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Appendix 1.1

Scoping Report



CREATING A BETTER
ENVIRONMENT



Daer Wind Farm

Scoping Report



December 2018

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**E.ON Climate & Renewables
UK Developments Ltd**

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1. Introduction

This Scoping Report has been prepared by Natural Power Consultants Limited (Natural Power) on behalf of E.ON Climate & Renewables UK Developments Ltd (E.ON) in anticipation of an application under Section 36 of the Electricity Act 1989 for a wind farm development adjacent to Daer Reservoir in South Lanarkshire and Dumfries & Galloway.

Under the statutory procedures set out in the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (EIA Regulations) it is proposed that any such application is accompanied by an Environmental Impact Assessment Report (EIAR). Under Regulation 12 of these EIA Regulations, a formal opinion of the information to be supplied in the EIAR is sought from Scottish Ministers.

The purpose of this Scoping Report is to provide information to consultees for determining the scope of the Environmental Impact Assessment (EIA) and EIAR.

Consultees will note that the Scoping Report contains a number of questions/comment boxes, which it would be useful to receive feedback on. Not all questions will be relevant to all consultees, therefore we request that consultees provide feedback only on those questions appropriate to them. The questions should not be considered an exhaustive list, and consequently consultees are welcome to provide feedback on any issue they consider relevant to Daer Wind Farm (herein referred to as the proposed development). If consultees elect not to respond, E.ON will assume that consultees are satisfied with the approach adopted/proposed.

The design of the proposed development to date has been an iterative process, and the layout has avoided impacts as far as possible. It may be that the layout presented in this Scoping Report is further refined during the EIA process and through further consultation. Therefore, it should be noted that any amendments to the design are unlikely to increase the likelihood of a significant effect. However, should any changes occur that are likely to result in a significant or unknown effect on an important feature previously scoped out, then this feature will be scoped back in to the EIA process. Any changes will first be discussed with the relevant consultees, to ensure that they too are in agreement with the applicant's understanding and before altering the inclusion or exclusion of features from the EIA. Further general information about embedded mitigation and layout iterations is provided in Section 8.

1.1. The Applicant

The Applicant, E.ON, is one of the world's leading energy companies. In the UK, E.ON supplies energy to more than 4 million customers and generates enough renewable electricity for around 1 million homes. In 2007, E.ON established E.ON Climate & Renewables (EC&R), a global business in developing new, cleaner ways of generating energy. Since its formation, EC&R has invested more than 12 billion Euros worldwide in renewable generation. In the UK, E.ON owns and operates 16 onshore and 5 major offshore wind farms. Together these have an installed capacity of 1.1 Gigawatts (GW). In addition, E.ON has over 83 MW of consented onshore projects in various stages of construction. At a local level E.ON owns the consented Lorg Wind Farm, near Sanquhar in Dumfries & Galloway, and is also bringing forward the Benbrack Wind Farm, 6 km to the south of Dalmellington also in Dumfries & Galloway.

2. Proposed Development

The proposed development is located in the Lowther Hills of South Lanarkshire and Dumfries and Galloway, directly adjacent to the south/east of the Daer Reservoir. The maximum topographic height of the site is 554 m. Figure 1 illustrates the current site layout of the turbines, which may be subject to change, and location of the site. Figure 2 shows the regional context of the proposed development. Figure 3 presents the site constraints identified to date which the current layout accounts for. The proposed development presented in this scoping report is considered by the Applicant to comprise of the largest extent of land and biggest number of turbines which is expected to be put forward for permission. It therefore represents what is likely to provide the most benefit and be the 'worst case' in regards to potential adverse environmental effects.

The proposed development is for:

- 15 wind turbines, at up to 170 m in height to blade tip
- Turbine foundations
- External transformer housing
- Crane pads
- Upgrading and new access tracks
- Underground electricity cables
- Anemometry mast
- Forestry felling and replanting
- Signage
- Temporary borrow pits
- Temporary construction and storage compounds, laydown areas and ancillary infrastructure.
- Drainage and drainage attenuation measures (as required).

The existing road that leads to the site entrance past Kirkhope will be utilised and upgraded where necessary.

The site currently consists of two land parcels, Daer and Rivox; the former which is wholly within South Lanarkshire and the latter which is wholly within Dumfries & Galloway.

A 35-year operational period may be sought for the proposed development following which, decommissioning of this project would be undertaken.

The specific turbine model has not yet been selected but it is expected to be a horizontal axis machine with three rotor blades. Current models have approximately 4.2 MW generating capacity and by the time the project is constructed, such machines may be capable of generating 5 MW of electricity each. Should the candidate turbine require it, external transformers will also be placed adjacent to each turbine.

Crane pads would be left in-situ following erection of turbines to allow for maintenance and replacement of parts as necessary during the lifetime of the project.

2.1. Crane hardstand and temporary laydown areas

To enable the construction and subsequent maintenance of the proposed wind turbines, crane hard stands and temporary laydown areas will be required. At this stage in the process the final design, location and orientation of these has yet to be concluded but will be undertaken in line with the principles identified elsewhere in this report and any potential residual impacts identified in the EIAR.

2.2. Access Tracks

Existing access tracks would be utilised where possible but additional site tracks would be required. The routes for the tracks will be chosen to minimise potential impacts on the environment, while taking account of other site specific constraints, and the EIAR will include rationale for their location.

The construction of the site tracks fall under two main categories, which can be categorised as follows:

- 'Cut' track – superficial layers are removed, along with soft subsoils until reaching a competent bearing layer which can be used as a formation level. This construction method will be used on steeper topography where floating track is deemed unacceptable due to ground conditions or slope stability and will generally generate higher volumes of excavated material.
- 'Floating' track – superficial layers and subsoils are left in-situ with the track built off the existing ground level, utilising geotextiles and geogrids to reinforce the track materials. This technique is generally used where there are deep soft underlying materials e.g. peat or soft clays.

Watercourse crossings will be minimised as far as possible and where these cannot be avoided then indicative water crossings will be identified and assessed.

2.3. Borrow Pits

Temporary borrow pits on site may be used to reduce the potential effects on the environment and transport network associated with transporting stone to site. Using site won stone is less likely to affect the pH of groundwater systems on site. The EIAR will include search areas of the proposed locations for on-site borrow pits. The EIAR will present high level details of the borrow pit designs including indicative borrow pit plans. A detailed working borrow pit scheme and a decommissioning and restoration strategy would be produced pre-construction as part of an appropriately worded suspensive condition.

2.4. Construction Environmental Management Plan

A Construction Environmental Management Plan (CEMP) would be created and agreed with South Lanarkshire Council, Dumfries & Galloway Council and Scottish Water prior to construction commencing through an appropriately worded suspensive condition in order to ensure the impacts from construction are kept to a practical minimum. The CEMP would set out the method statements for constructing site infrastructure, measures that would be undertaken by contractors to ensure good site practice with regards to construction practices and environmental management. Such measures would include for the transport and storage of potentially polluting substances such as oils and lubricants as well as waste management for example.

In the past, the use and implementation of a CEMP has ensured that the environment and in particular the integrity of drinking water reservoirs such as Afton Reservoir for example have not been significantly adversely affected. Should the proposed development be consented similar best practice guidelines and method statements will be adopted and agreed with Scottish Water to ensure again that the development does not impact negatively on the Daer Reservoir and other elements of the local environment.

2.5. Grid Connection

The proposed wind turbines would produce electricity at 690 Volts - 1000 Volts. The electricity would then be transformed to 33,000 Volts (33 kV) via a transformer which may be inside the turbine or located immediately adjacent to the tower of each turbine, depending on the final turbine model used. The transformers would be linked to an on-site substation via high voltage underground cables placed in trenches which would generally follow the route of the on-site tracks. In addition, where appropriate, the transformers would connect to the substation via underground cables across open ground with electrical marker posts used to identify their locations.

Connection of the proposed development to the national grid will be subject to a separate application.

2.6. Operational Period

The proposed development would in general operate automatically, but would be monitored by an experienced team at a control room on site and by the Developer's remote operation's team. Each individual turbine would operate independently from the others. Within the operational wind speed range the pitch angle of the turbine blades of each individual turbine would be automatically adjusted by the control system within the turbine, as appropriate for the measured wind speed. Should sensors, placed within the nacelle of the turbine, register any instability in the structure or any other malfunction in operation or should wind speeds increase over safe limits, then the turbine would automatically shut down. If the cause of the shutdown is high wind speeds then the turbine would automatically recommence operation once average wind speeds fell to within the operational range (generally between approximately 4 metres per second (m/s) and 25 m/s, i.e. 9 miles per hour (mph) and 56 mph. Under other causes of shut down the turbine would remain shut down and in a safe condition until manually restarted by a member of the operations and maintenance team.

The lifetime of the project is envisaged to be 35 years from commissioning to decommissioning. Turbines are now generally designed with a warranty life in excess of 30 years although advances in technology and understanding of turbine life may prolong this. To ensure that turbines continue to operate with acceptable availability in addition to maintenance in the event of malfunctions, regular pre-planned maintenance and servicing programmes are performed at the site on each turbine. Minor scheduled maintenance checks tend to be carried out every 6 months with major services being performed annually throughout the lifetime of the turbine. Each turbine would contain lubricating and hydraulic oils. These are often replaced during regular maintenance operations. In the unlikely event of a lubricant leak the fully sealed tower bottom would act as a bund containing the spillage until it can be appropriately cleaned up. Spill kits would be made readily available on site.

Storage of other potentially polluting substances at the site during the operational period of the wind farm would only take place where agreed with the relevant authorities.

Maintenance and operation staff on site would make use of the control building.

2.7. Decommissioning

At least six months prior to the decommissioning of the site a Decommissioning Method Statement would be prepared and agreed with the relevant consultees. Best practice guidelines will be utilised at this time. The applicant would expect a planning condition regarding decommissioning to be attached to the consent. Should the proposed development eventually be consented, its restoration fund would be expected to include salvage from turbine components. The provision of the fund should be made so as to not unnecessarily create duplication for the landowner and the planning authority.

If, nearer the time of decommissioning, it is considered by the wind farm operator that the development area may be suitable for re-powering, the applicant would submit a new application to the relevant authority for such development.

3. Community Consultation

Although there is no statutory requirement to undertake consultation, E.ON considers it to be a crucial part of the wind farm development process and will engage with the local community throughout the application process. A programme of statutory and public consultation will be undertaken to provide information to, and seek feedback from interested parties. This will include public exhibitions, a project website, leaflet drops and an established contact for project information requests as well as a freephone number and freepost address (outlined below).

Daer Wind Farm

Address – Daer Wind Farm, E.ON Climate & Renewables, Westwood, Westwood Way, Westwood Business Park, Coventry, CV4 8LG

Freephone – 0800 096 1199

It is also proposed to establish a Community Liaison Group comprising representatives from each of the community councils in the area and other local representatives. The engagement process will include outlining the findings of the baseline studies and assessment process. These meetings will be designed to provide a medium for two-way communication for the project and address any questions or concerns that representative community groups wish to raise. Public information events will be organised for the local community in 2019, designed to present the concepts of the scheme. These will be followed by further public consultation events as the design evolves through the EIA process. E.ON proposes to prepare a Pre-Application Consultation Report (PAC) as part of the Section 36 application, detailing the key outcomes of the consultation process.

Do consultees have any comments in relation to public consultation?

4. Stakeholder Consultation

E.ON considers consultation with statutory and non-statutory consultees as an integral part of the iterative EIA process and recognises the benefits in carrying out early consultation with all concerned parties. The consultation will progress with the circulation of this Scoping Report and will continue for the duration of EIA process.

5. Approach to the Environmental Impact Assessment

The EIA is a statutory procedure which draws together in a systematic way an assessment of the potential significant environmental effects arising from a proposed development. As the process has numerous steps, it allows for the opportunity to 'design out' adverse environmental effects at an early stage through the design of the project. This of course is generally preferable to mitigation or remedy at a later stage.

An iterative design approach is already in process for this project and will continue to be adopted throughout the EIA process, which will allow the proposed development to have adopted a design that works well for both the local environment and environmental resources within the area as well as being an economically viable scheme. The steps taken for informing and developing the EIA process are identified in the flow diagram below (Diagram 5.1).

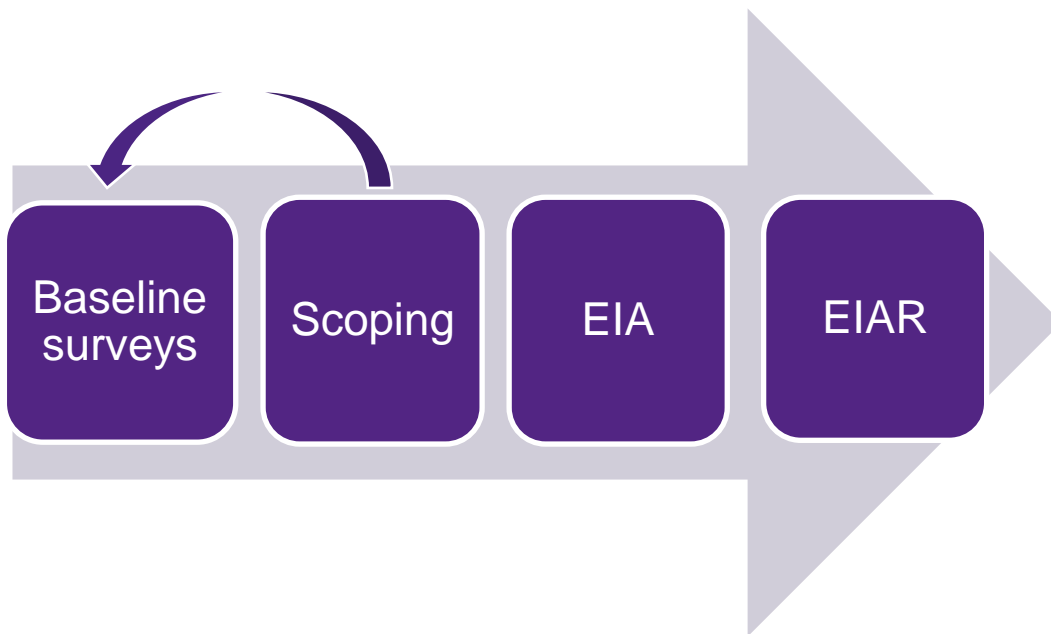


Diagram 5.1: EIA Process

Feasibility studies have been undertaken and some baseline surveys commenced, see section 11 for example.

Consultees are requested to respond where possible to propose scope in those features and topics that are likely to experience a significant impact, and thus ‘scope out’ the rest. In doing so the **impact assessment** will be **focussed** to those that will actually **influence** the **decision** as to whether or not the **project** should **receive consent**.

The impact assessment will determine for those assessed receptors what the impact, either directly or indirectly will be from the project, by comparing the baseline conditions with the conditions that would prevail should the proposed development be constructed, operated (and decommissioned). The environmental effects of the proposed development will be predicted in relation to environmental receptors (i.e. people), built resources and natural resources.

A distinction will be made in the assessments between impacts and effects, where:

- Impacts are defined as the predicted change to the baseline environment attributable to the scheme; and
- Effects are the consequence of impacts on environmental resources or receptors.

5.1. What will the EIA Assess?

The EIA will address the construction phase of the wind farm which would last approximately 12 to 18 months, the operational and maintenance phase which would last approximately 35 years, and the decommissioning phase.

The geographical coverage of the EIA will take account of the following:

- The physical extent of the proposed works;
- The nature of the baseline environment and the manner in which effects are propagated; and the
- Pattern of governmental administrative boundaries which provide the planning and policy context for the scheme.

5.2. Gathering Baseline Information

Baseline data is being collected for this project and the assessment team will ensure that sufficient data is obtained to enable a robust assessment, appropriate to the nature and scale of the proposed development. The extent of the baseline assessment will be determined using both professional judgement and industry best

practice. The EIA will also identify areas where the baseline may change, prior to the construction and operational phases of the project from current conditions (for example, maturation of landscaping).

The collection of baseline data will be achieved through desk study, consultation, field survey and monitoring and will be clearly reported in the subsequent sections, or within the EIAR (should there be an expected significant impact from the development). In line with the regulations, the EIAR will also indicate any difficulties encountered in compiling environmental baseline conditions; such as access to land to carryout surveys where permission was not granted.

5.3. Prediction and Evaluation of Impacts and Effects

The prediction of impacts examines the change to the baseline environment that could result from the construction and operation of the proposed development. The effects will be classified in to one or more of the following:

- Positive effects that have a beneficial influence, negative effects that have an adverse influence;
- Temporary effects that persist for a limited period only, due for example to particular construction activities;
- Permanent effects that result from an irreversible change to the baseline environment or which persist for the foreseeable future;
- Direct effects that arise from activities that form an integral part of the project;
- Indirect effects that arise from activities not explicitly forming part of the project;
- Secondary effects that arise as a result of an initial effect of the scheme; and
- Cumulative effects that arise from the combination of different impacts at a specific location, the recurrence of impacts of the same type at different locations, the interaction of different impacts over time, or the interaction of impacts arising from the scheme in conjunction with other development projects.

There is no statutory definition of what constitutes a significant effect. **A significant effect may be broadly defined as an effect which, either in isolation or combination with others, should be taken into account in the decision making process.** This general definition will be used as the basis against which the significance criteria for environmental disciplines will be developed. The threshold of significance for predicted effects tends to vary between the environmental topics. The assessment team will ensure that a consistent approach is applied to prevent undue weight being given to a particular discipline to the detriment of another.

