non-breeding season).

- Fourteen 'target species' were recorded, comprising of black grouse, pink-footed goose, greylag goose, whooper swan, golden plover, dunlin, osprey, golden eagle, red kite, black kite, hen harrier, goshawk, merlin and peregrine. Relatively low levels of flight activity were recorded for most target species (less than five flights), with the exception of pink-footed goose (six flocks, totalling 768 individual flights), greylag goose (six flocks, totalling 12 individual flights), osprey (five flights), red kite (110 records, totalling 117 individual flights), hen harrier (12 flights), goshawk (23 records, totalling 27 individual flights), merlin (eight flights) and peregrine (25 records, totalling 27 individual flights).
- A range of distribution and abundance surveys were undertaken during the breeding bird seasons in 2018 and 2019, comprising:
  - ▶ moorland breeding bird surveys using an adapted version of the Brown and Shepherd (1993) method as recommended by current NatureScot guidance (NatureScot, 2017). Survey areas covered all appropriate habitat within the Development Site boundary and 500m buffer around this (where access was available), with four visits being undertaken from April to July 2018 and 2019;
  - ▶ breeding raptor surveys covered the period April to July 2018 and March to July 2019. Surveys were undertaken in line with NatureScot (2017) guidance and followed the species-specific methodologies outlined in Hardey *et al.* (2013)<sup>44</sup> with surveys extending to 2km beyond the Development Site boundary (where access was available); and
  - ▶ black grouse surveys were undertaken within a 1.5km buffer of the Development Site (where access was available) and followed the guidance in Gilbert *et al* (1998)<sup>45</sup>, with two survey visits between late March and mid-May in 2018 and 2019.

10.2.6

Key findings comprised:

- Red kite probably bred within a 2km buffer of the Development Site in 2019. Goshawk bred within a 2km buffer of the Development Site in 2018 (one pair) and 2019 (one pair (possibly two)), and birds were observed to be holding territory at the second unconfirmed breeding site in spring 2020. Barn owl was recorded occupying a roost site within a 2km buffer of the Development Site in 2018 but was not recorded in 2019. Merlin bred within a 2km buffer of the Development Site in 2018. Peregrine bred within a 2km buffer of the Development Site in 2019.
- A single displaying male black grouse was observed in one location within the Development Site in the 2018 breeding season, although there were no records from any other surveys except for the single male recorded in flight during a VP survey in the 2018/19 non-breeding season; and
- The breeding wader assemblage of the Development Site and 500m buffer was limited to oystercatcher (one territory in 2018 only), golden plover (one territory in 2018 only), curlew (seven territories in 2018 and three in 2019), snipe (13 territories in 2018 and three in 2019) and common sandpiper (two territories in both 2018 and 2019).

<sup>44</sup> Hardey, J, Crick, H., Wernham, C., Riley, H., Etheridge, B., Thompson, D. 2013. Raptors: A Field Guide to Surveying and Monitoring – 3rd Edition. NatureScot

<sup>45</sup> Gilbert, G., Gibbons, D.W. & Evans, J. 1998. Bird Monitoring Methods. Royal Society for the Protection of Birds, Sandy, UK

## 10.3 Scope of Assessment and Assessment Methodology

- 10.3.1 The ornithological impact assessment will follow the Chartered Institute of Ecology and Environmental Management guidelines (CIEEM, 2019). It will focus on assessing the potential impact of the Proposed Development on any relevant designated sites and any birds of high nature conservation value. Where necessary, mitigation and enhancement measures will be considered. Potential impacts include:
- Direct habitat loss due to land take by wind turbine bases, tracks and ancillary structures;
  - Disturbance and displacement of birds from the proximity of the wind turbines. Such disturbance may occur as a consequence of construction work, or due to the presence of operational turbines close to nest sites or feeding areas or on habitual flight routes; and
  - The effects of collision with rotating turbine blades (i.e. killing or injury of birds), which is of particular relevance for sites located in areas with high raptor activity or which support large concentrations of waterfowl.
- 10.3.2 With regards to the first issue, total land take by wind farm infrastructure generally represents a small proportion of a site. Therefore, the permanent loss of nesting and foraging habitat for birds tends to be small and will generally have little effect on bird populations. At most wind farm sites, it is the latter two issues, collision risk and displacement, which may potentially be more significant, and these will be the focus of the assessment.
- 10.3.3 An Ornithology Chapter of the EIA Report would be produced that would document the findings of the desk study and the surveys which have been undertaken. These would form the baseline against which the potential impacts of the Proposed Development, alone and cumulatively with other operational and consented wind farm developments (at the Natural Heritage Zone scale), would be assessed, based on both species importance, the value of the site-based population and the nature and magnitude of the impact as a result of the Proposed Development. Collision risk analyses will be undertaken for appropriate receptors only and will take in to account the deviation between the recorded VP survey height bands and the turbine parameters of the Proposed Development (maximum tip height of 200m). Any mitigation that is considered to be necessary will be identified and residual effects will be determined.

# 11. Geology, Hydrology and Hydrogeology

## 11.1 Introduction

- 11.1.1 This Scoping chapter considers the potential effects of the Proposed Development with respect to geology, hydrology (including flood risk) and hydrogeology. The chapter should be read in conjunction with the development description provided in **Chapter 2: The Project Description** and with respect to relevant parts of **Chapter 9: Ecology**, where common receptors have been considered and where there is an overlap or relationship between the assessment of effects.

## 11.2 Baseline Conditions

### Data Sources

- 11.2.1 The appraisal of existing (baseline) conditions for the purposes of this Scoping Chapter has involved the collection and interpretation of a wide range of data and information from published material, plus consultations relating to the local and wider hydrological environment with statutory bodies, principally SEPA, DGC and EAC. The data collected, and other sources of information, are listed in **Table 11.1** **Error! Reference source not found.**. The hydrology assessment is also interrelated with, and uses information from, other chapters of this Scoping Report, such as **Chapter 9: Ecology**.

Table 11.1 Sources of Desk Study Information for Geology, Hydrology (Including Flood Risk) and Hydrogeology

Source	Data
Ordnance Survey (OS) 1:50,000 Landranger Sheet 77 Dalmellington & New Galloway	Topography and features
OS 1:25,000, Explorer Sheet 328: Sanquhar & New Cumnock	
OS 1:10,000 Raster map	
Centre for Ecology and Hydrology (CEH) National River Flow Archive ( <a href="http://www.ceh.ac.uk/data/nrfa/index.html">www.ceh.ac.uk/data/nrfa/index.html</a> )	Climate
CEH-GEAR data ( <a href="https://nrfa.ceh.ac.uk/catchment-rainfall">https://nrfa.ceh.ac.uk/catchment-rainfall</a> )	
Rainfall data <a href="https://www.metoffice.gov.uk/">https://www.metoffice.gov.uk/</a>	
Glenlee Climate Station Data <a href="https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcv12y3xn">https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcv12y3xn</a>	
British Geological Survey (BGS) 1:625000 Hydrogeological Map of Scotland (1988)	Geology, ground conditions and hydrogeology
BGS 1:10000 DiGMap BG 2009	
GeoIndex <a href="https://mapapps2.bgs.ac.uk/geoindex/home.html">https://mapapps2.bgs.ac.uk/geoindex/home.html</a>	

Source	Data
BGS/Natural Environment Research Council (NERC). A GIS of Aquifer Productivity in Scotland. Explanatory Notes. Commissioned Report CR/04/047N <a href="http://nora.nerc.ac.uk/504764/1/CR-04-047N_SEPA%20Aq%20productivity.pdf">http://nora.nerc.ac.uk/504764/1/CR-04-047N_SEPA%20Aq%20productivity.pdf</a>	
BGS Aquifer classification map layer on Scotland's Environment website <a href="https://map.environment.gov.scot/sewebmap/">https://map.environment.gov.scot/sewebmap/</a>	
SEPA/BGS/Scotland and North Ireland Forum for Environmental Research (SNIFFER) Vulnerability of Groundwater in the Uppermost Aquifer (Scotland)	
BGS Groundwater Vulnerability (Scotland) <a href="http://www.bgs.ac.uk/discoverymetadata/13603084.html">http://www.bgs.ac.uk/discoverymetadata/13603084.html</a>	
National Soil Map of Scotland (Macaulay Institute for Soil Research) <a href="http://soils.environment.gov.scot/">http://soils.environment.gov.scot/</a>	Soils and peat
River Network Map	Hydrology and flows
CEH National River Flow Archive (NRFA) ( <a href="http://www.ceh.ac.uk/data/nrfa/index.html">www.ceh.ac.uk/data/nrfa/index.html</a> )	
SEPA flood map ( <a href="http://map.sepa.org.uk/floodmap/map.htm">http://map.sepa.org.uk/floodmap/map.htm</a> )	Flood risk
Landmark 1 in 75, 1 in 100 and 1 in 1000 year flood maps	
SGt The River Basin Management Plan for Scotland River Basin District 2015-2027	River Basin Management Plan (RBMP) and water quality
SGt interactive mapping ( <a href="https://map.environment.gov.scot/sewebmap/?layers=riverClass">https://map.environment.gov.scot/sewebmap/?layers=riverClass</a> )	
SEPA interactive mapping facility for the RBMP ( <a href="https://www.sepa.org.uk/data-visualisation/water-environment-hub/?riverbasindistrict=Scotland">https://www.sepa.org.uk/data-visualisation/water-environment-hub/?riverbasindistrict=Scotland</a> )	
Water Body Data Sheets ( <a href="https://www2.sepa.org.uk/WaterBodyDataSheets">https://www2.sepa.org.uk/WaterBodyDataSheets</a> )	
SEPA data request: information on river water quality	
SEPA data request: information on locations of CAR licences, private water supplies (PWSs) from <a href="http://dwqr.scot/private-supply/pws-location-map/">http://dwqr.scot/private-supply/pws-location-map/</a> (withdrawn May 2020), and data request directly to EAC and DGC	Abstractions and discharges
NatureScot information on protected areas <a href="https://sitelink.nature.scot/">https://sitelink.nature.scot/</a> , also ecology surveys – as per Chapter 9 Ecology	Wetlands and peatlands