5.4. Mitigation of Environmental Effects

Mitigation measures will be considered for each significantly adverse effect. The EIAR will include a description of the measures envisaged to prevent, reduce and where possible remedy any significant adverse effects. In line with the regulations, when identifying mitigation measures, the project will take into account the practicability and cost effectiveness of the proposals and their efficiency in reducing environmental impacts. Where practical, mitigation measures will be set out as commitments which will ensure they are implemented.

Once the final design has been adopted and account has been taken of any mitigation measures, residual adverse effects will be listed. The significance of a residual adverse effect will be determined by correlating the magnitude of the change arising from the scheme with the sensitivity of the particular attribute under consideration. The magnitude of change will be evaluated in accordance with the following table, Table 5.1:

Table 5.1: Magnitude of Change

High	Total loss or major alteration to key elements/features of the baseline conditions
Medium	Partial loss or alteration to one or more key elements/features of the baseline conditions
Low	Minor shift away from the baseline conditions
Negligible	Very slight change from baseline conditions

Where applicable in carrying out individual assessments, a scale of increasing sensitivity of the resource or receptor will be defined. This may be defined in terms of quality, value, rarity or importance and can be classed as 'Low', 'Medium' or 'High'. For certain assessment areas, guidance will be taken from the value attributed to elements through designation or protection under law. Where assessment of this nature takes place the correlation of magnitude against sensitivity will determine a qualitative expression for the significance of the residual adverse effect. This is demonstrated in the matrix below, Table 5.2:

Table 5.2: Significance of Effect

Sensitivity of Resource / Receptor	Significance of Effect		
	Low	Medium	High
Magnitude of Impact			
High	Moderate	Moderate / Major	Major
Medium	Low / Moderate	Moderate	Moderate / Major
Low	Low	Low / Moderate	Moderate
Negligible	Negligible / Low	Low	Low / Moderate

Those residual adverse **effects indicated as Major and Moderate/Major will be regarded as being significant** effects in terms of the relevant legislation. However, other factors may have to be considered including the duration and the reversibility of the effect.

Do consultees have any comments in relation to the approach to the Environmental Impact Assessment?

As per the aim of the Scoping Report, we intend to focus the EIAR on the more significant effects and will therefore seek agreement that non-significant effects can be scoped out.

5.4.1. Securing Commitments and Mitigation through Planning Conditions

Where commitments have been discussed within this scoping report they will form part of the EIAR and therefore ensure that they are secured if the proposed development receives consent through specific planning conditions. These conditions may include, for example, requirements for detailed documents including a Construction Environmental Management Plan (CEMP) to be produced prior to construction.

6. Legal and Policy Context

The application will conform to the statutory requirements legislated by Section 36 of the Electricity Act 1989 and The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (referred to in this report as the EIA Regulations). Deemed planning permission will be sought by the Scottish Ministers under section 57(2) of the Town and Country Planning (Scotland) Act 1997 as amended.

A Planning Statement is likely to accompany the application for consent and would assess the proposed development in a legal and policy context against the relevant legislation and planning policies in force. The Planning Statement would assess such documents at international, national, regional and local levels, where applicable, including but not limited to:

- National Planning Framework for Scotland 3 (NPF3);
- Scottish Planning Policy 2014 (SPP);
- Clydeplan Strategic Development Plan 2017;
- South Lanarkshire Local Development Plan (2015); and

- Dumfries and Galloway Local Development Plan (2014).

7. Environmental Impact Assessment Report (EIAR)

The EIA process will result in the production of an Environmental Impact Assessment Report (EIAR). The **EIAR** will **identify** those **features/ receptors** that have been **agreed** with the **competent authority** and their **advisors** as those that are **likely** to have a **significant effect** from the **proposed development**, and **will make an influence on their decision process**.

It will focus on each of the broad topics identified within this Scoping Report, plus any others that develop throughout the remainder of the EIA process until submission.

Where features are considered, the assessment methodology, results, effects and mitigation proposed (if any) will be included. This will allow for the residual effect from the proposed development to be identified to allow the competent authority sufficient information to determine the application.

The EIAR will supplement the application and will also be accompanied by a Non-Technical Summary (NTS). A Pre-Application Consultation (PAC) Report and a Planning, Design and Access Statement are likely to also be provided.

The EIAR is likely to follow the structure below:

- Chapter 1: Introduction
- Chapter 2: Site Selection and Design Evolution
- Chapter 3: Project Description
- Chapter 4: Landscape and Visual Impact Assessment (LVIA)
- Chapter 5: Ecology Assessment
- Chapter 6: Ornithology Assessment
- Chapter 7: Hydrology, Geology and Hydrogeological Assessment
- Chapter 8: Noise
- Chapter 9: Cultural Heritage Assessment
- Chapter 10: Traffic and Transport Assessment
- Chapter 11: Forestry Assessment
- Chapter 12: Aviation and Existing Infrastructure
- Chapter 13: Socio-economics
- Chapter 14*: Synergistic Effects and Summary of Mitigation and Residual Effects

*The assessment of population and human health includes consideration of noise, shadow flicker, ice throw, lightning, private water supplies and socio-economics. Such factors are assessed throughout different areas of the EIAR and will be summarised in Chapter 14.

Do consultees have any comments in relation to the proposed chapters to be included in the EIAR?

As per Regulation 17 of the EIA Regulations, the EIAR will be submitted to Scottish Ministers in electronic form and two hard copies. Upon submission of the application, the EIAR will be made available in electronic form for public inspection at appropriate locations to be agreed with South Lanarkshire Council and Dumfries and Galloway Council and will be distributed to the relevant consultees. An NTS will be submitted alongside the EIAR, which will provide a summary of the main findings and will be written in a non-technical language for ease of understanding by the general public.

8. Embedded Mitigation and Further Layout Iterations

The design of the proposed development has generally avoided environmental and physical constraints which have been identified during initial feasibility studies (embedded mitigation). These will be refined as the EIA progresses.

Throughout the remainder of the EIA process (until the submission of the EIAR), it may be that the layout presented here in the Scoping Report, further develops (especially in light of the Scoping Opinion and public consultations). Should the layout change from now to the application, it should be noted that the layout presented within this Scoping Report represents a **'worst case scenario'** (e.g. turbines have been presented in the greatest number and tallest height) and therefore the proposal as identified now will have the greatest environmental impacts, and generally any amendments to the design will not increase the likelihood of a significant effect.

Should any changes occur that are likely to have a significant effect on the receptor these will be included within the EIAR. If the changes are not likely to have a significant effect, these will first be discussed with the relevant consultees, to ensure that they too are in agreement with the applicants' understanding before excluding them from the EIAR.

9. EIA Subjects

In the following sections the subject areas to be covered in the Scoping Report and EIAR are provided. Where it is considered that certain subjects or particular aspects within subjects can be scoped out of the EIAR, evidence and a rationale is provided.

10. Landscape and Visual Impact Assessment

10.1. Introduction

The Environmental Impact Assessment Report (EIAR) will include a comprehensive but focussed Landscape and Visual Impact Assessment (LVIA) of the likely significant effects of the proposed development on the landscape resource and visual amenity. These assessments will be undertaken by a chartered landscape architect.

10.2. Landscape Policy and Guidance

The LVIA would be prepared in accordance with the Guidelines for Landscape and Visual Impact Assessment (GLVIA), Third Edition, Landscape Institute and the Institute of Environmental Assessment (2013) (GLVIA3) and Landscape Character Assessment – Guidance for England and Scotland, The Countryside Agency and Scottish Natural Heritage (2002).

In addition to the GLVIA, the LVIA would take account of the following documents:

- Topic Paper 6: Techniques and Criteria for Judging Capacity and Sensitivity (Scottish Natural Heritage and the Countryside Agency 2004);
- Siting and Designing Windfarms in the Landscape, Version 2, SNH May 2014
- Visual Representation of Windfarms, Version 2.2, SNH Feb 2017
- Use of Photography and Photomontage in Landscape and Visual Assessment (Landscape Institute Advice Note 01/2011);
- Assessing the Cumulative Impact of Onshore Developments (SNH, March 2012)
- The assessment would also take cognisance of relevant national and local landscape planning policy and other such material that may be published during the preparation of the LVIA.

10.3. Methodology

A detailed methodology including detailed criteria for assessing landscape and visual effects will be included as an appendix document to the main LVIA EIAR Chapter. Below is a summary of the intended methodology that has been used for initial assessments to determine the landscape and visual baseline.

10.3.1. Study Area

A Zone of Theoretical Visibility (ZTV) map has been produced to illustrate the potential extent of visibility of the proposed development (see Figure 4). The ZTV assumes a bare earth surface, i.e. no trees or buildings etc. that might otherwise obscure the view of the turbines and therefore is a worst case illustration. The ZTV has been produced with an extent of 45 km based on SNH guidance¹ for ZTV production in relation to turbines of greater than 150 m in height. Following further evaluation of potential effects within this 45 km area, it is anticipated that a study area of lesser extent can be focussed on for assessing the potential significant landscape and visual effects of the proposed development.

10.3.2. Impacts and effects

A distinction will be made in the assessments between impacts and effects:

- Impacts are defined as the predicted change to the landscape and visual baseline as a result of the construction and operation of the proposed scheme.

¹ SNH Guidance: Visual Representation of Wind Farms Guidance version 2.2 (February 2017)

- Effects are the consequence of those impacts on landscape resources or visual receptors.

It is a requirement of the EIA Regulations to state whether effects are positive, neutral or adverse. However, as a precautionary approach, effects on landscape character and views will be considered in the LVIA to be adverse but it should be noted that not all people would experience effects on landscape character, views and visual amenity as adverse, as people's perception of wind turbines varies between negative and positive attitudes. An additional point is that simply because turbines are visible from a particular location or receptor, this does not mean that there will be an adverse effect. Rather, it is dependent on the level (or significance) of that effect or change.

10.3.3. Landscape and visual effects

In accordance with GLVIA3 the assessment of Landscape effects and visual effects are considered separately.

Landscape effects are defined as the potential changes as a result of the proposal on the physical landscape resource, including landscape features, which may give rise to changes in its' character, or constituent parts of its' character. This in turn may affect the perceived value ascribed to the landscape. Landscape resources evaluated include whole landscape character areas, individual elements and features and perceptual aspects and those areas designated for their scenic or landscape qualities at a national, regional or local policy level.

Visual effects consider potential changes as a result of the proposal on population or people. It considers changes to available views as a result of changes to the landscape and people's responses to these changes, otherwise referred to as visual amenity. Changes in views consider the appearance and prominence of the development from key viewpoint locations, settlements, routes and recreational areas. Viewers from such areas are collectively known as visual receptors. Visual effects include issues of intrusion (turbines encroach in the view) or obstruction (turbines intercept or block a view) and whether important opportunities to enjoy views may be improved or reduced as a result of the proposal.

The two principal criteria for determining the significance of both landscape and visual effects are:

- The nature of the location or receptor (sensitivity).
- The nature of an effect (magnitude).

Landscape effects

As guided by GLVIA3, the nature of the landscape receptors (sensitivity) will be assessed in terms of the susceptibility of the receptor to the proposed change and the value of the receptor and will be expressed in terms of High, Medium or Low sensitivity. The nature of the effect (magnitude) on each landscape receptor will be assessed in terms of the size and scale, geographical extent, duration and reversibility of that effect and will be expressed in terms of substantial, moderate, slight and negligible.

Visual Effects

As guided by the GLVIA3, the nature of the visual receptors (sensitivity) will be assessed in terms of the susceptibility of the receptor or viewer (not the view) to the proposed change in views and visual amenity and the value attached to particular views. This will be expressed in terms of High, Medium or Low. The nature of the effect (magnitude) on each visual receptor will be assessed in terms of the size and scale, geographical extent, duration and reversibility of that effect and will be expressed in terms of Substantial, Moderate, Slight and Negligible.

Significance of Landscape and Visual Effects

For both landscape and visual effects, an overall judgement is made on the nature of the receptor and the likely change resulting from the proposed development. This judgement is based on evaluations of the individual aspects of value, susceptibility, size and scale, geographical extent, duration and reversibility. The table below illustrates the four main levels of landscape and visual effects that will be used in this LVIA; Major, moderate, minor and negligible. Three intermediate combinations are also used for determining landscape and visual effects;

Major/moderate, moderate/minor and minor/negligible. The table is not a prescriptive tool and the evaluation of potential effects makes allowance for the use of professional judgement and experience.

Landscape Institute advice, contained in GLVIA3 statement of clarification 1/13 (June 2013), states that following the determination of magnitude and sensitivity, ‘the assessor should then establish (and it is for the assessor to decide and explain) the degree or level of change that is considered to be significant’. In accordance with this advice, the LVIA will establish at what level in the assessor’s opinion, ‘significant’ effects arise, as referred to in the EIA Regulations.

Those effects considered to be major and major/moderate effects by virtue of the more sensitive receptors and the greater magnitude of effects, are considered to be Significant Landscape or Visual Effects. Moderate, moderate/minor, minor, minor/negligible and negligible effects are considered to be Not Significant Landscape or Visual Effects. However, whilst assessments are based on factual and objective data where possible, they involve qualitative considerations, and are therefore essentially and inevitably a matter of professional judgement undertaken on an individual basis. In some instances Moderate effects may be judged to be Significant by the assessor and equally some Major/Moderate effects may be judged to be Not Significant. In these instances, the level of significance of the effect determined by the assessor will be explained in detail.

Examples of significant landscape effects can arise where changes to important key elements or attributes of a landscape character area occur without necessarily giving rise to a change in character, or where a new landscape type or sub-type and therefore new character area (at various scales) would result from the introduction of the proposed development.

A significant visual effect is considered to be a change in the view that would markedly change the composition of that view.

It should be noted that significant effects need not be unacceptable or necessarily adverse and may be reversible.

Table 10.1: Levels of Landscape effects and overall significance

Nature of effect (magnitude)	Nature of Receptor (Sensitivity)		
	High	Medium	Low
Substantial	Major		
Moderate		Moderate	
Slight			Minor
Negligible			Negligible

10.3.4. Cumulative Effects

The Cumulative Landscape and Visual Impact Assessment (CLVIA) will be undertaken in a similar process to the LVIA. The aim of the CLVIA is to identify, predict and evaluate potential key effects arising from the addition of the proposed development to a theoretical landscape baseline which includes cumulative sites currently present in the landscape and that may or may not be present in the landscape in the future. Cumulative sites consist of other wind farm developments only. As with the LVIA, the CLVIA deals with the effects on landscape and visual receptors separately.

The difference between LVIA and CLVIA is the different baseline conditions in terms of other wind farm developments that are assumed to be present in the landscape. The LVIA baseline conditions consider the introduction of the proposed development to a landscape with other operational wind farm developments and those under construction. The CLVIA baseline conditions consider the introduction of the proposed development to a landscape with other wind farm developments at more speculative stages of the planning system, such as:

- consented wind farms which have been granted planning consent but are not yet constructed; and
- submitted valid wind farm applications awaiting determination, including those at appeal.

For clarity, the cumulative assessment separates out these different speculative stages of development by identifying different ‘**cumulative baseline scenarios**’.

- The existing scenario of operational wind farms and those under construction is assessed in the LVIA and is referred to as **Scenario 1**. The CLVIA considers the following scenarios;
- **Scenario 2** considers the addition of the proposed development in the context of operational wind farms, those under construction and additionally those developments currently consented. This represents the likely future scenario.
- **Scenario 3** considers the addition of the proposed development in the context of operational, under construction, consented, undetermined planning applications and wind farm developments currently at appeal i.e. a less certain future scenario.

Scenario 3 represents the most unlikely cumulative baseline as not all planning applications would necessarily be approved. The detailed cumulative assessment will comprise the assessment of the introduction of the proposed scheme into each scenario baseline. Projects which have come forward of relevance at Scoping or pre-application stage would be acknowledged.

In the CLVIA, cumulative effects will be reported as the additional effects of the introduction of the proposed development, should other cumulative schemes be present in the different baseline scenarios, over and above the effects identified in the LVIA. For each receptor, it is clarified as to whether the effect has increased or decreased relative to the LVIA assessment or whether the effects will be the same as in the LVIA assessment.

Types of Cumulative landscape effects

Cumulative landscape effects are defined as effects on either the physical fabric, aesthetic aspects of the landscape or overall character of the landscape, or any special values attached to it.

Cumulative effects on the physical fabric of the landscape arise when two or more developments affect the landscape components or features such as woodland, dykes or hedgerows.

Cumulative effects on the aesthetic aspects of the landscape arise when two or more developments affect the aesthetic or perceptual components of landscape character including scale, sense of enclosure, diversity, pattern and colour and perceptual or experiential attributes such as naturalness, remoteness or tranquillity.

Cumulative effects on the landscape character can arise when a new proposal results in a progression from a landscape which contains one development which forms an individual, isolated feature, to a landscape in which two or more developments are evident and may form a significant or dominant characteristic.

Types of Cumulative visual effects

Cumulative visual effects are defined as effects that can be caused by combined visibility, which occurs where the observer is able to see two or more developments from one viewpoint or sequential effects which occur when the observer has to move to another viewpoint to see different developments e.g. along linear routes or journeys.

Combined visibility can occur as simultaneous visibility, where more than one development is visible in the same angle of view or successive visibility where two or more developments are present in views from the same viewpoint but cannot be seen at the same time as they are not in the same angle of view e.g. the viewer has to turn their head to see the other developments which become visible in succession.

Sequential visibility occurs where two or more developments are not present in views from the same viewpoint and cannot, therefore, ever be seen at the same time. The observer has to move to another viewpoint to see the other developments so they will then appear in sequence. Sequential effects are most common along linear routes and journeys. Sequential effects range from frequently sequential when the developments keep appearing regularly and with short time lapses between, depending on speed of travel and distance between the viewpoints,

to occasionally sequential, where there may be long time lapses between appearances, because the observer is moving very slowly and/or there are large distances between the areas of visibility.

Assessing Cumulative Landscape and Visual Effects

Assessing the significance of cumulative effects requires:

- the identification of the landscape and visual receptors;
- the consideration of the nature of the receptors (sensitivity) as identified in the LVIA; and
- the determination of the nature of the effect (magnitude) which would be experienced by each receptor as a result of the addition of the proposed development to each baseline scenario.

The landscape and visual receptors to be considered in the CLVIA will consist of all the LCTs, designated landscapes, sequential routes and static locations such as viewpoints or settlements assessed in the LVIA as having more than negligible effects.

The susceptibility of receptors may be affected by the presence of other wind energy developments. Some viewers may consider that susceptibility is reduced because other wind farms are 'already there', but for others it may be that sensitivity is increased because more development would be 'too much'. However, to retain a consistent and objective approach, the susceptibility of receptors used for the cumulative assessment is taken to be the same as that identified in the LVIA. The value of the receptor would also remain the same in the cumulative assessment and therefore the overall sensitivity of the receptor is considered to be the same as will be identified in the LVIA.

As in the LVIA, the nature or magnitude of the cumulative effect on landscape and visual receptors considers the size and scale, geographical extent, duration and reversibility of the change likely to result from the addition of the proposed development to the different baseline scenarios. With particular regard to cumulative visual effects, the following additional factors are also considered in determining the magnitude of cumulative visual change from each visual receptor:

- The number of turbine developments visible;
- The prominence of the developments likely to be seen;
- The amount of available view affected;
- The arrangement of turbine developments e.g. developments seen in one direction or in only part of the view, or seen in all directions;
- The relationship of the scale of the turbine developments including size and number of turbines which may also be expressed as the horizontal and vertical angle occupied by turbines;
- The position of the turbine developments in the view e.g. on the skyline, against the backdrop of land;
- The distances from the viewer and between developments;
- The landscape setting, context and separation (or coalescence) of turbine developments;
- Potential screening by land cover such as vegetation and local variations in topography.

As in the LVIA, four main levels of cumulative effect will be used in the CLVIA; Major, moderate, minor and negligible. Three intermediate combinations will also be used; Major/moderate, moderate/minor and minor/negligible. The evaluation of potential effects makes allowance for the use of professional judgement and experience.

Significance of cumulative effects

SNH guidance considers that the concept of a 'threshold of acceptable change' beyond which turbine developments in a particular area become unacceptable, is a crucial element in identifying significant adverse cumulative effects. In other words the effect of the present proposal is limited, but when added to the effect of what has already been permitted, or to new proposals which have been submitted for planning permission, it can become over-dominant in planning terms.

There are varying degrees of cumulative landscape effect. These are as follows:

- Multiple wind farms are seen as separate isolated features within the landscape character type, too infrequent and of insufficient significance to be perceived as a characteristic of the area;
- Multiple wind farms are seen as a key characteristic of the landscape, but not of sufficient dominance to be a defining characteristic of the area;
- Multiple wind farms appear as a dominant characteristic of the area, seeming to define the character type as a 'wind farm landscape' character area; and
- Wind farms cross different character types, reducing the distinction between the different types.

The appropriateness of such effects will depend on the value of a landscape, the objectives for change as defined in local capacity studies and scale of that effect, i.e. whether affecting a local character type or occurring at a regional level.

A significant cumulative landscape effect is considered to be a major or major/moderate landscape effect likely to be when the combination of the multiple wind farms (following the addition of the proposed development) become a dominant characteristic of the area and/or reduces the distinction between different character types and/or transforms/re-defines local or wider baseline landscape character.

A significant cumulative visual effect is considered to be a major or major/moderate visual effect and would result in a view whose composition would be markedly changed.

It should be noted that significant cumulative effects need not be unacceptable or necessarily negative and may be reversible. Each effect is evaluated on its own merit.

Do consultees have any comments on the LVIA and CLVIA methodologies?

10.3.5. Landscape Assessment

The assessment of the levels of effect on the landscape resource will be carried out in the detailed LVIA to be contained in the EIA report and will adopt the following general process:

- Identify and describe the key landscape characteristics of the development site;
- Describe the LCT's and landscape designations identified in the Landscape baseline to represent the wider landscape resource;
- Identify and describe the type of changes which are likely to occur to the development site and wider landscape resource as a result of the construction and operation of the proposed wind farm;
- Describe the extent to which the key characteristics of the development site and the wider landscape resource would be altered in terms of being weakened or strengthened by the introduction of the proposed wind farm;
- Assess the nature of the effect (magnitude) on the development site and wider landscape resource which are likely to result from the introduction of the proposed wind farm, at construction and operational stages.

10.4. Visual Baseline

The assessment of the visual effect of the proposed development considers the effect on visual receptors throughout the study area. These visual receptors comprise the visual baseline.

Visual receptors are people who will be affected by changes in views or visual amenity at different places. They are usually grouped by what they are doing at these places, such as residents. They include people living and working in the area, people who view the proposed development sequentially such as people travelling through the area on road, rail or other forms of transport, people visiting promoted tourist attractions and landscapes and people pursuing other recreational activities.

10.4.1. Zone of Theoretical Visibility Mapping

Computer generated ZTV mapping has been undertaken to assist in determining the likely extent of visibility of the proposed development within the study area and the likely landscape and visual receptors affected by the proposed development. The ZTV (Figure 4) has been undertaken in accordance with the guidance included within 'Visual Representation of Wind farms Good Practice Guidance' Version 2.2 (SNH, 2017).

10.4.2. Viewpoint Locations

A list of viewpoints is requested from South Lanarkshire Council (SLC), Dumfries & Galloway Council (DGC) and SNH for preliminary assessment and further consultation then approval.

The viewpoints selected should represent the views experienced towards the proposed development throughout the study area by various groups of people or receptors. Selected viewpoints should include representative, specific and illustrative views from publicly accessible locations, which are defined as:

- Representative viewpoints: selected to represent the experience of different types of visual receptors, where larger number of viewpoints cannot all be included individually and where the significant effects are unlikely to differ. For example, certain points may be chosen to represent the views of users of particular public footpaths and bridleways.
- Specific viewpoints: chosen because they are key views and sometimes promoted viewpoints within the landscape, including for example scenic viewpoints from roads, specific local visitor attractions, viewpoints in areas that are particularly noteworthy for visual and/or recreational amenity, such as landscapes with statutory landscape designations, or viewpoints with particular cultural landscape associations.
- Illustrative viewpoints: chosen specifically to demonstrate a particular effect or specific issue.

In accordance with recently revised guidance, 'Visual Representation of Windfarms' Version 2.2, (SNH Feb 2017), *'the aim is to choose a range of viewpoints from where there are likely to be significant effects and those that are representative of views within the study area...It is preferable not to include too many viewpoints as this can distract attention from the key significant effects...We therefore encourage all applicants and consultees to further scrutinise the list of viewpoints selected and reduce these where possible.'* (SNH, 2017 paras. 76 & 85).

Computer generated wire-frame visualisations of the proposed development will then be produced for each selected viewpoint to determine the potential view and suitability for EIA. It is suggested that between 10 and 20 viewpoints would be an appropriate quantity.

Following a list of final viewpoints being agreed with SLC, DGC and SNH, photomontage images will then be produced for the EIA. The photography and visualisation images produced in the EIAR will accord with the guidance included in 'Visual Representation of wind farms' Version 2.2 (SNH, 2017).

Aviation Lighting

The proposal for turbines at 170 m to blade tip may require further description and illustration of potential effects of aviation lighting. At time of writing the Civil Aviation Authority (CAA) requires visible red aviation warning lighting at up to 2000 candela for any structure at and greater than 150 m in height. For the proposed turbines, a 2000 candela light would be positioned on the nacelle and 32 candela lights on the tower of each turbine. At time of writing the CAA guidance² for lighting onshore wind turbines allows for the lighting intensity to be reduced to 10% in good visibility conditions and furthermore that the lighting be omni-directional and therefore dim in intensity outside of a 0° - 3° viewing angle. The current guidance is that the lighting would be static and only be operating during night time hours. The above methods mitigate the potential effects of the lighting.

² 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 (01/06/2017)

As a precautionary measure, it is proposed a description of any lighting proposals visible from each selected viewpoint will be included in the viewpoint assessment. A limited number of viewpoints may be illustrated in additional photomontages using photographs taken at dusk.

Consultees are asked to provide a suitable list of representative viewpoints, of which some could be considered for night time use. It is suggested that a total of 20 viewpoints maximum are taken forward to EIA.

10.4.3. Residential receptors

Settlements

Receptors within settlements are assumed to be high sensitivity receptors as the majority of receptors from these areas would be residents. Settlements are generally inward-looking with intervening built structures mostly intercepting views any further than settlement boundaries. This premise has led to the approach for the initial assessment, to only consider those settlements within a study area of 20 km from the proposed development that are identified in the Development Plans for SLC and DGC. Additional smaller settlements/hamlets within a 5 km radius of the proposed development will also be considered in the initial assessment.

Residential Visual Amenity Assessment (RVAA)

The Residential Visual Amenity Assessment (RVAA) will consist of a detailed study of the visibility from individual properties within a 2 km radius of the outer turbine of the proposed development. In the absence of published guidance on the distance from the proposed development that should be adopted for a detailed study of visual amenity from residential properties, a 2 km study area is considered appropriate.

This assessment will focus on the effect on the visual component of residential amenity only and does not consider other components such as noise, dust, shadow flicker etc. The assessments of these effects will be contained in other sections of the EIAR.

For properties considered to experience a high or moderate magnitude of visual change, this assessment will evaluate the potential effects on the visual component of residential amenity or 'living conditions'. The visibility of existing and under construction wind farms considered as scenario 1 cumulative developments will be taken into account as part of the existing visual baseline.

Do consultees have comment on the acceptability of the proposed RVAA study area of 2 km and the general methodology outlined above?

10.4.4. Sequential Receptors

Sequential impacts occur when an observer moves through a landscape along a linear route. This can lead to a series of viewpoints and experiences which may include other developments in addition to the proposed development.

An initial list of routes to assess is requested from SLC and DGC for preliminary assessment following which a final list can be agreed and taken forward to EIA. These may include main 'A' road routes and long distance footpath and cycle routes throughout the study area, 'B' roads and minor roads from within 10 km and from Core Paths to a radius of 5 km from the proposed development. The aim of the initial assessment will be to ascertain which sequential routes have the potential to experience significant visual effects including significant cumulative sequential effects.

Consultees are requested to propose a list of sequential receptors to be included in the detailed LVIA assessment.

10.5. Cumulative Baseline

As detailed above, the difference between LVIA and CLVIA is the different baseline conditions in terms of other wind farm developments. This cumulative baseline is divided into different scenarios that reflect which groups of wind farm developments are assumed to be present in the landscape.

Figure 2 includes other wind farm developments identified in the vicinity of the proposed development.

Do consultees have comment on the information contained in the Cumulative Search Area map, (which is presented to the best of our knowledge at time of writing)?

The Clyde Wind Farm including its extensions and Harestanes and Minnygap Wind Farms are likely to be the primary developments against which cumulative effects will be most relevant. Cumulative assessment of other projects such as North Lowther Energy Initiative will be dependent on their progress through the planning system. At time of writing this project was objected to by Dumfries & Galloway Council.

These most relevant wind farm developments comprise the cumulative baseline (or Cumulative Study Area). As stated in the SNH guidance 'Assessing the Cumulative Effects of Onshore Wind Energy Developments,' (SNH, 2012) *'the key principle for all cumulative impact assessments is to focus on the likely significant effects and in particular those which are likely to influence the outcome of the consenting process'*. (para 33 SNH 2012).

The cumulative baseline identifies those developments it is considered require further cumulative assessment in the detailed CLVIA. These include all operational, consented and valid planning applications within an approximate 10 km radius from the proposed development. Turbines below 50 m are only considered within a 5 km radius, and are scoped out of the LVIA beyond this distance. Potential sequential cumulative visual effects have been identified relating to the Southern Upland Way (SUW) long distance walking route and potential successive cumulative visibility occurs from points along the Southern Upland Way.

Beyond 30 km is considered too distant to present significant cumulative combined and cumulative sequential effects with the proposed development. Such developments are requested to be scoped out of the cumulative baseline.

Do consultees have comments regarding the cumulative baseline?

It should be noted that the cumulative baseline represents the 'maximum development scenario'. It considers the effects of the proposed development in addition to other developments that do not yet exist in the current landscape but which may exist in the future. This results in a high level of uncertainty in the cumulative baseline as not all of the other undetermined proposals will necessarily gain planning approval.

Owing to this uncertainty with regard to the maximum development scenario, the cumulative baseline is split into different scenarios with a decreasing likelihood of becoming operational.

The continually evolving nature of the cumulative baseline requires a reasonable end date beyond which any further changes to the baseline would not need to be considered in the CLVIA. It is suggested a 'cut-off' date of three months prior to the submission of the LVIA and CLVIA be a reasonable timeframe.

Do consultees have comment regarding a reasonable end date of three months prior to the submission of the LVIA and CLVIA after which point any additional sites will not be assessed with the application?

10.5.1. Cumulative assessment

The landscape and visual receptors to be considered in the CLVIA will also consist of relevant landscape character types, designated landscapes, sequential routes and static locations such as viewpoints and settlements.

In the CLVIA, cumulative effects will be reported as the additional effects of the introduction of the proposed development to the different baseline scenarios, over and above the effects identified in the LVIA. For each receptor, it is clarified as to whether the effect has increased or decreased relative to the LVIA assessment or whether the effects will be the same as in the LVIA assessment.

Cumulative wind farms will be shown in the viewpoint visualisations in accordance with SNH good practice guidance (2017). In addition, a ZTV to blade tip height of each wind farm proposal identified in the cumulative baseline will be prepared and then combined with the ZTV of the proposed scheme to create 'paired ZTVs' which illustrate the areas of mutual visibility, i.e. where the proposed scheme and other proposals are both visible from. ZTVs showing the combined visibility of each cumulative baseline scenario will also be prepared to illustrate the total visibility for each scenario.

10.6. Proposed Mitigation

By their nature landscape and visual effects require early consideration of mitigation which is embedded in the design of the proposed development, which has been specifically designed to avoid or to minimise the occurrence of adverse environmental impacts. This has led to a scheme of eleven turbines at varying heights to blade tip to reflect the underlying landform. All effects identified in the final detailed assessment will therefore be 'residual effects'.

11. Ornithology & Ecology

11.1. Introduction

This section provides information on the species and habitats most likely to be present and potentially impacted by the proposed development. This will inform recommendations for further survey work to be undertaken for the baseline, and allow for an EIAR chapter that focusses on important ornithological and ecological features in the context of the proposed development.

The desk study identifies species and habitats known to, or likely to, occur at the site by reviewing publicly available survey data for the study area and its surroundings, and ornithological data from previous surveys carried out by Natural Power during the 2018 bird breeding season (March to August inclusive). We present details of protected habitats and species that may occur on site and/or in the surrounding area, a summary of potential issues concerning protected species at the site and survey recommendations.

11.1.1. Legislation and Guidance

Baseline surveys are being carried out or proposed with reference to a number of national policy documents. Legislative and guidance documents with relevance to ornithology and ecology are listed below:

Legislation

- Directive 2009/147/EC on the Conservation of Wild Birds (the Birds Directive);
- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive);
- The Conservation of Habitats and Species Regulations 2010, which transposes the Habitats Directive into UK law;
- The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2007;
- The Conservation of Habitats and Species (Amendment) Regulations 2012, relating to reserved matters in Scotland;
- Environmental Impact Assessment Directive 85/337/EEC (the EIA Directive);
- Wildlife and Countryside Act 1981 (as amended);
- The Nature Conservation (Scotland) Act 2004;
- The Wildlife and Natural Environment (Scotland) Act 2011; and
- Protection of Badgers Act 1992 (as amended);
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

National Policy Guidance

- Scottish Planning Policy (SPP) (June 2014);
- Planning Advice Note (PAN) 1/2013 – Environmental Impact Assessment (Scottish Government 2013);
- PAN 51: Planning, Environmental Protection and Regulation (revised 2006);
- PAN 60: Planning for Natural Heritage (Scottish Government 2000);
- Planning Circular 3 2011; the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011; and
- Nature Conservation: Implementation in Scotland of the Habitats and Birds Directives: Scottish Executive Circular 6/1995 as amended (June 2000).