## Current Baseline

### Study Area

- 11.2.2 The Development Site covers an area of approximately 1,243 ha and for ease of description it is divided into three sections, namely: the south eastern section (land within the DGC boundary); the north western section (land within the DGC boundary); and the western section (land within the EAC boundary). Both desk study and survey data for this Scoping chapter have been gathered with respect to a defined Study Area. The Study Area is focussed on the Development Site and additionally within a 4km radius from a central point within the Development Site (National Grid Reference (NGR) 266700 600800). Data beyond the Study Area have also been collected as appropriate, such as abstractions, discharges and conservation sites.

## Current Baseline

- 11.2.3 Ground elevations in the Development Site range from 642m AOD on the summit of Alhang (NGR 264225 601030) to 267m AOD on the southern site boundary (NGR 266360 599770). The site access road rises from 267m AOD at the southern site entrance to ~620m AOD on Alwhat (NGR 264760 602144) in the north west of the Development Site. In the south eastern section of the site, the access track rises from ~286m AOD near Lorg Bridge (NGR 266840 600630) to ~520m AOD on Black Hill (NGR 268440 599050).
- 11.2.4 The topography gradients within the Development Site are extremely steep. For example, the average gradient from the southern site boundary to the summit of Meikledodd Hill (NGR 266050 602740) is 12%. The Development Site consists predominantly of moorland and land use is mainly sheep farming.
- 11.2.5 The Development Site lies within the surface water catchments of the Water of Ken, which drains to the south of the Development Site, and Afton Water, which flows to the north of the Development Site. The Water of Ken is confluent with the River Dee after Loch Ken (NGR 272690 566440), some ~40km downstream. Within the Development Site's south east and north west sections, a number of small watercourses are present, all of which are confluent with the Water of Ken. The Water of Ken itself flows in a general south westerly direction through the centre of the Development Site, entering at its north eastern boundary (NGR 268366 601695) and leaving at the southern boundary (NGR 266292 599487).
- 11.2.6 Afton Water flows north from the Development Site and is confluent with the River Nith at New Cumnock (NGR 262130 614010), approximately 13km north of the Development Site boundary. Two tributaries of Afton Water are present within the western section of the Development Site, namely Alhang Burn and the headwater burn that forms the source of Afton Water itself (NGR 264180 601570). Afton Water is dammed approximately 2.6km north of the Development Site, forming the Afton Reservoir (NGR 263500 604000), which, at its closest point, lies 1.2km to the north. Afton Reservoir is a Scottish Water asset from which water is abstracted for public water supply.
- 11.2.7 With respect to the Water of Ken tributaries, The Spout Burn (NGR 264580 601370) and Gills Burn (NGR 264310 600715), which are both confluent with Holm Burn, issue from points on Alhang, within the western section of the Development Site. Spout Burn flows south easterly for approximately 500m within the Development Site, then southerly after leaving it, before joining Holm Burn at Upper Holm of Dalquhairn (NGR 265495 599340). Gills Burn flows south westerly for approximately 200m within the Development Site, then southerly a short distance downstream of it, entering Holm Burn (NGR 264135 599960) some 1.5km upstream of the Holm Burn's confluence with Spout Burn.
- 11.2.8 In the north of the north western section of the Development Site, Lorg Burn issues from a point (NGR 265640 602400) in the valley between Brown Hill and Meikledodd Hill and flows in a general south easterly direction, confluent with the Water of Ken just downstream of Lorg Bridge (NGR 266778 600571). Also issuing on Brown Hill, the Alwhat Burn (NGR 265046 602115) is confluent with the Lorg Burn (NGR 266365 601413). Four unnamed tributaries feed into the Alwhat Burn, one issuing from Alwhat (NGR 264900 601650), two from Ewe Hill (NGR 265270 601340 and 265790 601330) and one from Brown Hill (NGR 265465 601610).
- 11.2.9 The Green Cleugh Burn is a tributary of the Lorg Burn, issuing from Lorg Hill (NGR 266350 601810). Four further unnamed and small tributaries of Lorg Burn issue from Lorg Hill, one from the east of Brown Hill (NGR 266040 601877), one from Green Cleugh (NGR 266422 601457), one from Rough Craig (NGR 266712 601360) and one from Lorg (NGR 266800 600960). Two further tributaries of Lorg Burn emanate from Ewe Hill, namely the Rough Cleugh (NGR 266090 600950) and Small

- Cleugh Burns (NGR 265910 600790). The Rough Cleugh Burn forms a waterfall at the eastern cliff edge of Ewe Hill.
- 11.2.10 Three unnamed tributaries of the Water of Ken are also present within the north western section of the Development Site. Two of these issue from the south eastern foot of Lorg Hill (NGR 267594 601474 and 267505 601300), and one from ~150m north west of Lorg Bridge (NGR 266567 600675).
- 11.2.11 In the south eastern section of the Development Site, numerous watercourses are present which are confluent with the Water of Ken. Altry Burn issues from NGR 267875 599690 and discharges to the Water of Ken to the north of Holm of Dalquhairn Bridge (NGR 266292 599487). The Small Burn, which issues from Craigstewart (NGR 267336 599990), and Coranbae Burn, which issues from a point to the south of the south eastern section of the Development Site on Caronbae Hill (NGR 267437 598990), are both confluent with the Altry Burn.
- 11.2.12 The Pulmulloch Burn, which has its headwaters on Cairn Hill (NGR 267910 598960), drains north, through the Fans of Altry, with tributaries feeding in from High Countam (NGR 268945 600060), Low Countam (NGR 268530 600550) and Sour Snout (NGR 268115 600880). The Pulmulloch Burn discharges to the Water of Ken near the north eastern site boundary (NGR 268310 601657).
- 11.2.13 Two further unnamed tributaries of the Water of Ken are located within the south eastern section of the Development Site. One of these issues from the west of Altry Hill (NGR 267375 600560), and the other from the sheepfold south west of Lorg Bridge (NGR 266800 600414).
- 11.2.14 As mentioned above, Afton Reservoir is located to the north of the Proposed Development. In addition to those tributaries of Afton Reservoir that emanate from within the Development Site, a number of its tributaries issue less than 750m from the northern Development Site boundary. These include Meikledodd Burn (NGR 265297 602869), Clashy warrant Burn (NGR 265287 602472), Sandyhole Burn (NGR 265790 603300), all of which are confluent with the Montraw Burn, and Alwhat Burn (NGR 264553 602280).
- 11.2.15 Approximately 14km south west, and downstream, of the Proposed Development site boundary, the Water of Ken is dammed, forming Carsfad Loch (NGR 260750, 585980). This loch is a stand-by reservoir, used for emergency abstraction only, by Scottish Water. The Proposed Development therefore lies within the surface water catchment for Carsfad Reservoir.
- 11.2.16 The closest SEPA surface water gauging station to the Development Site is on Afton Water (Gauge 79001 at Afton Reservoir NGR 263100 605000). Flow data for this gauge are available from 1965-1981, and the mean flow over this period is 0.20m<sup>3</sup>/s (17.3MI/d), with a Q95 flow (i.e. the flow exceeded 95% of the time) of 0.01m<sup>3</sup>/s (0.9MI/d).
- 11.2.17 The baseflow index (BFI) is a measure of the proportion of river flow that is derived from storage near the surface. The BFI given for the SEPA gauge at Afton Reservoir has a value of 0.11. This low BFI value suggests that baseflow is not a significant component of flow and would be expected for catchments rich in peat.
- 11.2.18 Flood risk for the site catchments has been assessed using SEPA's online flood mapping. This indicates that none of the proposed areas for the location of infrastructure within the Development Site are at risk of flooding from fluvial or other sources. Although it is likely that the catchments on and near the Development Site are less than the 3km<sup>2</sup> minimum required for SEPA to map, it is considered that any flood event on the Development Site would be contained within the steeply incised watercourse channels. Small patches of surface water flooding may occur along the tributaries on higher elevations of the Development Site.
- 11.2.19 Downstream of the Development Site, the SEPA online flood map indicates that the area from Holm of Dalquhairn Bridge (NGR 266170 599300) to Strahanna Bridge (NGR 264620 595890) is at

- localised risk from flooding from the Water of Ken. The probability of such an event is classed as Medium to High (0.5-10% Annual Exceedance Probability; AEP), or, in other words, a likelihood of occurrence once in every 200 years for the Medium risk scenario, or once in every 10 years for the High risk scenario.
- 11.2.20 The Water of Ken is classified by SEPA as of 'Poor' ecological potential and overall status with an overall chemical status of 'Pass' in 2018. Pressures from morphological alterations resulting from culverting are the principal reason for this downgraded classification. Approximately 14km south west of the Development Site and some 3.5km after its confluence with Water of Deugh, the Water of Ken forms Carsfad Loch. SEPA classifies this stretch of the Water of Ken as of 'Bad' ecological potential with an overall chemical status of 'Pass'. Pressures from morphological alterations, flow regulation and abstraction are the principal reasons for this downgraded classification.
- 11.2.21 The Alhang Burn, which is confluent with Afton Water, and therefore Afton Reservoir, is classified by SEPA as of 'Good' ecological potential and overall status in 2018. None of the other watercourses within the Development Site are classified by SEPA.
- 11.2.22 On-site field observations and analysis in September 2013 indicated that water quality within the Development Site was of a good standard. Waters within the north western section of the Development Site (Alwhat Burn, Lorg Burn and tributaries) were characteristically slightly acidic (low pH), whereas in the south eastern section (Pulmulloch Burn, Altry Burn and Water of Ken) they were characteristically neutral.
- 11.2.23 Water quality is an important consideration for fish hatcheries/ farms at this locality. A fisheries watercourse evaluation Survey on a number of watercourses directly associated with the Development Site, including the Water of Ken and the Afton Water will be undertaken in order to identify the suitability of watercourses to support potential fisheries interest/ risks (e.g. including salmon, lamprey, trout and aquatic invertebrates, including freshwater pearl mussel) (see **Chapter 9: Ecology**).
- 11.2.24 A pipe bridge<sup>46</sup> obstacle to fish migration is located on the Water of Ken, upstream and north of the Development Site, 400m southwest of Polskeoch (NGR NS6833902064). In addition, a pipe culvert over a trackway is an obstacle to fish migration located on the Montraw Burn at NGR NS6396903532, to the north west of the Development Site. The Afton Reservoir on the River Afton is also an impassable obstacle to fish migration along this watercourse.
- 11.2.25 The Development Site is located within a surface water Drinking water Protected Area (DWPA) with the "Scot Gov ID" of DWPA13\_479, associated with the Afton Water catchment and the Upper Nithsdale and Galloway groundwater DWPAs.
- 11.2.26 The Development Site is located approximately 11km south of the Southern Upland Fault, and the area is predominantly underlain by greywackes and shales of Ordovician age, with a south west-north east trending fault (Leadhills Fault) splitting the Development Site in an approximate north west / south east aspect. To the north west, underlying Alhang, Alwhat, Brown Hill and Lorg Hill, the formation is locally known as the Kirkcolm Formation. Part of the Barhill subgroup of the Leadhills Supergroup, this comprises medium to thin-bedded quartzose greywacke and sandstones with some thick siltstone intercalations. To the south east, underlying Altry Hill, High Countam, Low Countam and Sour Snout, the dominant formation is known locally as the Portpatrick Formation. Part of the Scaur subgroup, also of the Leadhills Supergroup, this chiefly comprises medium to coarse-grained greywacke sandstones, commonly thick-bedded, with many andesitic clasts.
- 11.2.27 Along the north western side of the Leadhills Fault, a narrow band of Moffat Shale is present. This comprises black and dark grey mudstones, locally with thin chert beds. Also, to the south of Lorg

<sup>46</sup> Described as an "impassable pipe bridge / Irish Brig due to all the infill of substrate at the upstream end of the ford (K Birkeland, 12/8/14)."; from <https://map.environment.gov.scot/sewebmap/> - Obstacles to Fish Migration data layer



- Hill, a band of rocks from the Crawford Group protrude. These comprise red and greyish bedded chert and red-brown mudstone which is locally cherty. There is also a very minor occurrence of basaltic rocks (unclassified) within this area.
- 11.2.28 A number of intrusions and dykes of late Silurian to early Devonian age are present within the Development Site. Intrusions of microdioritic rocks including porphyritic microdiorite outcrop at Craigstewart (NGR 267500 599550), Coranbae Burn (NGR 266620 599290) and Ewe Hill (NGR 266500 600500).
- 11.2.29 Intrusions of microcrystalline granitic rocks including microgranodiorite outcrop widely throughout the Development Site, with the largest of these trending north east to south west through Lorg. Another significant intrusion trends in the same direction on Ewe Hill, from Lorg Burn (NGR 266005 601630) to Spout Burn (NGR 265040 600905). Other minor microcrystalline granitic rock intrusions are present at Lorg Burn (NGR 266020 601645), Lorg Hill (NGR 266895 601630), Rough Craig (NGR 266890 601485), Craighfad (NGR 266130 600200), and two on the Pulmulloch Burn (NGR 268260 601090 and 268280 600800).
- 11.2.30 Drift cover in the Development Site indicates that the solid geology is overlain by a mixture of peat, till, hummocky glacial deposits and alluvium. There are also significant areas where no drift is mapped, probably indicating areas where bedrock is close to or at ground surface.
- 11.2.31 Peat deposits predominate to the south east of the fault, from Altry Hill, Craigstewart and Coranbae Hill, east to the eastern Development Site boundary, and encompassing the Fans of Altry entirely. Peat deposits are also prevalent to the north west of the Leadhills Fault, particularly in the western section of the Development Site, from the valleys of Alwhat/Brown Hill and Alwhat/Alhang and from Alhang to Wedder Hill. Additionally, small outcrops of peat are also present in the northernmost corner of the Development Site, on Meikledodd Hill and also on Ewe Hill.
- 11.2.32 Deposits of till extend north from the southern boundary of the Development Site and west of Coranbae Hill and Craigstewart, through the centre of the Development Site to the northern boundary. They also extend south from the northern boundary of the Development Site, along part of the Pulmulloch Burn, to Low Countam. These deposits comprise silty clay with stones and locally contain shells and are commonly stiff, unsorted and unconsolidated.
- 11.2.33 Alluvial deposits are not extensive and are confined to a short stretch of Lorg Burn and ~1.5km of the Water of Ken. Alluvium is present along the Lorg Burn from its confluence with Rough Cleugh Burn to Water of Ken, and along the Water of Ken from south east of Lorg to the southern boundary of the Development Site.
- 11.2.34 Hummocky glacial deposits are indicated from Lorg northwards along Lorg Burn, then west along Alwhat Burn. A small outcrop of these deposits is also present at the northern boundary of the Development Site, immediately north of the Water of Ken. These comprise poorly sorted stones in a silt and sand matrix.
- 11.2.35 Drift deposits are absent from the remainder of the Development Site, including large swathes of Lorg, Ewe, Altry and Coranbae Hill. In these areas bedrock is likely to be at or close to ground surface. The mapping indicates that bedrock is also close to the surface at Brown Hill, Craigstewart and from Carin to Black Hill. Small patches of ground where bedrock is likely to be outcropping are also present on High and Low Countam.
- 11.2.36 Different soil types have different hydrological properties which determine their ability to transmit water both horizontally and vertically. Soil type, therefore, has an important influence on the hydrological regime of any catchment. The Soil Survey of Scotland map for this area indicates that the soil type present on the Development Site is predominantly peaty in nature. The vast majority of the north western and western sections of the Development Site are underlain by peaty podzols and peaty gleys. These are derived from lower Paleozoic greywackes and shales. Within the Lorg

- Burn valley, the drifts are also derived from greywackes and shales but comprise rankers, podzols, brown forest soils, peaty podzols, peat and peaty gleys. In the south eastern section of the Development Site, soils are again predominantly derived from the same parent material, and comprise peaty podzols, peaty gleys and peat. However, in the south eastern corner of the Development Site, within the area encompassing High and Low Countam, Fans of Altry and Coranbae Hill, the Soil Survey of Scotland map indicates that the soils are blanket peat.
- 11.2.37 Peat depth surveys from August and September 2013 (Phase 1) and October 2015 (Phase 2) have indicated that four sizeable areas of peat are present within the Development Site. In the south eastern section of the Development Site two large peat bodies with peat depths ranging from <0.5m to 3.80m were encountered between the top of Altry Hill and the slopes of Low Countam, High Countam, Coranbae Hill and Black Hill. In the north western section of the Development Site one large peat body covering the small plateau and slopes of Brown Hill and Alwhat Hill was identified. In the western section of the Development Site, in the plateau between Alhang and Wedder Hill, peat depths ranged from <0.5m to 3.20m. Elsewhere, peat deposits were found to be generally less than 1m in thickness.
- 11.2.38 The Hydrogeological Map of Scotland (BGS, 1988) indicates that the entire Development Site is underlain by a concealed aquifer which is of limited potential groundwater yield. The underlying bedrock rocks comprising shales and greywackes where groundwater is confined to near surface cracks and joints and are therefore of a low permeability, and generally without groundwater except at shallow depths. Rare springs and boreholes provide weakly mineralised water except where contact is made with sulphide-rich black shales.
- 11.2.39 The bedrock beneath the Development Site is classed as a Class 2C, a low productive aquifer where flow is virtually all through fractures and other discontinuities. As a result, the bedrock can locally yield only small amounts of groundwater in the near-surface weathered zone and secondary fractures. Borehole yields are typically low, with an overall mean of up to 2 litres per second (l/s) and rarely from springs. Therefore, these rocks have limited groundwater in a near-surface weathered zone and secondary fractures.
- 11.2.40 Superficial deposits may also comprise a low productivity aquifer within lower elevations and valley bottoms. However, areas in which alluvium and hummocky glacial deposits are mapped, offer the opportunity for groundwater movement via intergranular flow. Therefore, in these areas maybe of enhanced hydraulic conductivity the aquifer is considered to be moderately to highly productive.
- 11.2.41 For the 2015 EIA SEPA had no groundwater level monitoring points within the study area (i.e. a 4 km radius from NGR 266700 600800). It is anticipated that this is still the case, but this will be confirmed during data requests to the organisation. The presence of low hydraulic conductivity bedrock underlying a quaternary aquifer of low productivity (dominantly peat and boulder clay) would suggest that groundwater levels in these deposits are locally perched and, therefore, relatively high or even close to ground surface.
- 11.2.42 According to SEPA RBMP mapping, the majority of the Development Site lies within the New Galloway bedrock and localised sand and gravel groundwater aquifer, which is classified as 'Good' for its groundwater chemistry and overall status. However, underlying the western section of the Development Site (within the EAC administrative boundary), is the Upper Nithsdale WFD bedrock groundwater body beneath and beyond the Development Site is classified as having a Poor overall status due to legacy mining and quarrying.
- 11.2.43 The Development Site sits within a Water Framework Directive (WFD) Groundwater Bodies Drinking Water Protected Area, meaning that it has to be protected with the aim of avoiding any deterioration in quality that would compromise a relevant abstraction of water intended for human consumption. However, there are no designated abstractions or Source Protection Zones (SPZs)