Other Guidance

- Guidelines for EclA in the UK and Ireland: Terrestrial, Freshwater and Coastal (CIEEM, 2016**Error! Bookmark not defined.**);
- Recommended bird survey methods to inform impact assessment of onshore wind farms (SNH, 2017³);
- Bird monitoring methods (Gilbert *et al.* 1998⁴);
- Raptors: a field guide to survey and monitoring (3rd edition; Hardey *et al.* 2013⁵);
- Birds and wind farms: risk assessment and mitigation (de Lucas *et al.* 2007⁶);
- Developing field and analytical methods to assess avian collision risk at wind farms (Band *et al.* 2007);
- Windfarms and birds: calculating a theoretical collision risk assuming no avoidance action (SNH, 2000⁷);
- Assessing significance of impacts from onshore windfarms on birds outwith designated areas (SNH, 2006⁸);
- Monitoring the impacts of onshore wind farms on birds (SNH, 2009a⁹);
- Guidance on methods for monitoring bird populations at onshore wind farms (SNH, 2009b¹⁰);
- Use of avoidance rates in the SNH wind farm collision risk model (SNH, 2010¹¹);
- Assessing the cumulative impact of onshore wind energy developments (SNH, 2012¹²);
- Avoidance rates for wintering species of geese in Scotland at onshore wind farms (SNH, 2013a¹³);
- Assessing connectivity with Special Protection Areas (SPAs) (SNH, 2013b¹⁴);
- Avoidance rates for the onshore SNH wind farm collision risk model (SNH, 2016¹⁵);
- British Standard 42020:2013 Biodiversity – code of practice for planning and development;
- Natural Heritage Zone (NHZ) bird population estimates. Scottish Windfarm Bird Steering Group (SWBSG). Commissioned report number 1504 (Wilson *et al.* 2015¹⁶);
- European Protected Species, Development Sites and the Planning System: Interim guidance for local authorities on licensing arrangements¹⁷;
- Land Use Planning System SEPA Guidance Note 4: Planning Guidance on Windfarm Developments¹⁸;

³ SNH. 2017. Recommended bird survey methods to inform impact assessment of onshore wind farms. SNH, Battleby.

⁴ Gilbert, G., Gibbons, D.W. & Evans, J. 1998. Bird Monitoring Methods. RSPB, Sandy.

⁵ Hardey, J., Crick, H., Wenham, C., Riley, H., Etheridge, B. & Thompson, D. 2013. Raptors: A Field Guide For Surveys and Monitoring, 3rd Edition. The Stationery Office. Edinburgh.

⁶ de Lucas, M., Janss, G. & Ferrer, M. (eds.) 2007. Birds and Wind Power. Quercus, Madrid.

⁷ SNH. 2000. Windfarms and birds: calculating a theoretical collision risk assuming no avoidance action. Scottish Natural Heritage, Edinburgh.

⁸ SNH. 2006. Assessing significance of impacts from onshore windfarms on birds outside designated areas. Scottish Natural Heritage, Inverness.

⁹ SNH. 2009a. Monitoring the impact of onshore wind farms on birds (Guidance note). Scottish Natural Heritage, Edinburgh.

¹⁰ SNH. 2009b. Guidance on methods for monitoring bird populations at onshore wind farms. Scottish Natural Heritage, Edinburgh.

¹¹ SNH. 2010. Use of avoidance rates in the SNH wind farm collision risk model. SNH avoidance rate information and guidance note. Scottish Natural Heritage. <http://www.snh.gov.uk/docs/B721137.pdf>

¹² SNH. 2012. Assessing the cumulative impact of onshore wind energy developments. Scottish Natural Heritage, Edinburgh.

¹³ SNH. 2013a. Avoidance rates for wintering species of geese in Scotland at onshore wind farms. Scottish Natural Heritage, Edinburgh.

¹⁴ SNH. 2013b. Assessing connectivity with Special Protection Areas (SPAs) (Guidance note). Scottish Natural Heritage, Edinburgh.

¹⁵ SNH. 2016. Avoidance rates for the onshore SNH wind farm collision risk model. Scottish Natural Heritage, Battleby.

¹⁶ Wilson, M.W., Austin, G.E., Gillings, S. & Wernham, C.V. (2015) Natural Heritage Zone bird population estimates. SWBSG commissioned report number 1504. Pp72. Available from www.swbsg.org

¹⁷ Scottish Executive, 2001 (updated 2006). European protected species, development sites and the planning system: Interim guidance for local authorities on licensing arrangements. Scottish Executive, Edinburgh.

- Good Practice during Wind Farm Construction¹⁹;
- Handbook for Phase 1 habitat survey: a technique for environmental audit²⁰;
- National Vegetation Classification Users' handbook²¹;
- Monitoring the Otter²²;
- Ecology of the European Otter²³;
- The Water Vole Conservation Handbook²⁴;
- Practical Techniques for Surveying and Monitoring Squirrels²⁵;
- Scotland's Wildlife: Badgers and Development.²⁶
- Bats and Onshore Wind Turbines (Version 2)²⁷;
- Bat Surveys: Good Practice Guidelines (2nd Edition)²⁸;
- English Nature's Bat Mitigation Guidelines²⁹;
- Natural England's interim guidance on 'Bats and Onshore Wind Turbines' (Technical Information Note (TIN) 051)³⁰;
- Scottish Biodiversity List (SBL)³¹; and
- East Lothian Local Biodiversity action Plan (LBAP)³².

11.1.2. Site description

The proposed development is located approximately 10 km west of Moffat. The Daer portion of the site is on an area of upland sheep-grazed pasture, bordered to the northwest by Daer Reservoir, to the west by the Crook Burn, and to the north and northeast by the Southern Upland Way. The proposed turbine area is spread over several hills ranging in height from 393 m above ordnance datum (AOD) at Sweetshaw Rig, to 554 m AOD on Whiteside Hill. Rivox is immediately adjacent to the east, in the Forestry Commission Scotland (FCS) Rivox commercial conifer plantation.

¹⁸ SEPA, 2012. Land Use Planning System Guidance Note 4: Planning guidance on windfarm developments. Appendix 2. Version 6: 12 March 2012

¹⁹ Scottish Renewables, SNH, SEPA, Forestry Commission Scotland, 2010. Good practice during windfarm construction

²⁰ JNCC, 2010. Handbook for Phase 1 habitat survey: a technique for environmental audit. JNCC, Peterborough

²¹ Rodwell, J. S. 2006. National Vegetation Classification: Users' handbook. JNCC, Peterborough

²² Chanin, P. 2003. Monitoring the Otter *Lutra lutra*. Conserving Natura 2000 Rivers: Monitoring Series No. 10. English Nature, Peterborough

²³ Chanin, P., 2003. Ecology of the European Otter. Conserving Natura 2000 Rivers Ecology Series No. 10. English Nature, Peterborough.

²⁴ Strachan, R., Moorhouse, T. & Gelling, M., 2011. The Water Vole Conservation Handbook. Third Edition, Wildlife Conservation Research Unit, University of Oxford, Abingdon.

²⁵ Gurnell, J., Lurz, P., McDonald, R., Pepper, H. 2009. Practical Techniques for Surveying and Monitoring Squirrels. Forestry Commission Scotland, Edinburgh

²⁶ SNH, 2001. Scotland's Wildlife: Badgers and Development. SNH, Battleby

²⁷ Walsh, K., Matthews, J. and Raynor, R, 2012. Bats and Wind Turbines Version 2 – June 2012. Natural England, SNH and Countryside Council for Wales

²⁸ Hundt, L. 2012. Bat Surveys: Good Practice Guidelines, 2nd edition. BCT, London

²⁹ English Nature, 2004. Bat Mitigation Guidelines. English Nature

³⁰ Natural England, 2014. Technical Information Note TIN051 Bats and onshore wind turbines interim guidance, 3rd Edition

³¹ The SBL forms a list of species and habitats of importance for biodiversity conservation in Scotland, produced by the Scottish Government

³² East Lothian Council, undated. East Lothian Biodiversity Action Plan 2008 – 2013. Available at: http://www.eastlothian.gov.uk/site/scripts/download_info.php?fileID=1321

Both portions of the site are drained by several burns. Figure 1 shows the location and boundary the development area. The surrounding area comprises the uplands of the Lowther Hills and several medium to large commercial conifer forest plantations. There are also areas of farmland and several scattered towns and small settlements. The nearest major road is the A74(M), which runs approximately north/south, c. 3 km to the east of the site.

11.2. Methods

Desk study data were acquired for protected species that were freely available for commercial use from the National Biodiversity Network (NBN). Searches for species data were limited to data from within the past ten years (2008 to 2018). Searches covered a 5 km buffer around the site boundary for non-avian and a 10 km buffer for avian species.

- Data for protected species were selected under the following lists:
- Scottish Biodiversity List (SBL);
- Local Biodiversity Action Plan (LBAP) for Dumfries and Galloway; and
- British Trust for Ornithology (BTO) Birds of Conservation Concern (BoCC) red and amber listed bird species³³.

Information regarding Designated Sites in the area surrounding Daer and Rivox was obtained using MAGIC online GIS tool³⁴ and Scottish Natural Heritage (SNH) Sitelink³⁵. Data were sought for the following:

- Special Areas of Conservation (SACs) – within 10 km of the proposed site boundary;
- Special Protection Areas (SPAs) – within 10 km of the proposed site boundary (20 km for sites containing geese);
- Sites of Special Scientific Interest (SSSIs) – within 10 km of the proposed site boundary;
- Important Bird Areas (IBAs) – within 10 km of the proposed site boundary;
- Locally designated sites such as Sites of Important Nature Conservation (SINCs) and Sites of Nature Conservation Interest (SNCIs) – within 10 km of the proposed site boundary; and
- Local and National Nature Reserves (including Royal Society for the Protection of Birds and Wildlife Trust Reserves) – within 10 km of the proposed site boundary.

11.2.1. Previous Survey Effort

The proposed development site has been surveyed for ornithological interest by RPS between 2003 and 2011; this has provided context for the bird species known or likely to occur at the site.

Updated ornithology surveys have been carried out on the proposed development site by Natural Power during the 2018 bird breeding season (March to August inclusive), as follows:

- Vantage point surveys;
- Black grouse surveys;
- Breeding raptor surveys;
- Barn owl surveys; and
- Brown and Shepherd³⁶ upland breeding bird surveys.

³³ Eaton, M.A., Brown, A.F., Noble, D.G., Musgrove, A.J., Hearn, R.D., Aebischer, N.J., Gibbons, D.W., Evans, A. & Gregory, R.D. 2015. Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. *British Birds* 102, 296–341

³⁴ <https://magic.defra.gov.uk/>

³⁵ <https://sitelink.nature.scot/home>

³⁶ Brown, A. F. & Shepherd, K. B. 1993. A method for censusing upland breeding waders. *Bird Study* 40, 189-195

Data recorded during the 2018 surveys has been reviewed and species recorded during these surveys have been included in the desk study results. Due to access constraints, all 2018 survey work has been conducted from within the site boundary or publicly accessible places such as roads.

11.3. Results

11.3.1. Designated Sites

No sites designated for ornithological interest were identified within 10 km of the proposed Daer and Rivox Wind Farm, or within 20 km for Special Protection Areas (SPAs) and Ramsar sites with geese as a designated feature.

There are four designated sites within 10 km of the proposed wind farm site which are designated for non-ornithological ecological features; these are summarised in Table 11.1, listed in order of proximity to the proposed development.

Table 11.1: Designated sites within a 5 and 10 km buffer area around the proposed wind farm site.

Site Name	Buffer Area (km)	Site Designation	Designated Features
Shiel Dod	5	SSSI	Upland Habitats, Upland Assemblage
River Tweed	10	SAC/SSSI	SAC Qualifying Interests: River lamprey (<i>Lampetra fluviatilis</i>) Brook lamprey (<i>Lampetra planeri</i>) Otter (<i>Lutra lutra</i>) Sea lamprey (<i>Petromyzon marinus</i>) Atlantic salmon (<i>Salmo salar</i>) Rivers with floating vegetation often dominated by water-crowfoot SSSI Notified Features: Freshwater habitats: Trophic range river/stream Vascular plants: Vascular plant assemblage Freshwater and estuarine fish: Atlantic salmon; Brook lamprey; River lamprey; Sea lamprey. Mammals: Otter Invertebrates: Beetle assemblage; Fly assemblage
Lochwood	10	SSSI	Wood pasture and parkland Purple hairstreak (<i>Neozephyrus quercus</i>), Lichen assemblage
Coshogle Wood	10	SSSI	Woodlands: Upland Oak Woodland

Site designation: SAC: Special Area of Conservation, SSSI: Site of Special Scientific Interest.

The closest of these designated sites, Shiel Dod SSSI, is immediately adjacent to the west of the proposed site boundary, covering 1186 hectares (see Figures 2 and 3). This is the only site designated for ecological features within 5 km of the proposed development, and the upland assemblage for which it is designated includes blanket bog, subalpine dry dwarf-shrub heath, and calcareous types of spring-head, rill and flush, including several notable plant species characteristic of these habitat types. Above 450 m the vegetation displays montane affinities. Where

rock exposures include greywackes, the vegetation has an unusual character reflecting base-enrichment, supporting an interesting flush flora which includes the Nationally Scarce hairy stonecrop *Sedum villosum*.

River Tweed SAC overlaps with the 10 km buffer to the northeast of the proposed development site. However, it is within a different catchment to the proposed development and as such there is no hydrological connectivity to the site.

11.3.2. Ornithological Species

Several protected bird species were recorded on site during baseline survey work in 2018. This included nine Schedule 1³⁷ raptor species, of which one (goshawk, *Accipiter gentilis*) was confirmed to be breeding in the forestry in Rivox (Table 3.2). Several other raptor and gull species were also detected in the proposed wind farm site during the 2018 surveys, as listed in Table 11.2; of these one (common gull, *Larus canus*) was confirmed breeding in a small colony within the Daer portion of the site.

Table 11.2: Raptor and gull species recorded by Natural Power during 2018 breeding season surveys at the proposed Daer and Rivox wind farm. Highlighted species are known to have bred at the site

Common name	Scientific name	Taxon group	No. Records (2018)	Protection Status
Barn owl	<i>Tyto alba</i>	Raptor	2	SBL LBAP Schedule 1 Target spp.
Buzzard	<i>Buteo buteo</i>	Raptor	427	None
Goshawk	<i>Accipiter gentilis</i>	Raptor	46	Schedule 1 Target spp.
Hen harrier	<i>Circus cyaneus</i>	Raptor	11	SBL LBAP BoCC: red Schedule 1 Annex I Target spp.
Kestrel	<i>Falco tinnunculus</i>	Raptor	98	SBL LBAP BoCC: amber Schedule 1
Marsh harrier	<i>Circus aeruginosus</i>	Raptor	2	SBL LBAP BoCC: amber Schedule 1 Annex I Target spp.
Merlin	<i>Falco columbarius</i>	Raptor	9	SBL LBAP BoCC: red

³⁷ Listed on Schedule 1 of the Wildlife & Countryside Act (1981) (as amended).

Common name	Scientific name	Taxon group	No. Records (2018)	Protection Status
				Schedule 1 Annex I Target spp.
Osprey	<i>Pandion haliaetus</i>	Raptor	8	SBL LBAP BoCC: amber Schedule 1 Annex I Target spp.
Peregrine	<i>Falco peregrinus</i>	Raptor	10	SBL LBAP Schedule 1 Annex I Target spp.
Red kite	<i>Milvus milvus</i>	Raptor	46	SBL LBAP Schedule 1 Annex I Target spp.
Sparrowhawk	<i>Accipiter nisus</i>	Raptor	5	None
Raven	<i>Corvus corax</i>	Corvid	147	None
Black-headed gull	<i>Larus ridibundus</i>	Gull	9	SBL LBAP BoCC: amber
Common gull (colony)	<i>Larus canus</i>	Gull	105	BoCC: amber Target spp.
Great black-backed gull	<i>Larus marinus</i>	Gull	8	BoCC: amber
Herring gull	<i>Larus argentatus</i>	Gull	22	SBL LBAP BoCC: red
Lesser black-backed gull	<i>Larus fuscus</i>	Gull	40	BoCC: amber

SBL = Scottish Biodiversity List

LBAP = Species included in Dumfries and Galloway Local Biodiversity Action Plan.

BoCC status; Amber = moderate conservation concern, Red = highest conservation concern; criteria are outlined in Eaton et al³³.

Schedule 1 = Species included on Schedule 1 of the of the Wildlife and Countryside Act 1981 (as amended).

Annex I = Species listed under Annex I of the EC Directive on the Conservation of Wild Birds

Target spp. = Target species in the context of baseline survey work undertaken by Natural Power.

Several species of wader, grouse and wildfowl were recorded on site during the 2018 surveys and from NBN during the desk study. These records are shown in Table 11.3. There were relatively high numbers of curlew,

lapwing, oystercatcher and snipe recorded during VP surveys and Brown & Shepherd surveys; from levels of flight activity recorded during VP surveys it is considered likely that these species nested in open habitats on site in 2018, as did red grouse. Common sandpiper and ringed plover were recorded breeding at the reservoir³⁸. Black grouse were also considered likely to be breeding on site; lekking behaviour was recorded in several locations on Daer during black grouse and VP surveys (Table 11.3).

Several passerine species associated with woodland, forestry and open habitats were recorded on the site during Brown & Shepherd surveys, as shown in Table 11.4. This included one Schedule 1 species, common crossbill, which was believed to be breeding in forestry within the proposed site boundary. Several nightjar records from within 10 km of the site in the last 10 years from Nightjar Breeding Season Surveys In Dumfries And Galloway Between 1981 And 2011 were returned by the data search from NBN. The most recent of these was from 2011.