- within the immediate vicinity of the Proposed Development, there are no known boreholes currently monitoring groundwater quality in the study area.
- 11.2.44 Protection of the aquifers is generally only provided by the overlying soils. The Vulnerability of Groundwater in the Uppermost Aquifer Map (SNIFFER, 2004) indicates that the classification of the study area is Class 4 i.e. the area is vulnerable to those pollutants not readily absorbed or transformed, and may be vulnerable to individual events as well as to persistent activity. This rises to Class 5, i.e. the area is vulnerable to most water pollutants with rapid impact in many scenarios, in the areas of the Development Site where the superficial aquifer is un-mapped and likely to be absent.
- 11.2.45 Groundwater-Dependent Terrestrial Ecosystems (GWDTEs), as defined by SEPA in its LUP-GU31 (2014), exist across the Development Site. These areas have been identified from NVC surveys undertaken in 2015. The NVC survey at this time indicated that potentially high groundwater dependent M23 (rush-pasture) communities are present in the base of most of the main valleys associated with the Water of Ken, Alwhat, Lorg, Altry and Small Burns, and in small patches elsewhere. Potentially high groundwater dependent M6 (mire) communities are much smaller in size and were concentrated on the upper and lower reaches of the Lorg Burn valley, the upper Water of Ken, and discrete patches west and east of Altry Hill and in the ridge between Alhang and Wedder Hill.
- 11.2.46 Potentially moderately groundwater dependant NVC communities are also present in parts of the Development Site. The most extensive of these was the U6 (grassland) community, which was most prevalent across the entire north western part of the Development Site, and on Brown Hill, Ewe Hill, Alwhat, Meikledodd Hill and Lorg Hill. Pockets of this grassland were also present across Altry Hill, in the eastern section of the Development Site. The next most prevalent moderately groundwater dependant NVC community present was the mire (M25) community, with pockets of this vegetation present on Low Countam and Coranbae Hill. A pocket of this habitat was also present near the base of Lorg Hill, just north of Water of Ken. Other moderately groundwater dependant NVC communities identified were grassland (MG9) and wet heath (M15), which were confined to small pockets in the centre and south of the Development Site.
- 11.2.47 Given the geology and groundwater potential within the Development Site, the 2015 EIA assessment (Appendix 11.A) of GWDTE's dependency on groundwater sources concluded that it was considered that many of these habitats are likely to be fed, almost entirely, by precipitation or very near-surface groundwater within shallow drift deposits and soils. In the most part, the presence of peat and/ or till and low permeability bedrock ensures that any groundwater levels are local and perched. Therefore, wider-scale groundwater supply to the habitats identified is limited, with the majority of the supply coming instead from surface or very near-surface infiltration and surface runoff. It is considered that the groundwater component supporting these habitats therefore resembles more of a surface (or near-surface) water regime, with very local and shallow rain-fed catchments for each GWDTE.
- 11.2.48 Nonetheless, despite the low productivity aquifers present at the Development Site, due to the presence of faulted bedrock within the area of the Development Site which may offer flow pathways, and the potential for some weathered bedrock providing localised groundwater storage, some habitats may be truly groundwater dependent. During the 2015 EIA<sup>47</sup> assessment seven potentially groundwater dependent habitats were identified and considered further within the GWDTE Risk Assessment at the time, whilst the other GWDTEs that were identified as not being truly groundwater dependent were 'scoped out' of the EIA.
- 11.2.49 Some isolated patches of native woodland are located within the vicinity of the Development Site. Native woodland is found along the banks of the Alwhat Burn and Montraw Burn at NGR

<sup>47</sup> Eon (November 2015). Lorg Wind Farm Environmental Statement Appendix 13.B – GWDTE Assessment

NS6399203325 to the northwest of the Development Site. Another area is found along the Polskeoch Burn at NGR NS6945702634, to the northeast of the Development Site and some larger scattered areas are located along the Water of Ken, for example at NGR NX6597599142, to the south of the Development Site.

11.2.50 Within the 2015 ES, DGC provided details of eleven private water supplies (PWSs) located within a 4km radius of the centre of the Development Site and these are shown in **Table 11.2**. At the time, although the property was uninhabited and the supply was unused, the presence of a PWS at Lorg Farmhouse was confirmed by the landowner. In addition, it was confirmed that this property would not be occupied for the construction, operational or decommissioning phases of the Proposed Development. For the 2015 EIA, EAC also provided a list of PWS within its administrative boundary, many of which did not include co-ordinates. Of those with co-ordinates, none were found to be located within 4km of the central NGR of the Development Site. For the current Proposed Development application new data requests will be made to both EAC and DGC for updated information on current PWSs.

Table 11.2 Private Water Supplies within the Study Area

Source Name	Eastings	Northing	Location Description	Distance
Lorg Farmhouse	266755	601110	Spring	0
Holm Of Dalquhairn	265529	599007	Spring	0.9
Auchrae	265150	596516	Spring	3
Blairoch Cairnhead	270107	597237	Surface runoff	2.1
Corlae Farmhouse	265830	597704	Borehole	1.75
Corlae Byre	265868	597730	Borehole	1.75
Corlae Byre	265866	597712	Borehole	1.75
Craigengillan Cottage	265125	597134	Spring	2.5
Craigieythorn Croft	265812	598116	Borehole	1.5
Dalgonar	270015	603101	Stream	2.25
Polskeoch Scar Valley	268669	602310	Spring	0.75
Upper Holm	265551	599313	Spring	0.75

Note: Known PWSs Located within 4km of central NGR

11.2.51 Following the introduction of CAR (2011), SEPA regulates activities such as abstraction, impoundment and engineering activities, as well as pollution of watercourses. During the 2015 EIA it was identified that SEPA held the records for four such activities within a 4km radius of NGR 267000 600500. One of these was for an engineering activity (culvert) of a surface watercourse, two were for sewage treatment effluent (STE) discharges to ground (septic tank discharges), and one was for a STE effluent discharge to surface water. All of these licences and associated activities, as of 2015, are presented in **Table 11.3**.

Table 11.3 SEPA Abstraction and Discharge Licences

Licence Number	Easting	Northing	Site Name	Description	Distance from boundary of the Site (km)
CAR/R/1018950	269649	598401	Cairnhead Forest	Culvert on Lagdubh Burn	0.9
CAR/R/1030849	265747	597899	New Dwelling & Outbuilding	STE to unnamed tributary of Shiel Burn	1.6
CAR/R/1066496	268630	602310	Polskeoch, Scar Water	STE to soakaway	0.7
CAR/R/1069956	270032	603103	Dalgonar	STE to soakaway	2.2

11.2.52 At the time, none of the licenced discharge points or engineering activity lay within either 100m of proposed new access tracks, or within 250m of the proposed location of the wind turbines or the borrow pit search area for the 2015 Proposed Development. For the current Proposed Development application new data requests will be made to both EAC and DGC for updated information on current abstractions and discharges.

## 11.3 Scope of Assessment

### Spatial Scope

11.3.1 The spatial scope of the assessment of Geology, Hydrology (including flood risk) and Hydrogeology covers the Study Area described in **Section 12.2**, on the basis that the majority of the effects on the water environment due to the Proposed Development are considered unlikely to extend beyond this area. The only theoretical receptors identified outside this Study Area are downgradient abstractions, properties/ infrastructure at risk of flooding, conservation sites and the Afton Water Reservoir, on the basis that any wind farm-inspired changes in the surface and groundwater environment could theoretically affect their catchments, flood risk and water supply respectively.

### Temporal Scope

11.3.2 The temporal scope of the assessment of Geology, Hydrology (including flood risk) and Hydrogeology is consistent with the construction and operational periods for the Proposed Development. The construction period for the Proposed Development would be approximately 12 months in duration, and would comprise the activities listed in **Chapter 2 – Section 2.3**. The EIA assumes decommissioning would occur at the end of the 30 years operational phase.

### Potential Receptors

11.3.1 Receptors that could be significantly affected by the Proposed Development and that therefore need to be taken forward for further consideration are identified within the baseline description above. Some of the information within the baseline is based on the 2015 EIA baseline and will have to be updated once current information is received from data requests from the appropriate consultation with organisations.

11.3.2 Based on the current information available the only receptors considered outside this Study Area are nearby abstractions / conservation sites, and properties / infrastructure at risk of downstream

- flooding. Receptors that are likely to be significantly affected will be identified on the basis of their value / sensitivity and the magnitude of change to which they are exposed as a result of the Proposed Development.
- 11.3.3 The principal receptors identified that would potentially be affected by the Proposed Development comprise the following:
- Watercourses and associated WFD surface water bodies (such as the Afton Water, the Water of Ken and Pulmulloch Burn watercourses);
  - Aquifers and the associated WFD groundwater body (Upper Nithsdale and New Galloway);
  - Downstream humans, property and infrastructure;
  - Abstractions, springs and water resource use; and
  - Water conditions supporting conservation sites (including GWDTEs).
- 11.3.4 The Afton Water flows into the Afton Reservoir 1.2km downstream of the Development Site and is used for public water supply. The risk of pollution to the tributary watercourses of both the Afton Water within or immediately downstream the Proposed Development will be appropriately mitigated. In the unlikely event of there being any pollution event which would affect Scottish Water assets, the Applicant would inform Scottish Water as soon as possible and this requirement would be specified in the CEMP.
- 11.3.5 In terms of the receptors 'scoped out' from further assessment, these include the following:
- The underlying solid geology comprises a variety of sedimentary lithologies which outcrops across parts of the Study Area, but the geology is not considered to be of local or regional importance and no features of geological interest have been designated;
  - Any flooding will be contained within the steeply incised channels and valleys at / in the vicinity of the Development Site, together with the remote location of the Development Site and an absence of any immediate downstream flood risk receptors, flood risk has been 'scoped out' of the assessment<sup>48</sup>;
  - The stretch of the Water of Ken that forms the Carsfad Reservoir is located a significant distance downstream of the Proposed Development site. In addition, it is located downstream of the Water of Ken's confluence with another large watercourse (Water of Deugh), and as a result, with the effect of dilution along with mitigation measures inherent within the design, any potential effects (e.g. sediment loading), are likely to be insignificant. On this basis Carsfad Reservoir has been 'scoped out' of the assessment; and
  - Groundwater within the peat is not identified as an aquifer by the BGS and so is not regarded as an aquifer receptor in this assessment. However, this groundwater is still taken account of in the assessment in terms of its role in supporting the mosaic of peatlands and GWDTEs.
- 11.3.6 No other identified receptors have been 'scoped out' at this stage.
- 11.3.7 The potential for likely significant effects of the Proposed Development on peat hydrology has been considered. Comprehensive peat probing surveys have been undertaken across the majority of the Development Site as part of the previous application. A slightly expanded Development Site boundary is being proposed and if it is determined that wind farm infrastructure would be proposed in this area, then additional peat surveys would be undertaken to ascertain the extent of peat across this part of the site, which would inform a Peat Management Plan and peat slide risk

<sup>48</sup> SEPA indicated their agreement with this approach (consultation response of 20/08/2015) during the 2015 EIA application and no changes to the impacts on the flood risk environment are foreseen for the current application.

assessment. The Peat Management Plan and peat slide risk assessment would be undertaken to inform the EIA.

11.3.8 Where possible, the design process has avoided locating infrastructure in areas of deep peat or areas potentially at risk of peat slide in the subsequent layout of access tracks, turbine locations and other infrastructure.

11.3.9 A carbon balance assessment would be undertaken using the most up to date version of the Scottish Government Windfarm Carbon Calculator Tool, currently v1.6.0 (August 2019).

11.3.10

### Likely Significant Effects

11.3.11 The likely significant hydrological and hydrogeological effects that will be taken forward for assessment in the EIA are summarised in **Table 11.4**.

Table 11.4 Likely Significant Geology, Hydrology and Hydrogeology Effects

Activity	Effects	Receptors
<b>Land preparation (earthworks and excavation of the turbine foundations and borrow pits)</b>	Ground disturbance leads to sediment loading and pollution of watercourses.	Watercourses and associated WFD surface water bodies (such as the Afton Water, the Water of Ken and Pulmulloch Burn watercourses)
	Contamination of soils, surface waters and groundwater due to accidental release of pollutants during works.	Aquifers and associated WFD groundwater body (Upper Nithsdale and New Galloway)
	Excavation and fill leads to disruption of surface and near-surface flow paths and changes to the drainage regime, most typically increased runoff and flood risk.	Abstractions, springs and water resource use
	Dewatering interception of groundwater leading to a loss of water resource and disruption of groundwater support (baseflow) to watercourses.	Water conditions supporting conservation sites (including GWDTEs) Conservation sites
<b>Soil compaction and temporary hardstanding</b>	Contamination of soils, surface waters and groundwater due to accidental release of pollutants during works.	Watercourses and associated WFD surface water bodies (such as the Afton Water, the Water of Ken and Pulmulloch Burn watercourses)
	Reduced infiltration capacity results in increased runoff and flood risk, and reduced recharge to groundwater, leading to loss of water resource and disruption of baseflow to watercourses.	Aquifers and associated WFD groundwater body (Upper Nithsdale and New Galloway)
		Abstractions, springs and water resource use
		Water conditions supporting conservation sites (including GWDTEs) Conservation sites
<b>Land clearance and deforestation</b>	Land clearance and ground disturbance leads to sediment loading and pollution of watercourses.	Watercourses and associated WFD surface water bodies (such as the Afton Water, the Water of Ken and Pulmulloch Burn watercourses)

Activity	Effects	Receptors
	<p>Contamination of soils, surface waters and groundwater due to accidental release of pollutants during works.</p> <p>Land clearance leads to disruption of surface and near-surface flow paths and changes to the drainage regime, most typically increased runoff and flood risk.</p> <p>Land clearance leads to breakdown of peat structure and disturbance of peat hydrology.</p>	<p>Aquifers and associated WFD groundwater body (Upper Nithsdale and New Galloway)</p> <p>Abstractions, springs and water resource use</p> <p>Water conditions supporting conservation sites (including GWDTEs)</p>
<b>Peat working</b>	<p>Ground disturbance leads to sediment loading and pollution of watercourses.</p> <p>Contamination of soils, surface waters and groundwater due to accidental release of pollutants during works.</p> <p>Peat disturbance leads to disruption of surface and near-surface flow paths and changes to the drainage regime, most typically increased runoff and flood risk.</p> <p>Peat disturbance leads to breakdown of peat structure and disturbance of peat hydrology.</p>	<p>Watercourses and associated WFD surface water bodies (such as the Afton Water, the Water of Ken and Pulmulloch Burn watercourses)</p> <p>Aquifers and associated WFD groundwater body (Upper Nithsdale and New Galloway)</p> <p>Abstractions, springs and water resource use</p> <p>Water conditions supporting conservation sites (including GWDTEs)</p>
<b>Material stockpiling/ removal (quarrying)</b>	<p>Ground disturbance leads to sediment loading and pollution of watercourses.</p> <p>Contamination of soils, surface waters and groundwater due to accidental release of pollutants during works.</p> <p>Excavation and fill leads to disruption of surface and near-surface flow paths and changes to the drainage regime, most typically increased runoff and flood risk.</p> <p>Dewatering interception of groundwater leading to a loss of water resource and disruption of groundwater support (baseflow) to watercourses.</p>	<p>Watercourses and associated WFD surface water bodies (such as the Afton Water, the Water of Ken and Pulmulloch Burn watercourses)</p> <p>Aquifers and associated WFD groundwater body (Upper Nithsdale and New Galloway)</p> <p>Abstractions, springs and water resource use</p> <p>Water conditions supporting conservation sites (including GWDTEs)</p> <p>Conservation sites</p>
<b>Watercourse crossings</b>	<p>Bank and bed disturbance leads to sediment loading, changes in morphology and pollution of watercourses.</p> <p>Contamination of watercourses due to accidental release of pollutants during works.</p>	<p>Watercourses and associated WFD surface water bodies (such as the Afton Water, the Water of Ken and Pulmulloch Burn watercourses)</p> <p>Abstractions, springs and water resource use</p>
<b>Track and crane pad placement</b>	<p>Ground disturbance leads to sediment loading and pollution of watercourses.</p> <p>Contamination of soils, surface waters and groundwater due to accidental release of pollutants during works.</p>	<p>Watercourses and associated WFD surface water bodies (such as the Afton Water, the Water of Ken and Pulmulloch Burn watercourses)</p> <p>Aquifers and associated WFD groundwater body (Upper Nithsdale and New Galloway)</p>