Table 11.3: Wader, grouse and wildfowl species listed by NBN in wind farm and buffer area for the proposed Daer and Rivox wind farm, and/or recorded by Natural Power during 2018 breeding season ornithology surveys, with number of records. Highlighted species are believed or known to have bred at the site

Common name	Scientific name	Taxon group	NBN Records	Natural Power 2018 Surveys	Protection Status
Black grouse	<i>Tetrao tetrix</i>	Grouse	70	13	SBL LBAP BoCC: red Target spp.
Red grouse	<i>Lagopus lagopus subsp. scotica</i>	Grouse	/	2	SBL BoCC: amber
Common sandpiper	<i>Actitis hypoleucos</i>	Wader	/	1	BoCC: amber Target spp.
Curlew	<i>Numenius arquata</i>	Wader	2	107	SBL LBAP BoCC: red Target spp.
Dunlin	<i>Calidris alpina</i>	Wader	/	1	SBL LBAP Annex I BoCC: amber Target spp.
Golden plover	<i>Pluvialis apricaria</i>	Wader	/	2	SBL LBAP Annex I Target spp.
Green sandpiper	<i>Tringa ochropus</i>	Wader	/	1	SBL BoCC: amber Schedule 1 Target spp.
Greenshank	<i>Tringa nebularia</i>	Wader	/	1	BoCC: amber

³⁸ Note that territory analysis is still to be undertaken and so the current list of likely breeding species is not exhaustive

Common name	Scientific name	Taxon group	NBN Records	Natural Power 2018 Surveys	Protection Status
					Schedule 1 Target spp.
Grey heron	<i>Ardea cinerea</i>	Wader	n/a	7	None
Northern lapwing	<i>Vanellus vanellus</i>	Wader	93	11	SBL LBAP BoCC: red Target spp.
Oystercatcher	<i>Haematopus ostralegus</i>	Wader	/	40	BoCC: amber Target spp.
Redshank	<i>Tringa totanus</i>	Wader	/	3	BoCC: amber Target spp.
Ringed plover	<i>Charadrius hiaticula</i>	Wader	/	3	BoCC: red Target spp.
Snipe	<i>Gallinago gallinago</i>	Wader	/	15	BoCC: amber Target spp.
Goldeneye	<i>Bucephala clangula</i>	Waterfowl	/	1	BoCC: amber Target spp.
Goosander	<i>Mergus Merganser</i>	Waterfowl	n/a	4	Target spp.
Greylag goose	<i>Anser anser</i>	Waterfowl	/	18	BoCC: amber Target spp.
Mallard	<i>Anas platyrhynchos</i>	Waterfowl	/	8	BoCC: amber
Pink-footed goose	<i>Anser brachyrhynchus</i>	Waterfowl	/	1	BoCC: amber Target spp.
Teal	<i>Anas crecca</i>	Waterfowl	/	1	BoCC: amber Target spp.

SBL = Scottish Biodiversity List.

LBAP = Species included in Dumfries and Galloway Local Biodiversity Action Plan.

BoCC status; Amber = moderate conservation concern, Red = highest conservation concern; criteria are outlined in Eaton et al.³³.

Schedule 1 = Species included on Schedule 1 of the of the Wildlife and Countryside Act 1981 (as amended).

Annex I = Species listed under Annex I of the EC Directive on the Conservation of Wild Birds

Target spp. = Target species in the context of baseline survey work undertaken by Natural Power.

Table 11.4: Passerine species listed by NBN in wind farm and buffer area for the proposed Daer and Rivox wind farm, and/or recorded by Natural Power (NP) during 2018 breeding season ornithology surveys. Distance data from the NBN records are only provided for nightjar

Common name	Scientific name	NBN Records	Natural Power 2018 Surveys	Protection Status
Chaffinch	<i>Fringilla coelebs</i>	n/a	Present	None
Common crossbill	<i>Loxia curvirostra</i>	/	Present	Schedule 1
Common starling	<i>Sturnus vulgaris</i>	12	Present	SBL

Common name	Scientific name	NBN Records	Natural Power 2018 Surveys	Protection Status
				BoCC: red
Dipper	<i>Cinclus cinclus</i>	/	Present	BoCC: amber
Dunnock	<i>Prunella modularis</i>	17	Present	BoCC: amber
Grey wagtail	<i>Motacilla cinerea</i>	/	Present	BoCC: red
House martin	<i>Delichon urbicum</i>	/	Present	BoCC: amber
House sparrow	<i>Passer domesticus</i>	28	Not recorded	SBL LBAP BoCC: red
Lesser redpoll	<i>Carduelis cabaret</i>	/	Present	SBL BoCC: red
Linnet	<i>Carduelis cannabina</i>	/	Present	SBL LBAP BoCC: red
Meadow pipit	<i>Anthus pratensis</i>	/	Present	BoCC: amber
Mistle thrush	<i>Turdus viscivorus</i>	/	Present	BoCC: red
Nightjar	<i>Caprimulgus europaeus</i>	59	Not recorded	Annex I SBL LBAP BoCC: amber
Pied wagtail	<i>Motacilla alba</i>	n/a	Present	None
Reed bunting	<i>Emberiza schoeniclus</i>	/	Present	SBL LBAP BoCC: amber
Sand martin	<i>Riparia riparia</i>	n/a	Present	None
Siskin	<i>Carduelis spinus</i>	/	Present	SBL LBAP
Skylark	<i>Alauda arvensis</i>	2	Present	SBL LBAP BoCC: red
Song thrush	<i>Turdus philomelos</i>	1	Not recorded	SBL LBAP BoCC: red
Spotted flycatcher	<i>Muscicapa striata</i>	/	Present	SBL LBAP BoCC: red
Stonechat	<i>Saxicola rubicola</i>	n/a	Present	None
Swallow	<i>Hirundo rustica</i>	n/a	Present	None
Swift	<i>Apus apus</i>	9	Not recorded	SBL LBAP BoCC: amber
Tree sparrow	<i>Passer montanus</i>	1	Not recorded	SBL

Common name	Scientific name	NBN Records	Natural Power 2018 Surveys	Protection Status
				LBAP BoCC: red
Wheatear	<i>Oenanthe oenanthe</i>	n/a	Present	None
Whinchat	<i>Saxicola rubetra</i>	/	Present	BoCC: red
Willow warbler	<i>Phylloscopus trochilus</i>	/	Present	BoCC: amber
Woodpigeon	<i>Columba palumbus</i>	n/a	Present	None
Wren	<i>Troglodytes troglodytes</i>	n/a	Present	None
Yellow wagtail	<i>Motacilla flava</i>	/	Present	SBL BoCC: red

SBL = Scottish Biodiversity List.

LBAP = Species included in Dumfries and Galloway Local Biodiversity Action Plan.

BoCC status; Amber = moderate conservation concern, Red = highest conservation concern; criteria are outlined in Eaton et al.³³.

Schedule 1 = Species included on Schedule 1 of the of the Wildlife and Countryside Act 1981 (as amended).

Annex I = Species listed under Annex I of the EC Directive on the Conservation of Wild Birds

Target spp. = Target species in the context of baseline survey work undertaken by Natural Power.

Table 11.5: Non-avian species records from the proposed Daer and Rivox wind farm and buffer area within the last 10 years, from NBN

Common name	Scientific name	Taxon group	No. Records	Distance from site boundary of most recent record km (year)	Distance from site boundary of closest record km (year)	Protection Status
Pipistrelle	<i>Pipistrellus pipistrellus</i>	Terrestrial mammal - bat	1	2.54 (2008)	2.54 (2008)	SBL LBAP
Red squirrel	<i>Sciurus vulgaris</i>	Terrestrial mammal	33	4.82 (2017)	3.10 (2013)	SBL LBAP
Small pearl-bordered fritillary	<i>Boloria selene</i>	Terrestrial Insect - butterfly	6	4.94 (2010)	4.94 (2010)	SBL LBAP
Small heath	<i>Coenonympha pamphilus</i>	Terrestrial Insect - butterfly	162	4.94 (2015)	4.94 (2015)	SBL
Variable damselfly	<i>Coenagrion pulchellum</i>	Aquatic Insect - damselfly	23	4.38 (2014)	1.19 (2011)	LBAP
River lamprey	<i>Lampetra fluviatilis</i>	Aquatic - Jawless fish	1	0.96 (2009)	0.96 (2009)	SBL LBAP

SBL = Scottish Biodiversity List.

LBAP = Species included in Dumfries and Galloway Local Biodiversity Action Plan.

11.3.3. Protected Non-avian Species and Habitats

No survey work has been undertaken yet for non-ornithological ecological features (species and habitats), and information for these aspects therefore comes solely from NBN.

11.3.3.1. Species

Records from the last 10 years of non-avian protected species returned from the NBN database are described below and outlined in Table 11.5 above.

Red squirrel (*Sciurus vulgaris*) were recorded within 5 km of the proposed wind farm site in 2017 and abundant records of this species were provided by NBN. One protected bat species, pipistrelle (*Pipistrellus pipistrellus*), was recorded within 5 km of the proposed wind farm site; all bat species are listed on Annex IV of the EC Directive of the Conservation of Natural Habitats and of Wild Fauna and Flora, (commonly referred to as the Habitats Directive³⁹) and are therefore designated as European Protected Species (EPS). Both red squirrel and common pipistrelle bat are associated with tree cover and likely to be found in the plantation areas of the site. There were no recent records of otter, pine marten, water vole or badger within 5 km of the proposed development from NBN, but they are likely to be present given the site location and habitats present at the proposed site.

The river lamprey (*Lampetra fluviatilis*), a freshwater fish, migrates up river in order to breed in April/May and was found within 1 km of the proposed wind farm site. This species is a qualifying feature of the River Tweed SAC and SSSI, however the proposed development is in the catchments of the River Clyde and the River Annan, so there is unlikely to be connectivity to the SAC.

The variable damselfly (*Coenagrion pulchellum*) can be found in and near ponds, ditches or slow moving water, and has been found with 2 km of the proposed wind farm site. Two butterfly species were located within 5 km of the proposed wind farm site. Both species are found in open habitats on moorland or grassland.

11.3.3.2. Habitats

The majority of the proposed site comprises three main habitat types, namely upland pasture, commercial non-native plantation forestry and freshwater streams and water bodies. These habitats are associated with several protected non-avian species and habitats, as described above. In addition, there is a likelihood of Groundwater Dependent Terrestrial Ecosystems (GWDTEs) being present on site. GWDTEs have a high level of protection under the Water Framework Directive (WFD), and they must be considered in any construction proposals. There may also be areas of Annex I habitat present, i.e. habitats listed under Annex I of the Habitats Directive³⁹. The most common of these in upland areas comprise upland heathland and blanket bog, both of which are likely to occur in places within the proposed site boundary.

11.4. Proposed Scope of Works (2019)

The requirement for ecological and ornithological survey work at the proposed development is based on species and habitats identified as potentially present within the vicinity of the site during desk-based study and the 2018 ornithology surveys.

Access to areas within Daer was withdrawn due to lambing pressures during late April and early May 2018. Additionally, access to survey buffers outwith the site boundary was not possible during survey work in 2018, so as far as possible buffers were surveyed from within the site boundary and publicly accessible places. It is recommended that access to the full buffers of the site is negotiated for 2019 survey work if possible, but failing this the same methods will be employed as in 2018.

³⁹ Habitats Directive available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992L0043:EN:NOT>

11.4.1. Ornithology surveys

Non-breeding season VP surveys are currently being undertaken at the same locations as used for the 2018 breeding season surveys (see Figure 5), with 36 hours of survey effort being carried out at each VP location between September 2018 and February 2019 (inclusive) in line with SNH guidance³. In addition, a further 36 hours of crepuscular VP surveys, targeted at geese, are being carried out at each VP location during the principal autumn goose migration period (September to November 2018 inclusive) in order to detect high levels of activity of migratory geese over the site, including potential use of the site and adjacent reservoir for roosting and foraging. Results of these surveys will be used to inform the requirement for a repeat of the crepuscular effort during the spring migration period, following discussion with SNH.

Following consultation with SNH which was undertaken in July 2018, a second breeding season of ornithological survey work is also proposed for March to August 2019 (inclusive). Details of the proposed survey work are provided below.

11.4.1.1. Vantage point surveys

SNH guidance³ recommends that ornithological surveys at proposed onshore wind farm sites should focus on protected species and other species of conservation concern, with reference to the following three lists:

- Species listed under Annex I of the EC Directive on the Conservation of Wild Birds, commonly referred to as the Birds Directive
- Species listed under Schedule 1 of the Wildlife & Countryside Act (1981) (as amended)
- Red-listed Birds of Conservation Concern³³

In addition, SNH state that special consideration should be given to the following species lists:

- Species identified as being of local conservation concern: Dumfries and Galloway Local Biodiversity Action Plan (LBAP)
- Any species supported by a site in “a particular concentration”³
- Species listed on the SBL.

Within these lists, SNH recommends that the greatest attention should be paid to those species which, as a result of their flight patterns or response behaviour, may be subject to impact from wind farms (such as raptors) and species that have poor manoeuvrability in flight (such as geese and swans).

Based on these recommendations and the desk study data, Natural Power has identified the following birds as target species for vantage point surveys within the proposed Daer and Rivox development:

- All raptors and owls listed in Annex I of the Birds Directive and/or Schedule 1 of the Wildlife and Countryside Act 1981 (as amended);
- All species of goose, swan and duck species, with the exception of Canada goose (*Branta canadensis*) and mallard (*Anas platyrhynchos*);
- All wader species;
- Nightjar; and
- Black grouse.

Following SNH guidance³, the following secondary species have also been considered:

- All other waterfowl (e.g. mallard and grey heron);
- All other raptor and owl species;
- Gull species;
- Raven; and

- Any large aggregations of red-listed passerines.

11.4.1.2. Upland Breeding Bird Survey

Several breeding wader species have been recorded within the vicinity of the proposed development, and extensive suitable habitat is present. Surveys will determine the upland breeding wader assemblage, following methods detailed in Brown & Shepherd³⁶ and summarised in Gilbert *et al.* (1998)⁴. As is standard for wind farm developments in upland habitats an adapted version of Brown and Shepherd will be used to target other upland breeding bird species such as passerines. All open moorland areas within the proposed Daer and Rivox site boundaries will be surveyed, approaching all areas of the open ground to within 100 m. Should access to the site buffer not be possible, the boundary will be walked in order that 100 m of the buffer outwith the site boundary can be surveyed. Forested areas, including clear-felled and newly planted areas that are unsuitable for breeding waders, shall not be included within the breeding bird survey in 2019.

Breeding bird surveys will be carried out between April and mid-July 2019. In line with SNH guidance³, four survey visits will be carried out with at least seven days between each visit.

11.4.1.3. Breeding Raptor Survey

Several protected raptor species were recorded on site in 2018, with goshawk confirmed as breeding on site. There is suitable habitat present for both forestry- and open ground- breeding raptor species at the proposed development, many of which were observed during baseline survey work in 2018. Breeding raptor surveys will be undertaken within the proposed development (and buffer, access constraints allowing); a combination of short VPs and walkovers will be used to detect displaying or nesting behaviour during the breeding season of goshawk and other raptor species in accordance with methods described in Hardey *et al.* (2013)⁵. Surveys will record all Schedule 1 and Annex I raptor species but with a particular focus on those species recorded during VP surveys, those for which evidence of breeding has previously been recorded in the vicinity (hen harrier, merlin and goshawk), and those for which suitable breeding habitat exists (e.g. short-eared owl). The frequency and distribution of raptor sightings recorded during ongoing VP surveys will also be used to inform the scheduled raptor survey work.

The breeding raptor surveys will begin in March 2019 and will continue until August 2019. All surveys will be carried out by experienced surveyors under a Schedule 1 Licence, to ensure minimising disturbance to breeding birds.

As discussed in Section 11.4 above, access to the recommended buffer of the proposed development site (i.e. 1 km for goshawk, 2 km for other raptor species) has not been possible. Historical records of raptor activity and breeding attempts were not available for this report from publicly accessible sources, it is therefore recommended that historical records for the site and surrounding areas are purchased from the local raptor study group, to provide additional context.

11.4.1.4. Barn Owl Survey

Barn owls are known to be present in the vicinity of the proposed development, and there are several farms and agricultural outbuildings with the potential to be suitable for breeding barn owls. However, no signs of use by barn owl were recorded at any of these buildings, no barn owl breeding behaviour was observed on site, and very few flight observations of this species were recorded during survey work undertaken in 2018. As such, it is proposed to scope out the requirement for a repeat of breeding barn owl surveys in 2019. Should high levels of barn owl activity be detected during other survey work carried out next year, this recommendation may be revised and barn owl survey scoped back in. We would recommend that pre-construction checks of suitable buildings and structures within a 1.5 km buffer of the proposed development is undertaken, to check for any change to baseline conditions.

11.4.1.5. Black Grouse Lek Survey

There is extensive suitable habitat for this species at the proposed development, and a known historical lek site located to the west of Earlside. This area was surveyed 'remotely' from a VP in mid-May 2018 (during the period when access to Daer was withdrawn) in order to determine whether black grouse are still present at this lek site. This was followed by a walkover survey once full access was obtained in mid-May 2018. Lekking black grouse were recorded within Daer, but given constraints to survey access and timing Natural Power would recommend undertaking a further black grouse survey in 2019 following the National Black Grouse Survey Instructions⁴⁰ summarised in Gilbert *et al.*⁴. All suitable black grouse habitat within the site boundary and a 1.5 km buffer (access allowing) would be surveyed during the period March to mid-May. A two to three visit survey approach would be undertaken as follows:

- Visit 1: site visit to assess any previously unsurveyed habitat for black grouse suitability. If no access is possible outwith the site boundaries, this visit may not be necessary;
- Visit 2: areas of suitable habitat with the potential to support lekking black grouse visited twice on different mornings to establish presence/absence; and
- Visit 3: to be undertaken one hour prior to dawn until one hour after. Any locations where black grouse were recorded as present during the second visit would be revisited in order to provide an accurate count of the number of lekking birds present.