Activity	Effects	Receptors
	Track and crane pad placement leads to disruption of surface and near-surface flow paths and changes to the drainage regime, most typically increased runoff and flood risk.	<p>Abstractions, springs and water resource use</p> <p>Water conditions supporting conservation sites (including GWDTEs)</p> <p>Conservation sites</p>
<b>Control building and potential substation placement</b>	<p>Ground disturbance leads to sediment loading and pollution of watercourses.</p> <p>Contamination of soils, surface waters and groundwater due to accidental release of pollutants during works.</p> <p>Control building and potential substation placement leads to disruption of surface and near-surface flow paths and changes to the drainage regime, most typically increased runoff and flood risk.</p>	<p>Watercourses and associated WFD surface water bodies (such as the Afton Water, the Water of Ken and Pulmulloch Burn watercourses)</p> <p>Aquifers and associated WFD groundwater body (Upper Nithsdale and New Galloway)</p> <p>Abstractions, springs and water resource use</p> <p>Water conditions supporting conservation sites (including GWDTEs)</p> <p>Conservation sites</p>
<b>Operational facilities and activities</b>	<p>Exposed ground leads to continued sediment loading and pollution of watercourses.</p> <p>Contamination of soils, surface waters and groundwater due to accidental release of pollutants during maintenance activities.</p> <p>Contamination of soils, surface waters and groundwater due to control building and substation chemical leaks and concrete leaching.</p> <p>Continuation of flow disruption, reduced infiltration capacity and peat disruption effects.</p>	<p>Watercourses and associated WFD surface water bodies (such as the Afton Water, the Water of Ken and Pulmulloch Burn watercourses)</p> <p>Aquifers and associated WFD groundwater body (Upper Nithsdale and New Galloway)</p> <p>Abstractions, springs and water resource use</p> <p>Water conditions supporting conservation sites (including GWDTEs)</p>

**Note:** For each activity an effect will often impact many different types of receptors. Effects and receptors have only been listed above due to the large number possible linkages involved.

- 11.3.12 The main potential hydrological / hydrogeological impacts associated with the Proposed Development relate to the construction phase, in particular from tracks and watercourse crossings. The EIA will identify the location and the nature of the impact from these construction and upgrading activities, in particular the potential for the generation of silt-laden runoff. It will then prescribe measures to be adopted during construction to mitigate against negative impacts on the water environment.
- 11.3.13 Other activities of relevance include the construction of wind turbine foundations and crane pads, the control building and potential substation. The impacts from these activities, such as the leaching of concrete residues to the water environment and changes in the runoff / recharge characteristics, will also be addressed in the EIA. Again, mitigation measures will be outlined that would reduce negative impacts.

- 11.3.14 The possibility for borrow pits and stockpiling will be explored, and should the Development Site be suitable the impacts these would have on the water environment will also be assessed. Appropriate mitigation measures will be prescribed to reduce any negative impacts on the water environment from borrow pits.
- 11.3.15 Impacts during decommissioning are likely to be similar to those during the construction phase, but would depend on the exact nature of the decommissioning activities that take place. However, it is likely that the ground disturbance would be much less. Mitigation similar to that implemented during the construction and operational phases (updated to reflect changes in legislation/guidance) would also help ensure that the significance of such impacts is minimised, and it is therefore proposed that consideration of decommissioning effects is 'scoped out' of the EIA.

## 11.4 Assessment Methodology

- 11.4.1 The generic project-wide approach to the assessment methodology is set out in **Chapter 3: EIA Process and Consultation**. This section describes how this methodology will be applied, and adapted as appropriate, to address the specific needs of the Hydrology (including flood risk) and Hydrogeology assessment.
- 11.4.2 The EIA Report chapter will summarise the findings of the desk study and consultation, these together forming the baseline against which the potential impact of the Proposed Development, alone and cumulatively with other relevant wind farm developments will be assessed.
- 11.4.3 The significance of the effects resulting from the Proposed Development is primarily determined by the value of a given water feature and the magnitude of change. In terms of the hydrology and hydrogeology, the key types of effects relate to water quantity (level and flow) and quality. However, depending on the effects on surface water flows, there may also be effects on immediate and downstream morphology and sediment dynamics and flood risk.
- 11.4.4 Therefore, the assessment will be based on both receptor importance and the nature and magnitude of the impact as a result of the Proposed Development. All mitigation considered necessary will be identified and residual effects with this mitigation in place will be determined. It is intended that no residual significant effects will remain following adoption of the proposed mitigation, but whether this is achievable will be investigated within the EIA Report.

## 12. Traffic and Transport

### 12.1 Introduction

- 12.1.1 With reference to applicable policies, guidance and strategies, the Traffic and Transport chapter of the EIA Report will assess the impact of the various different stages of the Proposed Development on the existing road network in the area.
- 12.1.2 The study area for the EIA will include all transport routes associated with the Proposed Development and will consider the impact of, the construction phase, operational phase and decommissioning phases on the transport haulage routes.

### 12.2 Planning Policy and Guidance

- 12.2.1 The chapter will take into account:
- Scottish Planning Policy (SPP);
  - Planning Advice Note 75 – Planning for Transport; and
  - Planning Specific Advice Sheet for Onshore Wind Turbines.
- 12.2.2 The assessment will be prepared according to the guidance document *Transport Assessment Implementation: A Guide*, published by the Scottish Executive (2005). The Traffic and Transport Chapter will also take account of the *Guidelines for the Environmental Assessment of Road Traffic* (GEART) (IEA, 1993).

### 12.3 Baseline Conditions

#### Data Sources

- 12.3.1 The sources of information that will be used for the Traffic and Transport assessment are listed in **Table 12.1**.

Table 12.1 Sources of Information used for the Traffic and Transport Assessment

Source	Data
Google Earth / Google Maps	Online mapping
Crashmap	Personal Injury Accidents (PIAs)
Dumfries and Galloway Council / East Ayrshire Council	Personal Injury Accidents (PIAs) (in the absence of up to date data from Crashmap)
Department for Transport	Traffic Counts (AADT)
Independent Traffic Survey Company	Traffic Automatic Traffic Counts (ATC) if DfT count sites are not in suitable location of if ATCs are identify for use by DGC

- 12.3.2 Previous EIA, Further Environmental Information (FEI) and Section 42 application documents will also be reviewed however, traffic and accident data within these documents is dated and likely to be invalid for use with the assessment. New data will be established from the sources identified above.

### Current Baseline

- 12.3.3 It is anticipated that the Abnormal Indivisible Loads (AIL) transporting turbine equipment, will travel by road from the Port of Ayr, which is the closest port in the region capable of handling wind turbine equipment. The Port of Ayr has been frequently used for the delivery of wind turbine components in this region.
- 12.3.4 The proposed access from the Port of Ayr to the Proposed Development is expected to route as follows: A79 – A719 – A77 (northbound) – A76 (southbound) – B741 – Afton Road.
- 12.3.5 Information from previous AIL access studies on this route will be utilised where possible.
- 12.3.6 It is assumed that a significant proportion of aggregate could be won from on-site borrow pits. However, the assessment will assume that 100% of all aggregate required will be imported from off-site. It is likely that either Tincornhill Quarry or Tongland Quarry may be used however, quarry sites will be investigated and confirmed at EIA stage. The expected Heavy Goods Vehicle (HGV) haulage routes from these quarries is as follows:
- Tincornhill Quarry: B713 – B705 – B713 – A76 – Afton Road; and
  - Tongland Quarry: A711 – A75 – A713 – B729.
- 12.3.7 The sections of the road network included within the assessment will be determined on the basis of the potential effect of increased traffic associated with the Proposed Development on identified sensitive receptors.

## 12.4 Scope of Assessment

- 12.4.1 The majority of traffic will be generated during the construction phase, with relatively little traffic generation anticipated during operation.
- 12.4.2 Once the Proposed Development is operational, it is envisaged that the amount of traffic associated with the scheme would be minimal. Occasional visits may be made to the site for maintenance checks. The vehicles used for these visits are likely to be a 4x4 or similar and there may be an occasional need for an HGV to access the site for maintenance and repairs.
- 12.4.3 It is considered that the effects of operational traffic would be negligible and therefore it is proposed that the assessment of the operational phase of the development is 'scoped out' of the EIA.
- 12.4.4 On the assumption that below ground infrastructure and access tracks will remain in situ, less traffic will be generated during decommissioning than during construction. The traffic baseline may be different to the current baseline traffic conditions when decommissioning is undertaken after the 30 year operational phase.
- 12.4.5 The effects on the road network are likely to be similar in nature though of lower magnitude than that relating to the construction phase as less vehicle movements would be required.
- 12.4.6 It is considered that the effects of decommissioning traffic would be lower in magnitude than the construction phase as less vehicle movements are required; therefore, it is proposed that the assessment of the decommissioning phase of the development is 'scoped out' of the EIA.

- 12.4.7 The main transportation impacts will be associated with the movements of commercial HGVs travelling to and from the site during the construction phase of the Proposed Development and this will be considered in the EIA Report.

### Potential Receptors

- 12.4.8 The traffic impact study area is likely to be defined as comprising the following sections of the road network:

- A75;
- A713;
- B743;
- A76; and
- Afton Road.

- 12.4.9 These highways provide comprehensive coverage of the routes surrounding the Development Site. Beyond these roads, traffic from the Proposed Development would access the wider road network where its effect would be diluted by existing traffic on these routes or would distribute to a point where the effects from traffic would be minimal.

- 12.4.10 The receptors along the highways identified above have been identified as forming the scope of the assessment in relation to potentially traffic-related effects. Receptors are the users or beneficiaries of highway network assets and facilities such as pedestrians, cyclists, equestrians and drivers who travel within the vicinity of the Proposed Development.

- 12.4.11 The assessment will be based on the *Guidelines for the Environmental Assessment of Road Traffic* which identifies the following groups and special interest groups that may be affected:

- people at home;
- people at work;
- sensitive groups including children, elderly and disabled;
- sensitive locations such as hospitals, churches, schools and historical buildings;
- pedestrians;
- cyclists;
- open spaces, recreational areas and shopping areas;
- sites of ecological and nature conservation value; and
- sites of tourist / visitor attractions.

### Likely Significant Effects

- 12.4.12 The potential effects of the Proposed Development that are likely to be significant with regards to Traffic and Transport, and those which will be subject to further assessment are:

- Severance: the separation of people from places and other people and places or impede pedestrian access to essential facilities;
- Driver delay: traffic delays to non-development traffic;

- Pedestrian amenity: the effect on the relative pleasantness of a pedestrian journey as a result of changes in traffic flow, traffic composition and pavement width / separation from traffic;
- Pedestrian delay: the ability of people to cross roads as a result of changes in traffic volume, composition and speed, the level of pedestrian activity, visibility and general physical conditions of the Proposed Development;
- Fear and intimidation: these may be experienced by people as a result of an increase in traffic volume and its proximity or the lack of protection caused by such factors as narrow pavement widths; and
- Accidents and safety: the risk of accidents occurring where the Proposed Development is expected to produce a change in the character of traffic.

## 12.5 Assessment Methodology

12.5.1 The guidance that is followed when assessing the potential significance of road traffic effects is summarised in GEART, which states that:

*"The detailed assessment of impacts is...likely to concentrate on the period during which the absolute level of an impact is at its peak, as well as the hour at which the greatest level of change is likely to occur."* (Paragraph 3.10).

12.5.2 To assess the impact at its peak, the likely percentage increase in traffic is determined by comparing estimates of traffic generated by the Proposed Development with future predicted baseline traffic flows on the roads used by construction traffic in vicinity of the Site.

### Determination of Significance

12.5.3 The EIA Regulations recognise that developments will affect different environmental elements to differing degrees, and that not all of these are of sufficient concern to warrant detailed investigation or assessment through the EIA process. The EIA Regulations identify those environmental resources that warrant investigation as those that are *"likely to be significantly affected by the development"*.

12.5.4 The EIA Regulations do not define significance and it will be necessary to state how this will be defined for the EIA. The significance of an effect resulting from a development during construction or operation is most commonly assessed by reference to the sensitivity (or value) of a receptor and the magnitude of the effect. This approach provides a mechanism for identifying areas where mitigation measures may be required and to identify the most appropriate measures to alleviate the risk presented by the development.

12.5.5 GEART provides two rules that are used to establish whether an environmental assessment of traffic effects should be carried out on receptors:

- Rule 1: Include highway links where traffic flows are predicted to increase by more than 30% (or where the number of HGVs is predicted to increase by more than 30%); and
- Rule 2: Include sensitive areas where traffic flows are predicted to increase by 10% or more.

12.5.6 It should be noted that, according to GEART, predicted traffic flow increases below 10% are generally not considered to be significant as daily variations in background traffic flow may fluctuate by this amount. Changes in traffic flows below this level are, therefore, assumed not to result in significant environmental effects and will therefore be scoped out of the EIA.

- 12.5.7 The main transportation impacts associated with a wind farm relate to the construction phase of the development. This would include the movement of HGV traffic travelling to and from a site bringing in material for the construction of the access, tracks, foundations, crane hard standing etc. The assessment will identify the number of HGV movements required for the Proposed Development and a schedule/programme which identifies the peak month and peak daily movement.
- 12.5.8 Other construction impacts relate to the delivery of the turbine components. These components, by their nature are large and require abnormal load delivery. The assessment will identify the number of abnormal loads required for the Proposed Development.
- 12.5.9 The assessment will include the identification of the baseline data through relevant survey information for all the roads associated with the different elements of the Proposed Development. The assessment will identify the:
- Existing traffic flows;
  - Potential impacts (of changes in traffic flows) on local roads;
  - Potential impacts (of changes in traffic flows) on users of those roads; and
  - Potential impacts (of changes in traffic flows) on land uses and environmental resources and sensitive receptors fronting those roads, including the relevant occupiers and users.
- 12.5.10 The sensitivity of each highway link included in the assessment will be assigned a sensitivity in accordance with GEART. This is based on the proximity of sensitive receptors to the highway link and the highway environment. Sensitivity judged as High or Medium results in Rule 2 (sensitive areas where traffic flows are predicted to increase by 10% or more) being considered. Sensitivity judged as Low or Negligible results in Rule 1 being considered (where traffic flows are predicted to increase by more than 30% (or where the number of HGVs is predicted to increase by more than 30%)).
- 12.5.11 The classification of a likely traffic and transport effect will then be derived by considering the sensitivity of the receptor against the magnitude of change, with the details of the assessment presented in the EIA Report.
- 12.5.12 Consideration would be given as to whether any of the receptors which would be taken forward for assessment are likely to be subject to cumulative effects because of the Traffic and Transport effects generated by other proposed developments in the area, and if this is likely to be the case a cumulative assessment would be undertaken.

## 13. Socio-economics

### 13.1 Introduction

- 13.1.1 The assessments provided in Chapter 15 - Socio-economics, Tourism and Recreation of the 2015 ES, 2017 FEI and 2020 Section 42 Variation Application concluded that residual economic effects during construction, operation and decommissioning would be beneficial, but 'not significant'. Also, residual effects once the Proposed Development is operational would be beneficial, but not significant in respect of public access. All other construction and operational effects on recreation and tourism receptors during construction, operation and decommissioning were concluded as not being significant in EIA terms. The additional effects of the Proposed Development are not anticipated to alter these conclusions and as there are no likely significant effects, it is proposed to scope Socio-economics out of the assessment<sup>49</sup>.

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<sup>49</sup> Public access and recreation, including relevant tourist receptors, will be considered as part of the LVIA.



## 14. Infrastructure and Other Issues

### 14.1 Introduction

- 14.1.1 Specific Advice Sheet Onshore Wind Turbines (Scottish Government, May 2014) identifies that wind turbines might impact on infrastructure, telecommunications, utilities and air safeguarding issues. Effects may, for example, include disruption of microwave rebroadcast links or local radio communication systems. The quality of television reception may also be affected, though to a lesser extent than prior to the switchover to digital transmissions, and viewers may suffer reduction of picture quality and acoustic interference.

### 14.2 Existing Infrastructure, Telecommunications and Broadcast Services

- 14.2.1 The 2015 Environmental Statement (ES) and 2017 Further Environmental Information (FEI) prepared for the Consented Development identified that following mitigation measures, there would be no significant effects on existing infrastructure.
- 14.2.2 A range of investigations would be undertaken in respect of the Proposed Development to establish the current baseline in terms of existing infrastructure associated with utilities such as water, gas, electricity and telecommunications links to establish either the absence of effects or to identify appropriate mitigation to overcome any effects. These matters would be addressed through consultation with the relevant system operators.

### 14.3 Shadow Flicker

- 14.3.1 Shadow Flicker is a phenomenon that can occur in sunny weather when turbines are operating and the rotating blades cause a flickering effect inside a building where sunlight passes through an opening such as a window or door.
- 14.3.2 For shadow flicker to occur, the receptor must be directly in line with the wind turbines when the sun is low in the sky and within 10 rotor diameters of a turbine where they are located within 130 degrees either side of north of any turbine. In these circumstances, the moving turbine blade briefly blocks/reduces the intensity of light entering an opening to a room on each rotation, causing a flickering to be perceived. In the open, shadow flicker is generally not perceived as light outdoors is reflected from all directions.
- 14.3.3 It is stated within the Scottish Government's Onshore Wind Turbines planning advice note (May 2014) that where separation is provided between wind turbines and nearby dwellings (as a general rule, 10 rotor diameters), 'shadow flicker should not be a problem'.
- 14.3.4 Where properties meet both of the criteria for there to be a potential shadow flicker effect, the seasonal duration of this effect will be calculated from the geometry of the turbine and the latitude of the Development Site, to assess potential impacts upon the amenity of local residents. Mitigation measures will be proposed in the EIA Report should they be necessary.
- 14.3.5 The nearest residential properties is located approximately 1.2km to the north and over 2km to the south west of the nearest turbine. If, after design development, any properties were to be located within a 130 degree segment either side of due north, relative to the turbines and within ten rotor diameters of a turbine (as per the guidance) they will be assessed for shadow flicker.

## 14.4 Aviation

- 14.4.1 Wind turbines within radar Line of Sight (LoS), and therefore detectable by radar systems, reflect radio waves that can interfere with the system. Turbine induced radar clutter appearing on radar displays can affect the safe provision of Air Traffic Services as it can mask unidentified aircraft from the air traffic controller and / or prevent the accurate continued identification of aircraft under control. In some cases, radar reflections from the turbines can affect the performance of the radar system itself. Additionally, due to their height, wind turbines could also potentially present a collision risk to low flying aircraft, therefore affecting military low-level training flights.
- 14.4.2 The 2015 ES and the 2017 FEI in respect of the Consented Development identified the potential for direct effects from operation on Ministry of Defence (MoD) Low Flying activities, NATS Great Dun Fell Primary Surveillance Radar (PSR), Lowther Hill PSR, and Glasgow Prestwick Airport PSR. With mitigation measures, the assessments found there to be no significant effects on aviation as a result of the Consented Development.
- 14.4.3 Consultations will be undertaken with aviation stakeholders to identify if the Proposed Development is likely to cause any problems in relation to their operations. If any problems are identified, negotiations would be undertaken to seek and agree appropriate mitigation.