Areas of suitable habitat outwith the site to which survey access is not possible will be scanned with binoculars from the boundary, from publicly accessible locations and from suitable vantage points within the site. It is recommended that the local biological records centre is also contacted to provide data they hold for the protected species, including black grouse, in the buffer of the site.

11.4.1.6. Nightjar Survey

Nightjar are afforded the highest level of statutory protection via inclusion in Annex I of the Council Directive 2009/147/EC on the Conservation of Wild Birds (Birds Directive). All Annex I species are the subject of special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution. The desk-based study returned 59 NBN records of this species within 10 km of the proposed development within the last 10 years. Given this, and the occurrence of potentially suitable breeding habitat within the site (particularly Rivox), it is considered prudent to undertake nightjar surveys during the 2019 breeding season. The requirement for this, and detailed methods, would be discussed and agreed with SNH, but outline methods are summarised below.

Three survey visits would be undertaken within all suitable habitat (including clearfell, young forestry plantations and lowland heath) from June until mid-July, undertaken at dusk (22:00-23.30 BST in June) or an hour before dawn (02:00-04:00 BST). According to methods described in Gilbert *et al.*⁴, surveyors would not attempt to count more than 80 ha of suitable habitat at a time (equivalent to slightly less than 1 km square marked on an Ordnance Survey (OS) map). Surveys would be undertaken in suitable weather conditions, avoiding surveying in winds greater than Beaufort force 3. Dry, drizzly and humid conditions are all suitable for undertaking surveys for this species.

Due to sensitivity concerns, the records from NBN are only free available at a 10 km grid square resolution. It is recommended that the local biological records centre is also contacted to provide data they hold for the protected species, including nightjar, within the proposed development site and buffer in order to give more precise location information for this species.

⁴⁰ Etheridge, B & Baines, D (1995) Instructions for the Black Grouse Survey 1995/6: a joint RSPB/GCT/JNCC/SNH project. Unpublished

Do consultees have any comment with regard to the proposed baseline non-breeding and breeding season ornithological survey programme?

11.4.2. Non-avian Surveys

11.4.2.1. Extended Phase 1 Habitat Survey

An extended Phase 1 habitat survey of the proposed development will be required, following the standard habitat survey method described in the Handbook for Phase 1 Habitat Survey: a technique for environmental audit²⁰. This survey would aim to characterise the habitats present on site, and to identify any habitats of significant conservation value and/or protected plant species. During the extended Phase 1 habitat survey, the surveyor would also assess habitat suitability to support protected species, including bird, mammal and herptile species, which may inform the requirement for further species-specific survey work.

11.4.2.2. National Vegetation Classification (NVC) survey

National Vegetation Classification (NVC) survey is recommended to provide more detailed information regarding protected habitats on site, this is particularly important in the context of peat forming habitats and GWDTE. There is a requirement under the Water Framework Directive to carry out assessment to carry out assessment of the likely impacts of development on habitats which are dependent on groundwater, in line with SEPA LUPS guidance¹⁸. The potential for groundwater dependency is initially identified via NVC survey. GWDTE need consideration within 250 m of excavations greater than 1 m deep, and as such survey will be carried out within a 300 m buffer of the proposed development area to allow for a micro-siting buffer of 50 m. Surveys will be undertaken following the standard survey method as described in the National Vegetation Classification Users' Handbook²¹.

11.4.2.3. Protected Terrestrial Mammals

Records were returned for red squirrel, a species that is increasing and spreading in range in southern Scotland, and as such habitat suitability for this species within the Rivox plantation will be determined during an extended Phase 1 habitat survey. Species-specific surveys will be undertaken for red squirrel should suitable habitat or field evidence of this species be recorded during the extended Phase 1 habitat survey.

There were no records of otter and water vole from within the site boundary or surrounding area in the last 10 years provided by NBN. However, several watercourses of varying sizes run through the proposed development and the site is border by Daer Reservoir at the northwest, and so there is the potential for both species to be present, In addition, otter is a qualifying interest of the nearby River Tweed SAC. As such, surveys for otter are required in order to provide detailed information regarding the status of this protected mammal species; signs of water vole will be surveyed for at the same time. Surveys would follow standard methods as described in Chanin²² and Strachan *et al.*²⁴. The survey area would encompass all suitable otter and water vole habitat (i.e. all watercourses and the edge of water bodies) located within a 250 m buffer of the proposed development (access permitting). Surveys would be carried out between May and September, when water levels are less variable and when water vole breeding territories are established and likely to be marked by latrines.

There were no records of badger and pine marten from within the site boundary or surrounding area in the last 10 years provided by NBN, however suitable habitat for these species is present within the proposed Daer & Rivox Wind Farm. Surveys for badger and pine marten would be required to provide detailed information regarding the status of these protected mammal species at the proposed development. All suitable habitat within the proposed Daer & Rivox Wind Farm and extending out to a 150 m buffer from the site boundary would be surveyed for badger, and within a 250 m buffer for pine marten (access permitting). Surveys for badger can be undertaken any time of year, but badger signs will be less visible when vegetation is at its height in late summer. Surveys for

badger and pine marten consist of searches for field signs and sett/den searches, as described in Neal & Cheeseman (1996)⁴¹, Bang & Dahlstrøm (2001)⁴² and Sargent *et al.* (2003)⁴³, amongst other sources. DNA typing of potential pine marten scats is recommended to confirm species identity, as there is overlap in the size and morphology with scats of other species⁴⁴.

11.4.2.4. Bats

There is an NBN record of common pipistrelle from the vicinity of the proposed development, and many areas of habitat present with the potential to support bat species (e.g. sheltered woodland edge, watercourses and standing waterbodies, farm buildings and pasture). The following survey programme is accordingly based on the requirement for medium risk sites. Should survey work during the early part of the season indicate it is appropriate, the requirement may be reduced to that for low risk sites following consultation with, and agreement by, SNH.

It is proposed that a bat roost survey coupled with activity surveys using static detectors are undertaken between April and September, as summarised below, in order to determine the level of bat activity. Bat surveys would be based on standard Natural England³⁰ and Bat Conservation Trust (BCT) guidance²⁸. The BCT survey guidance is currently being updated and it is our understanding that transect survey work is no longer required, as such we have not proposed these; transect surveys will be scoped back in if required. The requirement for static detector survey effort is based on our understanding of this new, as yet unpublished, guidance.

- **Bat roost survey:** There are buildings within the proposed development site with the potential to support roosting bats. A ground-based assessment of buildings, trees and other structures within 200 m of the proposed development (access permitting) would be required to determine suitability to support roosting bats and to identify whether additional emergence/return surveys are required. In addition surveyors would search for any other potential bat roost structures (e.g. mine shafts, bridges) which may be present.
- **Fixed position recording static detector surveys:** remote recording devices (e.g. Anabat bat detectors) should be utilised to record bat activity during the active season (April to September). It is anticipated that for a 15 turbine layout, 11 to 12 detectors would be required, each surveyed for a minimum period of 10 nights per month. Consideration will also be given to carrying out activity surveys 'at height'.

11.4.2.5. Electrofishing and Freshwater Macro-Invertebrate Surveys

The site is drained by several burns, including Crook Burn to the west which feeds in Daer Reservoir, and Cloffin Burn in Rivox which drains into the Evan Water to the East. Although the River Tweed SAC is within 10 km of the proposed development, there is no hydrological connectivity with this site as the proposed development is not sited within the catchment of the River Tweed. As such, it is not considered that baseline aquatic surveys are required for this site.

If the proposed development is developed, it is proposed that a programme of aquatic ecological monitoring agreed with the relevant consultees (including SNH and the local Fishery Board) would be undertaken in the post-consent phase and monitoring would continue throughout the construction and post-construction phases in order to protect the hydrological environment. This monitoring would include water quality monitoring, electrofishing surveys and macro-invertebrate surveys.

⁴¹ Neal, E. & Cheeseman, C. 1996. Badgers. Poyser Natural History, London.

⁴² Bang, P. & Dahlstrøm, P. 2001. Animal Tracks and Signs. Oxford University Press, Oxford.

⁴³ Sargent, G., Morris, P. and Troughton, G. 2003. How to Find and Identify Mammals, 3rd Edition. The Mammal Society, Southampton.

⁴⁴ Davison, A., Birks, J.D.S., Brookes, R.C, Braithwaite, T.C. & Messenger, J.E. 2002. On the origin of faeces: morphological versus molecular methods for surveying rare carnivores from their scats. *Journal of Zoology*, 257: 141-143.

Do consultees have any comment with regard to the proposed baseline non-avian ecology survey programme?

11.5. Conclusion and recommendations

The proposed development site is likely to support a wide range of protected species and habitats, including:

- Schedule 1 / Annex I raptors;
- Black grouse;
- Waders and wildfowl;
- Protected terrestrial mammals;
- Bats;
- Annex I habitats and GWDTEs; and,
- Possible breeding nightjar.

The main ecological issues at the proposed development, and cumulatively with other developments in the surrounding area, are likely to be as follows:

- Disturbance to breeding/foraging Schedule 1 / Annex I raptors, such as hen harrier, goshawk and merlin (and potentially peregrine, red kite, osprey and owl species);
- Collision risk to Schedule 1 / Annex I raptors;
- Disturbance to black grouse;
- Collision risk to black grouse;
- Disturbance to breeding wader species, particularly golden plover, snipe and curlew;
- Collision risk to breeding wader species;
- Possible disturbance to breeding nightjar;
- Hydrological impacts on Annex I habitat (particularly upland heathland and blanket bog) and on GWDTEs;
- Impacts on otter, badger and potentially pine marten (particularly disturbance);
- Impacts on bat species (disturbance to roosts); and
- Collision risk to bat species.

Do consultees have any comment with regard to the features and potential effects identified as likely to require consideration for the proposed development?

Based on the results of the desk-based study and the survey work undertaken to date, the following survey work is proposed for 2019.

- Breeding season VP survey;
- Black grouse survey;
- Breeding raptor survey;
- Brown & Shepherd upland breeding bird survey;
- Breeding nightjar survey;

- Phase 1 Habitat survey extended for protected species (such as red squirrels and herptiles), which may warrant further survey;
- NVC survey provide more detailed habitat information and to identify habitats of significant conservation concern;
- Badger and pine marten survey;
- Otter and water vole survey;
- Bat walkover survey to identify the potential for the site to support roosting bats; and
- Bat static detector surveys to monitor bat activity across the site;

It is also recommended that third party organisations such as the local biological records centre and raptor study group are contacted to request any records they hold for the proposed development and appropriate buffers.

12. Hydrology, Geology and Hydrogeology

12.1. Introduction

As noted previously, the intention of this Scoping report is to provide the competent authority and its advisors with information (where it currently exists) on the likely impacts of the project on individual receptors and important features. This will allow for an EIAR that focusses on only those aspects of the proposed development that are likely to have a significant impact on known hydrological, geological and hydrogeological receptors, as well as those receptors that are currently unknown.

As part of the EIA, a Hydrological, Geological and Hydrogeological Impact Assessment will be undertaken on those receptors that are likely to experience a **significant impact** from the construction, operation and decommissioning of the project.

The proposed development is adjacent to Daer Reservoir, a Scottish Water asset. The Applicant, E.ON, has experience of working with Scottish Water on similar projects such as Afton Wind Farm which was proposed adjacent to Afton Reservoir and has since been consented and constructed. Similar methodologies employed to successfully protect the water environment at Afton would be used as appropriate at the proposed development.

12.2. Embedded Mitigation and Layout Iterations

The design of the proposed development to date has avoided known impacts on hydrological receptors as far as possible (embedded mitigation). Throughout the remainder of the EIA process and following further survey work and feedback from the consultation process, it may be that the layout presented here in the Scoping Report, further develops. Should the layout change from now to the application, it should be noted that the layout presented within this scoping report represents a 'worst case scenario' from the development, and therefore generally any amendments to the design will not increase the likelihood of a significant impact. Should any changes occur that are likely to have a significant impact on the receptor these will be included within the EIA. If the changes are not likely to have a significant impact, these will first be discussed with the relevant consultees, to ensure that they too are in agreement with the applicant's understanding and before excluding them from the EIA.

Refer to Section 8 for further general information about embedded mitigation.

12.2.1. Mitigation by Design

A series of buffer distances have been adopted to help reduce effects of the proposed development on the hydrological environment. A 50 m buffer has been implemented for all identified natural hydrological features. Infrastructure will be located outwith this buffer except where access necessitates.

Watercourse crossings associated with the new access track required as part of the proposed development will be minimised as far as practicable.

12.2.2. Good Practice Mitigation

Mitigation will follow the well-established principles of industry good practice so as to prevent or minimise effects on the surface and groundwater environment. The following good practice principles will be included as part of the embedded mitigation:

- *Drainage* – all runoff derived from works associated with the proposed development will not be allowed to directly enter the natural drainage network. All runoff will be adequately treated via a suitably designed drainage scheme with appropriate sediment and pollution management measures. The proposed development is situated in an upland hydrological area and it is imperative that the drainage infrastructure is designed to accommodate storm flows based on a 1 in 200 year event + climate change to help maintain the existing hydrological regime.

- *Storage* – all soil/peat stockpiles as well as equipment, materials and chemicals will be stored well away from any watercourses. Chemical, fuel and oil stores will be sited on impervious bases with a secured bund. No fuels, chemicals or oils would be stored in the catchment of the Daer Reservoir.
- *Vehicles and Refuelling* – standing machinery will have drip trays placed underneath to prevent oil and fuel leaks causing pollution. Where practicable, refuelling of vehicles and machinery will be carried out in designated areas, on an impermeable surface, and well away from any watercourse.
- *Maintenance* – only emergency maintenance to construction plant will be carried out within the Planning Application Boundary, in designated areas, on an impermeable surface well away from any watercourse or drainage, unless vehicles have broken down necessitating maintenance at the point of breakdown, where special precautions will be taken.
- *Welfare Facilities* – on-site welfare facilities will be adequately designed and maintained to ensure all sewage is disposed of appropriately. This may take the form of a soakaway or tankering and off-site disposal depending on the suitability of the site for a soakaway and only with prior agreement with SEPA.
- *Cement and Concrete* – fresh concrete and cement are very alkaline and corrosive and can be lethal to aquatic life. The use of wet concrete in and around watercourses will be avoided and carefully controlled.
- *Monitoring Plan* – all activities undertaken as part of the proposed development will be monitored throughout the construction phase. Such monitoring will be to ensure environmental compliance.
- *Contingency Plans* – plans will ensure that emergency equipment is available on site i.e. spill kits and absorbent materials, advice on action to be taken and who should be informed in the event of a pollution incident.
- *Training* – All relevant staff personnel will be trained in both normal operating and emergency procedures, and be made aware of highly sensitive areas on site.

Further details on specific mitigation requirements will be provided as part of the EIA. This is likely to include the preparation of a site specific Construction Environmental Management Plan (CEMP) as well as associated appendices, including but not limited to, a peat slide risk assessment, a peat management plan, a watercourse crossing assessment and hydrological monitoring plan. Under the Water Environment (Miscellaneous) (Scotland) Regulations 2017, amendments were made to the Controlled Activities Regulations (CAR) and the proposed development will require a construction site licence for water management across the entirety of the wind farm site prior to any construction works taking place, including enabling works. No work will be able to commence on site until a Pollution Prevention Plan (PPP) has been prepared and agreed with Scottish Environment Protection Agency (SEPA).

12.3. Legislation and Guidance

12.3.1. International Legislation and Policy

The assessment takes into account the requirements of the Water Framework Directive (2000/60/EC) (WFD). The WFD aims to protect and enhance the quality of surface freshwater (including lakes, rivers and streams), groundwater, groundwater dependent terrestrial ecosystems (GWDTE), estuaries and coastal waters. The key objectives of the WFD relevant to this assessment are:

- To prevent deterioration and enhance aquatic ecosystems; and
- To establish a framework of protection of surface freshwater and groundwater.

The WFD resulted in The Water Environment and Water Services (Scotland) Act 2003, which gave Scottish Ministers powers to introduce regulatory controls over water activities in order to protect, improve and promote sustainable use of Scotland's water environment. These regulatory controls, in the form of The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) or CAR, made it an offence to undertake the following activities without a CAR authorisation:

- Discharges to all wetlands, surface waters and groundwaters;

- Disposal to land;
- Abstractions from all wetlands, surface waters and groundwaters;
- Impoundments (dams and weirs) of rivers, lochs, wetlands and transitional waters; and
- Engineering works in inland waters and wetlands.

12.3.2. National & Regional Legislation and Policy

The assessment takes into account the following legislation and policy:

- The Water Environment and Water Services (Scotland) Act 2003;
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended);
- Flood Risk Management (Scotland) Act 2009;
- The Water Supply (Water Quality) (Scotland) Regulations 2001;
- Private Water Supplies (Scotland) Regulations 2006;
- Part IIa of the Environment Protection Act 1990;
- Waste Management Licensing Regulations 1994;
- Pollution Prevention and Control Regulations (Scotland 2000); and
- Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.
- Scottish Planning Policy (2014);
- Land Use Planning System (LUPS) Guidance Note 4: Planning Guidance on Onshore Windfarm Developments;
- LUPS Guidance Note 31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems; and
- SEPA Policies:
 - No. 19 Groundwater Protection Policy for Scotland;
 - No. 22 Flood Risk Assessment Strategy;
 - No. 41 Development at Risk of Flooding: Advice and Consultation;
 - No. 54 Land Protection Policy; and
 - No. 61 Control of Priority & Dangerous Substances & Specific Pollutants in the Water Environment.

12.3.3. Other Guidance and Best Practice

Table 12.2 lists other key guidance and best practice documentation relevant to assessment.

Table 12.1: Guidance and Best Practice

TOPIC	SOURCE OF INFORMATION
Scottish Government Planning Advice Notes (PAN's)	<p>PAN 50: Controlling the Environmental Effects of Surface Mineral Workings</p> <p>PAN 51 Planning, Environmental Protection and Regulation</p> <p>PAN 1/2013 Environmental Impact Assessment</p> <p>PAN 61 Planning and Sustainable Urban Drainage Systems</p> <p>PAN 79 Water and Drainage</p>
SEPA Guidance for Pollution Prevention (GPP's) and Pollution Prevention Guidelines (PPG's)	<p>PPG1 General Guide to the Prevention of Water Pollution</p> <p>GPP2: Above Ground Oil Storage Tanks</p> <p>GPP4 Treatment and Disposal of Wastewater Where there is no Connection to the Public Foul Sewer</p> <p>GPP5: Works and maintenance in or near water</p> <p>PPG6 Working at Construction and Demolition Sites</p> <p>PPG 7: Safe Storage - The Safe Operation of Refuelling Facilities;</p> <p>GPP 8: Safe Storage and Disposal of Used Oils GPP 13: Vehicle Washing and Cleaning;</p> <p>GPP 21: Pollution Incident Response Planning;</p> <p>GPP 22: Dealing with Spills; and</p> <p>PPG 26 Safe Storage - Drums and Intermediate Bulk Containers.</p>
SEPA Position Statements (Published)	<p>WAT-PS-06-02 Culverting of Watercourses</p> <p>WAT-PS-07-02 Bank Protection</p> <p>WAT SG- 78 Sediment Management Authorisation</p>
Construction Industry Research and Information Association (CIRIA)	<p>CIRIA C692 Environmental Good Practice on Site (third edition)</p> <p>CIRIA C753 The SuDS Manual</p> <p>CIRIA C532 Control of Water Pollution from Construction Sites</p> <p>CIRIA C648 Control of Water Pollution from Linear Construction Projects</p> <p>CIRIA C689 Culvert Design and Operation Guide</p>
Other Guidelines	<p>Scottish Renewables Joint Publication, (2015) Good Practice During Wind Farm Construction Version 3FCE, SNH, (2010), Floating Roads on Peat</p> <p>Scottish Renewables, Joint Publication (2012), Development of Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste</p> <p>SEPA, The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended), A Practical Guide, Version 7.5, May 2017</p> <p>River Crossings and Migratory Fish: Design Guidance, A Consultation Paper, The Scottish Executive</p> <p>WAT-SG-23: SEPA (2008), Engineering in the Water Environment, Good Practice Guide - Bank Protection Rivers and Lochs, First Edition</p> <p>WAT-SG-25: SEPA (2010), Engineering in the Water Environment, Good Practice Guide, River Crossings, Second Edition</p> <p>WAT-SG-26: SEPA (2010), Engineering in the Water Environment, Good</p>

TOPIC**SOURCE OF INFORMATION**

[Practice Guide, Sediment Management](#), First Edition

WAT-SG-31: SEPA, (2006) Special Requirements for Civil Engineering Contracts for the Prevention of Pollution, Version 2

12.4. Desk Based Studies

The following sections summarises the work that has been undertaken to inform the details presented in this scoping report.

12.4.1. Surface Water Hydrology

The general position of the proposed windfarm atop hills east of Daer Reservoir means that it's straddled across two main hydrological networks, Daer Water (River Clyde) and Evan Water (River Annan). There are eight main burns which supply these networks situated in and around the proposed development area.

These catchments along with the additional detail taken from the Flood Estimation Handbook (FEH) CD ROM are summarised below.

Table 12.2: Summary of catchments within the potential development area

Catchment Name	Downstream Network Name	AREA /km ²	ALTBAR /mAOD	BFI HOST	SAAR mm yr-1
Cloffin Burn	Annan	4.54	367	0.351	1,708
Crook Burn	Clyde	8.84	477	0.291	1,893
Daer Water	Clyde	18.6	515	0.351	1,900
Garpol Water	Annan	7.76	341	0.315	1,679
Grey Burn	Annan	4.26	380	0.375	1,656
Kinnel Water	Annan	3.7	447	0.341	1,848
Sweetshaw Burn	Clyde	2.27	440	0.344	1,668
White Burn	Clyde	7.35	424	0.297	1,788

Source: Data collected from a combination of Ordnance Survey mapping and also FEH Web Service. ALTBAR – Average Altitude in the catchment, BFI HOST – Base Flow Index (0 [low] to 1[high]), SAAR – Standard Annual Average Rainfall.

The catchments situated in and around the proposed development area are typical of the type of upland watersheds within Southern Uplands, being high in altitude with a correspondingly high average rainfall volume.

Base Flow Index (BFI) data for the site catchments was also taken from the FEH Web Service. The BFI is a measure of the proportion of a catchment's long-term runoff that derives from stored sources, with the BFI ranging from 0.1 in relatively impermeable clay catchments to 0.99 in highly permeable catchments.

12.4.1.1. Daer Reservoir and Upper Clyde Catchments

The Daer and upper Clyde catchments drain northwards down Clydesdale. Within close proximity to the proposed development area, the watershed is split from numerous smaller catchments, all of which feed directly into the Daer Reservoir. Of these, the catchments which could be potentially impacted by the construction, operation and decommissioning of the proposed development include, Daer Water, Crook Burn, White Burn (incorporating Sheil Burn) and the Sweetshaw Burn.

The Daer Reservoir itself is designated as a Drinking Water Protection Zone. In addition to this designation the Daer Water falls within the protection area for Freshwater Fish.

12.4.1.2. Upper Annan Catchments

The upper Annan catchments drain south down Annandale discharging into the Solway Firth. Within the proposed development area, the watercourses which supply this network are again divided into a number of smaller catchments discharging east through a forestry plantation. This includes the Cloffin Burn, Garpol Water, Grey Burn and Kinnel Water.

12.4.2. Water Quality

A number of watercourses within the vicinity of the option area have been classified under SEPA's River Basin Management Plans (RBMP) (SEPA 2011). The RBMP are one of the requirements of the Water Framework Directive (WFD) (2000/60/EC) and are the plans designed for protecting and improving the water environment. The details of the watercourses within the Development that are classified under the RBMP classification scheme are provided below.

Table 12.3: RBMP classification of watercourses in the vicinity of the option area

River	2008 Ecological Status	Current & Targeted Ecological Status (in line with first, second and third RBMP cycles)		
		2015	2021	2027
Daer Water	Good	Good	Good	Good
Cloffin Burn	Good	Poor	Good	Good
Garpool Water	Good	Moderate	Good	Good
Kinnel Water	Good	Poor	Good	Good

12.4.3. Designated Areas

There is one designated site within 5 km of the proposed development's site boundary. This is the Shiel Dod Site of Special Scientific Interest (SSSI). Between 5 km and 10 km there are a number of further SSSI sites, some of which are also designated as Special Areas of Conservation (SAC). These are: the Carron Water and Hapland Burn SSSI, the River Tweed SSSI and SAC, the Lochwood SSSI, the Coshogle Wood SSSI and lastly the Moffat hills SSSI and SAC.

There are no other designated sites within 10 km of the site.

Table 12.4: Summary of international and national designated sites of relevance to hydrology located within 5 km of the proposed development

Designation	Site name	Qualifying features	Distance to site boundary
SSSI	Shiel Dod	This SSSI is designated for its upland assemblage. This includes blanket bog, subalpine dry dwarf-shrub heath, and calcareous types of spring-head, rill and flush. Its blanket bog is notable for the occurrence of extensive areas of <i>Rubus chamaemorus</i> . Above 450 metres the vegetation displays montane affinities. There are also small areas of calcareous grassland which support such species as quaking-grass <i>Danthonia decumbens</i> and <i>Thymus polytrichus</i> . The base-rich cleughs also support flush flora which	Borders directly (situated to the south east of the proposed development)

Designation	Site name	Qualifying features	Distance to site boundary
		includes the Nationally Scarce <i>Sedum villosum</i> . The calcareous habitat types are likely to be Ground Water Dependent Terrestrial Ecosystem (GWDTE).	
SSSI	Carron Water and Hapland Burn	This site is noted by its natural geological features, namely its igneous petrology and stratigraphy.	Approximately 6 km
SAC, SSI	River Tweed	These SAC and SSI designations are due to the importance of this area's freshwater habitats, and fish species. The Tweed and its tributaries are of high conservation and ecological value, containing a range of vascular plants, freshwater and estuarine fish, mammals and invertebrates. This includes the presence of River lamprey (<i>Lampetra fluviatilis</i>), Brook lamprey (<i>Lampetra planeri</i>), Otter (<i>Lutra lutra</i>), Sea lamprey (<i>Petromyzon marinus</i>) and Atlantic salmon (<i>Salmo salar</i>)	Approximately 6.5 km
SSSI	Lochwood	Lochwood is an area of old parkland oakwood of a type rare in the Scottish Lowlands. This SSSI is designated for its wood pasture and parkland as well as the presence of the Butterflies such as the Purple hairstreak <i>Neozephyrus quercus</i> , its invertebrate communities and its lichen assemblage, some of which is unique to Scotland Lochwood is an area of old parkland oakwood of a type rare in the Scottish lowlands.	Approximately 8 km
SSSI	Coshogle Wood	This designated area is notified for its acid-neutral, sessile oak dominated woodland. This is found on steep valley sides and is one of the best examples in upper Nithsdale.	Approximately 9.5 km
SAC, SSI	Moffat Hills	Here the SAC and SSI designations are due to geological and biological features found within the area. Many of the Moffat hills (a massif of Silurian greywackes often rising above 750 m) show evidence of past glaciation, including a multitude of notable glacial features. The vegetation includes alpine and boreal heaths, dry heaths, blanket bog, tall herb communities plants in crevices on base-rich rocks, acid rocks and scree. There are also siliceous	Approximately 10 km

Designation	Site name	Qualifying features	Distance to site boundary
		alpine and boreal grasslands.	

12.4.4. Flood Risk

The Flood Risk Management (Scotland) Act 2009 sets in place a statutory framework for delivering a sustainable and risk-based approach to managing flooding.

Flood information provided by SEPA indicates that within the proposed development area there is a risk from flooding in the Daer Water, Crook and Cloffin catchments (less than 0.5% [1 in 200] chance of flooding each year). This risk is mainly associated with fluvial flooding and appears to be most significant on areas of level ground in the riparian zones and in the base of the corries. There is also a minor surface water flood risk (pluvial) within the forested areas, however these again appear to be constrained to areas of flat or level ground.

A full flood risk assessment will be undertaken as part of the planning application. The assessment will be carried out in accordance with Scottish Planning Policy (SPP). The document states that *“Planning authorities must take the probability of flooding from all sources – (coastal, fluvial (watercourse), pluvial (surface water), groundwater, sewers and blocked culverts) and the risks involved into account when preparing development plans and determining planning applications.”*

12.4.5. Soils and Peat

Peat is a soft to very soft, highly compressible, highly porous organic material that can consist of up to 90 – 95% water, with 5 – 10% solid material⁴⁵. Unmodified peat consists of two layers; a surface acrotelm which is usually 10 – 30 cm thick, highly permeable and receptive to rainfall. Decomposition of organic matter within the acrotelm occurs aerobically and rapidly. The acrotelm generally has a high proportion of fibrous material and often forms a crust in dry conditions.

A second layer, or catotelm, lies beneath the acrotelm and forms a stable colloidal substance which is generally impermeable. As a result the catotelm usually remains saturated with little groundwater flow. Peat is thixotropic, meaning that the viscosity of the material decreases when stress is applied. The thixotropic nature of peat may be considered less important where the peat has been modified through artificial drainage or natural erosion and is drier, but will be significant when the peat body is saturated.

The distribution of soils across the site is dependent upon land use, geology, topography and hydrological regime of the area. Information on the site soils has been provided by the James Hutton Institute, specifically from its online soil information for Scottish soils (SIFSS) portal.

Table 12.5: Summary of Soil Types

Soil Association	Parent Material	Component Soils
Ettrick (soil mapping units - 218, 219, 220, 229, 230, 232,233)	Drifts derived from Lower Paleozoic greywackes and shales	Peaty gleys with peaty gleyed podzols with dystrophic blanket peat Peaty gleys with dystrophic semi-confined peat Dystrophic blanket peat with peaty gleys Peaty gleyed podzols Peaty gleyed podzols with peaty gleys Brown earths with noncalcareous gleys Noncalcareous gleys with peaty gleys respectively

⁴⁵ J. Warburton, J. Holden and A.J.Mills, (2004), Hydrological controls of surficial mass movements in peat, Earth-Science Reviews, 67, 139 – 156

Soil Association	Parent Material	Component Soils
Organic Soils (soil mapping unit 4)	Organic deposits	Dystrophic blanket peat

The above soils information indicates that gleys, peaty podzols and peat is present in the area occupied by the proposed development. Site survey work would be needed to confirm the presence and depth of peat on site. The completion of such works will support the completion of the EIA and associated technical appendices.

12.4.6. Bedrock Geology

According to the 1:50,000 scale British Geological Survey (BGS) Bedrock Geology Sheet, the site is underlain by an assemblage of sedimentary bedrocks dating from the Silurian Period. The eastern part of the site around the Cloffin Burn and Grey Burns' are dominated by units of Sandstone, Mudstone and Conglomerate from the Queensberry Formation, which is likely to be at least 100 m in vertical thickness but may be substantially more. On the western end of the site closer to the Daer Reservoir the bedrock geology is that of the Gala Unit 4, which is comprised of highly indurated wacke deposits and are likely to be very similar in character to the to the Queenberry Formation. The depth of the Gala Unit 4 may be in excess of ~1500 m. It is likely that there will be an extensive zone of highly fractured, weathered bedrock in the near surface.

There are no apparent registered geologically derived Sites of Special Scientific Importance within the site boundary or with a 500 m buffer.

12.4.7. Superficial Geology

According to the 1:50,000 scale BGS Superficial Drift Sheet the solid bedrock is likely to be overlain by an assemblage or post glacial quaternary deposits comprising of sands, gravels, clays and also areas of peat. It appears that the majority of these deposits are mapped to be within the confines of the valley bottoms and sides with no deposits mapped to be on the hill tops themselves. It is anticipated the general succession of facies is likely to be a layer of peat underlain by more recent alluvial sediments such as sands and gravels, then glacially derived sands and gravels which may also have a clay matrix.

12.5. Hydrogeology

According to the 1:625,000 scale BGS Hydrogeology Sheet the site is underlain by a low productivity aquifer with limited resource potential. This is on account of both the Queensberry Formation and the Gala Unit 4 bedrock being highly indurated and consequently very low in permeability. Notwithstanding, the aquifer underlying the majority of the site, Upper Clyde, is classified by SEPA as being in 'Poor' condition on account of the historic mining and quarrying of materials in the area. The adjacent Annerdale aquifer is classed as being in 'good' condition. The Annerdale bedrock aquifer is also classified as a Drinking Water Protection Zone.

Given the low porosity of the underlying bedrock, it is possible that groundwater may exist within the weathered zone in fractures, or in superficial sands and gravel deposits. The volume of water and its corresponding transmissivity will be a primary function of the materials porosity derived from the content of clays and silts. Since most of these deposits are mapped to be around watercourses it is likely these locations may well support perched aquifers, supplying baseflow to some of the catchments. These may also support species and be considered as groundwater dependant terrestrial ecosystems (GWDTE).

13. Population and Human Health

A requirement of the EIA Regulations is to consider potential effects upon population and human health. These have typically been assessed in the past but under different headings and are now brought together under the same umbrella. Issues considered under this topic include:

- Noise
- Shadow Flicker
- Ice Throw
- Lightning
- Private Water Supplies
- Socio-economics

13.1. Noise

As part of the EIA, a noise assessment will be undertaken by a suitably experienced and qualified noise consultant.

Noise and vibration will occur during the construction, operation and de-commissioning of the proposed development. The extent to which this is significant depends on the noise sources, in each case, and the distance of each of the noise sources to noise sensitive receptors.

Noise sensitive receptors in this case are considered to be residential properties (those identified at this stage are noted on Figure 3. During the construction and de-commissioning phases, the effects can be divided into noise and vibration from on-site activities and from construction traffic accessing the site. During operation, noise is generated by the turbines as they rotate with noise output depending on wind speed. Vehicle movements during operation (for maintenance for example) can be considered insignificant in terms of noise impact due to the relatively small number of movements of primarily smaller vehicles. For on-site construction noise and operational noise at different wind speeds, the levels received at residential properties will depend on wind direction.

The site location is rural and remote and residential properties around the site are likely to be free of any noise of human origin except for road noise from the A74(M) and B7076 as well as occasional air traffic and operation of forestry and farm machinery. Any road noise as well as noise relating to forestry is more likely to be significant for properties to the east of the proposed development. Such other noise as there is, is likely to be from animals and birds and from wind around trees and foliage, depending on wind speed.