## 14.5 Population and Human Health

- 14.5.1 The potential effects on population and human health arising from the Proposed Development would be considered in the context of the other factors identified in Schedule 4(4) of the 2017 EIA Regulations given that any environmentally related health issues (both beneficial and adverse) are likely to result from, for example, exposure to traffic, changes in living conditions resulting from noise, and increased employment opportunities. It is therefore proposed that population and human health effects of the Proposed Development are incorporated within the relevant technical chapters of the EIA Report (i.e. Socio-economics, Traffic and Transport, Noise, and Landscape and Visual (in respect of residential amenity in particular)).
- 14.5.2 However, to clearly demonstrate that population and human health effects are included in the EIA Report, and to assist with ease of reference, it is proposed that a summary table that identifies the potential effects and the EIA Report chapter that considers the matter in more detail would be included (either as an appendix or within a succinct 'Other Issues' chapter).

## 14.6 Climate

- 14.6.1 The vulnerability of the Proposed Development to climate change and extreme climate events will be considered within the engineering design and it is not proposed that a separate EIA Report chapter on 'Climate' is prepared. A Peat Slide Risk Assessment and Peat Management Plan will be produced as part of the EIA.
- 14.6.2 A carbon balance calculator would be completed using the most recent version available on the Scottish Government website and this would be reported in the Renewable Energy Policy, Carbon Balance and Peat Management EIA Report chapter.
- 14.6.3 Given the non-emitting nature of a wind farm and the fact that it is a renewable technology, it is not proposed to undertake an additional greenhouse gas (GHG) assessment, but any effects on climate would be considered in relevant technical assessments.

## 14.7 Sustainable Resource Use

- 14.7.1 Although application sites for wind turbine development can encompass large areas of land, the actual built development covers a relatively small area and, in most circumstances, farming / forestry and other land-based activities would continue in and around turbine development. As a result of this, the Proposed Development would only result in a small land take, which is unlikely to result in significant environmental effects in terms of land use.
- 14.7.2 In terms of soil and peat, the design of tracks, turbine foundations, hardstanding, borrow pits etc. would minimise the amount of soil disturbance. Where soils and peat would be excavated, they would be stored on the Development Site in accordance with the Peat Management Plan and the Construction and Environmental Management Plan (CEMP) which would be produced prior to construction, and then used in the restoration of the site post construction to minimise the loss of soil and peat resource.
- 14.7.3 With regards water, the key environmental effects of this natural resource would be its use during the construction, operational and decommissioning phases, the potential increase in flood risk and the disturbance of surface and groundwater as a result of construction activities. With regards to construction works, the water resource would be managed in accordance with the CEMP. With regards to surface water and groundwater, potential effects would be addressed in the Geology, Hydrology and Hydrogeology chapter of the EIA Report, with appropriate mitigation measures outlined where required.
- 14.7.4 The potential effects of the Proposed Development on biodiversity would be addressed within the Ecology and Ornithology chapters of the EIA Report, within which appropriate mitigation would be set out in order to minimise the potential damage to habitats and species during the construction, operation and decommissioning. Mitigation measures would also be detailed in a Habitat Management Plan, which it is expected would be required by planning condition, and also within the CEMP.
- 14.7.5 As a result, it is not proposed that Sustainable Resource Use is considered as a discrete section of the EIA Report for the Proposed Development.

## 14.8 Major Accidents and Disasters

- 14.8.1 The scope for the EIA to consider major accidents and disasters has been initially considered in **Table 14.1** below. Major accidents or disasters have been scoped in where they represent a high risk to the Proposed Development, either from the proposed location or from the project itself. A high risk is considered to be where there is reasonable likelihood of the accident or disaster occurring, or where the effect of the accident or disaster would lead to the requirement for mitigation which is beyond the usual scope of construction or operational activities. Where an accident or disaster has been scoped in, the EIA Report chapter(s) identified would consider the matter in more detail. This further detail may show that no further assessment is needed, or it may lead onto an appropriate level of assessment and/or identification of appropriate mitigation.

Table 14.1 Major Accidents and Disasters

Major Accident or Disaster	Risk due to location	Risk due to project	Scoped in / out due to risk	Rationale	EIA Report Chapter
<b>Biological hazards: epidemics</b>	Low	Very low	Out	The probability of epidemics which would affect the construction or	N/A

Major Accident or Disaster	Risk due to location	Risk due to project	Scoped in / out due to risk	Rationale	EIA Report Chapter
				<p>operation of the Proposed Development is considered to be Low.</p> <p>If necessary government guidance in relation to social distancing would be followed to enable safe construction and operation of the Proposed Development.</p>	
<b>Biological hazards: animal and insect infestation</b>	Very low	Very low	Out	The probability of animal and insect infestations which would affect the construction or operation of the Proposed Development is considered to be very low.	N/A
<b>Earthquakes</b>	No	No	Out	Any earthquakes in the vicinity of the Proposed Development would be of a very small magnitude and the design of turbine foundations etc. is adequate to withstand such low magnitude events.	N/A
<b>Tsunamis / tidal waves / storm surges</b>	No	No	Out	The general location of the Proposed Development and its distance from the coast means there is no risk of these phenomena affecting the Proposed Development.	N/A
<b>Volcanic eruptions</b>	No	No	Out	There are no active volcanos in the vicinity of the Proposed Development.	N/A
<b>Famine / food insecurity</b>	Negligible	Very low	Out	The probability of famine / food insecurity which would affect the construction or operation of the Proposed Development is considered to be Negligible.	N/A

Major Accident or Disaster	Risk due to location	Risk due to project	Scoped in / out due to risk	Rationale	EIA Report Chapter
<b>Displaced populations</b>	Negligible	Very low	Out	The probability of displaced populations affecting the construction or operation of the Proposed Development is considered to be Negligible.	N/A
<b>Landslide / subsidence</b>	Low	Low	In	A peat slide risk assessment would be undertaken.	Renewable Energy Policy, Carbon Balance and Peat Management
<b>Severe weather: storms</b>	Medium	No	Out	Turbines are equipped with lightning conductors and automatically shut down when wind speeds are at a level which could damage internal components.	N/A
<b>Severe weather: droughts</b>	Very Low	No	Out	The probability of severe drought occurring in the vicinity of the Proposed Development is considered to be very low. Furthermore, turbines would be unaffected by drought conditions.	N/A
<b>Severe weather: extreme temperatures</b>	Low	Very Low	In – severe cold weather could lead to ice build-up on blades.	Ice build-up could lead to ice throw, or to blade damage and throw.	Project Description and other issues chapter.
<b>Floods</b>	Low	Very Low	In – a high level flood risk assessment would be undertaken as part of the EIA.	Damage to turbines or infrastructure from flooding, or increase in flood risk elsewhere from development in flood zones.	Site Selection and Design Evolution, and Hydrology, Hydrogeology & Geology.
<b>Terrorist incidents</b>	No	No	Out	N/A	N/A
<b>Cyber attacks</b>	No	No	Out	N/A	N/A
<b>Disruptive industrial action</b>	No	No	Out	N/A	N/A
<b>Public disorder</b>	No	No	Out	N/A	N/A
<b>Wildfires</b>	No	No	Out	N/A	N/A
<b>Severe space weather</b>	No	No	Out	N/A	N/A
<b>Poor air quality events</b>	No	No	Out	N/A	N/A

Major Accident or Disaster	Risk due to location	Risk due to project	Scoped in / out due to risk	Rationale	EIA Report Chapter
<b>Transport accidents</b>	No	Yes	In – abnormal loads and increase in traffic from construction.	Abnormal loads or an increase in traffic could lead to an increased risk of accidents. Highway network may be unsuitable for such traffic, further increasing accident risk.	Design Evolution and Traffic and Transport.
<b>Industrial accidents</b>	No	Yes	In – from construction and maintenance activities.	Manual labour, working at height and use of specialist plant all bring risk of industrial accidents. Relevant UK health and safety legislation will be adhered to; site construction management practices will include, but are not limited to, temporary diversions of public rights of way, relevant signage and fencing of potentially hazardous construction areas where appropriate.	Construction activities are covered by separate H&S legislation and guidelines.  Site Selection and Design Evolution, Geology, Hydrology, and Hydrogeology, and Ecology (pollution).
<b>Electricity, gas, water supply or sewerage system failures</b>	No	Yes	In – site contains electricity transmission and telecommunication cables.	Construction activities or turbine collapse could damage electricity infrastructure. All relevant health and safety legislation will be followed, and industry best practice guidance adhered to. HSE GS6 <i>Avoiding danger from overhead power lines</i> will be followed.	Site Selection and Design Evolution; and Existing Infrastructure, Telecommunications and Broadcast Services.
<b>Urban fires</b>	No	No	Out	The Proposed Development is not in close proximity to any urban areas.	N/A

# Appendix A

## Figures

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