13.1.1. Planning Policy and Guidance on Noise Issues

The principal planning guidance on noise is contained in Planning Advice Note (PAN) 1/2011, *Planning and Noise*, which contains advice on assessment of noise from new sources as well as the effects of noise on new residential development. For construction noise it refers to the Control of Pollution Act and the Pollution and Prevention Control Act 1999 for relevant installations. The accompanying Technical Advice Note, *Assessment of Noise*, lists BS 5228, *Noise and Vibration Control on Construction and Open Sites* as being applicable for Environmental Impact Assessment (EIA) and planning purposes. In respect of operational noise from wind farms, PAN 1/2011 refers to 'web based planning advice' on renewables technologies⁴⁶ which in turn refers to ETSU-R-97, *The Assessment and Rating of Noise from Wind Farms* (ETSU-R-97), as the appropriate method for assessment of operational noise. Additional guidance on assessment of operational noise is contained in the UK Institute of Acoustics (IOA) document *Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating*

46 <http://www.gov.scot/Resource/0045/00451413.pdf> (last updated 28 May 2014)

of *Wind Turbine Noise* (GPG) which has been endorsed by the Cabinet Secretary for Finance, Employment and Sustainable Growth of the Scottish Government.

13.1.2. Assessment Methodology

13.1.2.1. Construction Noise

On-site construction noise is temporary and would be managed under best practice applicable at the time. If deemed to be required by the local planning authority, a suitably worded planning condition can be imposed to restrict working hours in order to protect residential amenity. It is therefore suggested that construction noise can be **scoped out**.

13.1.2.2. Operational Noise

Operational noise will be assessed according to the requirements of ETSU-R-97 as clarified and refined by the UK IOA GPG. The ETSU-R-97 methodology sets noise limits for the day and night-time periods by carrying out measurements of baseline/background noise and wind speed and deriving 'prevailing'⁴⁷ background noise levels from the results, with limits set at 5 dB above this subject to lower limiting values which are different for day and night periods or where properties are deemed to be 'financially involved' with the development.

Can consultees construction noise to be scoped out of EIA?

13.2. Shadow Flicker

The EIAR will also assess the potential effect of shadow flicker associated with the proposed development.

Standard guidance⁴⁸ states that shadow flicker occurs within ten rotor diameters of the turbine, and that effects only occur within 130 degrees either side of north relative to the turbines. Beyond these limits it is considered that potential impacts associated with shadow flicker will not be significant.

There are currently eight potential residential properties identified near to the site boundary. An assessment will be undertaken to predict any shadow flicker effects that could be experienced and appropriate mitigation will be proposed if required.

13.3. Ice Throw

Ice throw is the process of ice falling or being launched from the blades of a turbine. As imbedded mitigation, the turbines will have sensors on them to detect the build-up of ice and automatically prevent the turbines spinning when ice has developed on them, thus preventing the ice being thrown. Scottish Government's Onshore Wind Farm Advice Sheet states that danger to human or animal life from falling parts or ice is rare. Ice throw will **not** be assessed in the EIA.

13.4. Lightning

As stated in Scottish Government's Onshore Wind Farm Advice Sheet, the danger to human or animal life from lightning strike via a turbine is rare since lightning is directed down the turbine to the earth. Maintenance of the

⁴⁷ The results of a polynomial regression line through a plot of individual 10 minute measurements of noise against wind speed.

⁴⁸ Available online: <http://www.scotland.gov.uk/Resource/0040/00405870.pdf> (last accessed 16/10/2018)

turbines would not be undertaken during high lightning risk weather conditions. Lightning will **not** be assessed in the EIA.

13.5. Water Supply

The Hydrology chapter of the EIAR will present the relevant hydrological assessment. It will inform a brief assessment upon human health in the Population and Human Health chapter of the EIAR.

13.5.1. Private Water Supplies

Several private water supplies (PWS) have been identified within close proximity to the proposed development. Increased sediment erosion as a result of wind farm construction, operation and decommissioning can have significant impacts on the quality, quantity and continuity of water supply to the properties. Potential effects will be assessed in the EIAR and appropriate mitigation would be proposed.

13.5.2. Public Water Supplies

Daer Reservoir (operated by Scottish Water) has been identified to be on the western periphery of the site boundary, with many of the watersheds situated within the site discharging into its catchment. The applicant would consult with Scottish Water during the EIA process to ensure this asset remains safeguarded.

13.6. Socio-Economic Assessment

13.6.1. Introduction

Consideration of sustainable economic development has become a cornerstone of government policy and a key driver of the planning system in recent years. The underlying socio-economic wellbeing of an area is also itself a driver in terms of population change. The EIA will therefore include a socio-economic assessment to ensure the balance between economic, social and environmental effects can be properly assessed.

A report issued by BiGGAR Economics⁴⁹ in 2016 concludes that there is *no relationship between the development of onshore wind farms and tourism employment at the level of the Scottish economy, at local authority level nor in the areas immediately surrounding wind farm development*. It is intended to scope out any specific assessment of tourism from the EIA.

13.6.2. Methodology

Instead we propose that the socio-economic assessment would be based upon 3 economic boundaries (local, regional and national economy) will include the following:

- assess the existing economic environment using official data on population, industrial structure, unemployment and economic activity levels, income and earnings;
- assess the potential economic effects during the development and construction phase of the project including direct employment, supplier effects and income effects;
- assess the potential economic effects during the operation of the wind farm including direct employment, supplier effects and income effects;
- assess the economic affects arising from infrastructure improvements and potential community benefits; and
- consider and report on mitigation and management measures which could be employed to minimise any negative impacts and maximise potential positive impacts.

49 Available online: <http://www.bigbareconomics.co.uk/wp-content/uploads/2016/07/Research-Report-on-Wind-Farms-and-Tourism-in-Scotland-July-16.pdf> (last accessed 16/10/2018)

13.6.3. Analysis

As part of the proposed socio-economic assessment, the social and economic effects associated with the proposed development will be identified. Information potentially contained in this section may include the following:

- Direct and supply chain impacts.
- The total amounts predicted to be spent in terms of construction and operation.
- Predicted numbers of jobs supported in the operational phase.
- Predicted spending on accommodation & local businesses – details of accommodation stayed in by construction workers.
- Environmental benefits - electricity generated annually (MWh).
- Case studies of particular businesses – details of Scottish based Tier 1 suppliers.
- Investment in transport infrastructure – details of any investments that have been made.

This analysis will help inform the prediction of the likely social and economic effects associated with the proposed development.

14. Cultural Heritage

14.1. Introduction

As part of the EIA, a Cultural Heritage Assessment will be undertaken by a suitable qualified consultant. The assessment will be conducted with reference to the relevant statutory and planning frameworks for cultural heritage. Legislation includes:

- The Ancient Monuments and Archaeological Areas Act 1979;
- The Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997;
- The Town and Country Planning (General Development Procedure) (Scotland) Order 1992; and,
- The Electricity Act 1989 (Schedule 9).

The primary planning policy and guidance comprises: Historic Environment Scotland Policy Statement (HESPS), Scottish Planning Policy (SPP) and PAN 2/2011 at the national level; and, ClydePlan Strategic Development Plan and the SLC and DGC Development Plans at the local level.

14.2. Scope of Works

The objectives of the assessment will be to:

- Assess the proposed development area and its environs in terms of its archaeological potential;
- Identify archaeological sites and monuments present within the proposed development area and its environs through desk-based assessment and site visits where appropriate;
- Consider the potential effect of the construction and operation of the proposed development on the cultural heritage resource; and,
- Propose measures, where appropriate, to mitigate any adverse effects.

The assessment will be undertaken in accordance with the Chartered Institute for Archaeologists (CIfA) code of conduct, standards and guidance. Principal methods employed for the assessment will be:

- Consultation with Historic Environment Scotland and with relevant Council Archaeology Services: South Lanarkshire and Dumfries and Galloway Council;
- Archival and documentary research; and,

- Walk-over field survey and site visits.

14.3. Methodology

The desk-based assessment will include reference to the following sources:

- South Lanarkshire Council and DGC Historic Environment Record (HER): to acquire a digital database extract in GIS for all assets within the development area.
- Historic Environment Scotland Spatial Data Warehouse: for up-to-date data on the locations and extents of Scheduled Monuments, Listed Buildings, Conservation Areas, Inventory status Garden and Designed Landscapes and Inventory status Historic Battlefields within 10 km of the proposed development.
- The Historic Environment Scotland database (Canmore): for any information additional to that contained in the HER.
- Relevant bibliographic references: to provide background and historic information (including: Statistical Accounts of Scotland and any relevant sources referenced in the HER entries).
- Map Library of the National Library of Scotland: for Ordnance Survey maps and other historical map resources.
- Historic Land-Use Assessment Data for Scotland (HLAMap): for information on the historic land use character of the Proposed Development Area and identification of potential historic landscapes.
- Scottish Palaeoecological Archive Database (SPAD) (Coles et al. 1998): for information on possible sites with palaeoenvironmental and palaeoecological potential.

A walk-over reconnaissance field survey will be carried out to record the locations of known heritage assets and identify any other, hitherto unrecorded assets.

Cultural heritage assets whose settings could be significantly affected by the proposed development will be visited.

The effects of the proposed development on cultural heritage assets will be assessed on the basis of their type (direct effects, effects on setting and cumulative effects). The assessment will take into account the relative sensitivity of the assets, which will be determined according to the relative weight which statute and policy attach to them, principally as published in SPP and HESPS. The assessment will include:

- Identification of on-site constraints and provision of recommendations for design mitigation;
- Assessment of magnitude and significance of effects of the proposed development on any identified site;
- Mitigation measures designed to prevent, reduce or offset significant adverse effects, if required; and
- Recommendations for post-consent works, if required.

Potential visualisation viewpoints for the assessment of potentially significant impacts on the settings of cultural heritage assets (including cumulative impacts) will be agreed, through consultation, with Historic Environment Scotland (HES) and with the SLC and DGC Archaeology Services.

A preliminary list of potential cultural heritage viewpoints is requested from HES, SLC and DGC for consideration and agreement.

15. Traffic and Transport

Initial site feasibility studies have been undertaken to determine the transport route to site. A number of options have been discounted and others are being further investigated. One such potential route for transport to site is as follows:

- M74 on to A702;
- Southbound on the A702 to Watermeetings;
- Minor road from Watermeetings to site.

This potential access route from the M74 is illustrated in Figure 1. The preferred route to site which will be applied for shall be presented and assessed in the EIAR. Common to all options is the port of entry at KGV Docks in Glasgow.

An assessment of traffic and transport will consider:

- Baseline conditions on the adjacent public highways including suitability for construction traffic, estimated or recorded current traffic flows of ordinary and HGV traffic and identification of bottlenecks;
- Traffic movements generated during construction, operation and decommissioning, need for road improvements and/or traffic management;
- Magnitude and significance of impact of traffic movements and traffic management; and
- Management or mitigation measures, as applicable.

The assessment of the safety aspects of the construction, operation and decommissioning of the proposed development will consider the health and safety of construction workers and risks to safety of members of the general public. South Lanarkshire Council and Dumfries and Galloway Council will be consulted with regard to the location of any hazardous sites within the vicinity of the proposed development.

Where these are not considered significant or effects can be limited through embedded mitigation including adherence to a Traffic Management Plan, then further detailed assessment will be scoped out.

16. Forestry

16.1. Introduction

This section sets out the approach which would be used to integrate the proposed development into the existing woodland structure, should the forested Rivox land be developed. A Wind Farm Forest Design Plan would be prepared, which would detail felling and replanting proposals, illustrating the forestry requirements associated with the construction and operation of the proposed development.

Part of the site (towards the east) is located in an area with extensive commercial woodlands. The forests are Forestry Commission owned and managed. They consist primarily of areas of commercial conifers at various states of felling.

In the UK there is a strong presumption against permanent deforestation unless it addresses other environmental concerns. In Scotland, this felling is dealt with under the Scottish Government's "Control of Woodland Removal Policy" (FCS 2009)⁵⁰. The purpose of the policy is to provide direction for decisions on woodland removal in Scotland. The requirements of the policy will be addressed within the EIA and reported in the EIAR.

⁵⁰ Forestry Commission Scotland (2009). The Scottish Government's Policy on Control of Woodland Removal. Edinburgh.

16.2. Consultation

The main forestry consultee is Forestry Commission Scotland (FCS), South Scotland Conservancy as this is the conservancy in which the areas of commercial forestry within the site fall. However the western portion of the site is found in the Forestry Commission's Central Scotland Conservancy. Consultation would be welcomed to ensure that the proposed changes to the woodlands are appropriate and address the requirements of the Control of Woodland Removal Policy and other guidance. In addition there may be interrelated issues raised by other consultees e.g. SEPA on forestry residues, which would be addressed within the forestry assessment.

16.3. Legislation and Guidance

The forestry proposals will be prepared in accordance with the current industry best practice and guidance including, but not limited to:

- Forestry Commission (2011). The UK Forestry Standard: The Government's Approach to Sustainable Forestry, Forestry Commission, Edinburgh.
- Forestry Commission (2011): The UK Forestry Standard Guidelines. Edinburgh.
- Forestry Commission Scotland (2009). The Scottish Government's Policy on Control of Woodland Removal. Edinburgh.
- Forestry Commission Scotland (2015): Guidance to Forestry Commission Scotland staff on implementing the Scottish Government's Policy on Control of Woodland Removal.
- The Scottish Government (2006). The Scottish Forestry Strategy. Edinburgh.
- The Scottish Government (2011). Scottish Land Use Strategy. Edinburgh.
- The Scottish Government (2012): Waste (Scotland) Regulations 2012.
- The Scottish Government (2014a). Scotland's Third National Planning Framework (NPF3). Edinburgh.
- The Scottish Government (2014b). Scottish Planning Policy. Edinburgh
- SEPA (2013): SEPA Guidance Notes WST-G-027 "Management of Forestry Waste".
- SEPA (2014): LUPS-GU27 "Use of Trees Cleared to Facilitate Development of Afforested Land.
- UKWAS (2012). The UK Woodland Assurance Standard Third Edition, UKWAS, Edinburgh.

16.4. Methodology

Commercial forests are dynamic and constantly changing through landowner activities, market forces and natural events such as windblow or pest and diseases. Commercial forestry is therefore not being regarded as a receptor for a formal impact assessment. Instead it would be a factual assessment describing the changes to the forest structure resulting from the incorporation of the wind farm into the forest. This would include the changes to, for example, the woodland composition and felling programmes. The effects of forest felling and restocking would be assessed in the relevant chapters of the EIAR including Ornithology; Landscape and Visual; Hydrology, Geology and Hydrogeology; Ecology; and Traffic and Transport.

The forestry baseline will describe the crops existing at the time of preparation of the EIAR. This would include current species; the planting year; felling and restocking plans; and other relevant woodland information. It would be prepared from existing forest records; desk based assessments; site visits; and aerial photographs.

There is potential for changes to the forest structure resulting from the proposed development, with consequential implications for the wider felling and restocking plans across the forest area. Areas of woodland may need to be felled for the construction and operation of the proposed development including access tracks, turbine locations and other infrastructure. The potential effects would be changes to the structure of the woodlands, which may result in a loss of woodland area. This would be addressed through a redesign of the existing forest including, for example, the use of designed open space; alternative woodland types; changing the management intensity; or the

provision of compensation planting on an alternative site. The changes to the forests for a particular development are regarded as site specific and it is considered that there are no cumulative forestry issues to be addressed.

The principal output would be the preparation of the Wind Farm Forest Design Plan. This would include a felling plan to show which woodlands are to be felled and when they are to be felled during the life of the proposed development. It would further include a restocking plan showing which woodlands are to be replanted and when during the life of the proposed development. The changes to the woodland structure would be analysed and described including changes to species composition, age class structure, timber production, traffic movements and the felling and restocking plans.

The resulting changes to the woodland structure and any requirement for compensation planting to mitigate against any woodland loss would be considered in the context of the Control of Woodland Removal Policy and in consultation with FCS.

The integration of the proposed development in to the forest design plan will be a key part of the development process. Should felling be required and compensatory planting needed as a result this can be enforced through a planning condition should the eventual application be consented. As part of the condition discharge process, FCS would be consulted.

17. Existing Infrastructure & Aviation

This section of the EIAR will assess the potential impact on any existing infrastructure in the vicinity of the proposed development. The approach to the assessment will be to consult with statutory undertakers and other relevant organisations to ascertain if the proposed development will have an impact on their services and if so, what mitigation if any will be necessary. In this respect, the EIA will consider:

- Civil aviation.
- Military interests including aviation, radar and Eskdalemuir seismic array.
- Water, gas and power.
- Existing footpaths including Public Rights of Way and Southern Upland Way.
- Microwave fixed links.
- Telecoms.

The proposed development is located on land belonging to Scottish Water and the Applicant will be liaising closely with this stakeholder to minimise effects upon its infrastructure and disruption to its services.

The locations of all footpaths have been considered during the iterative design process. During construction these will be appropriately managed for health and safety reasons.

18. Synergistic Effects and Summary of Mitigation and Residual Effects

This section will present the synergistic effects associated with the proposed development. Such effects are those which are a result of the combination of independent impacts such as landscape & visual impacts and noise impacts. The resulting synergistic effect in this example is related to population and human health which this chapter will assess. Climate change is also a topic which can be impacted directly by a project and in turn also affect other topics. The proposed development is anticipated to have a positive effect on climate change and Met Office data may be used to help in this assessment.

The chapter will identify all mitigation, including the mitigation by design that will be undertaken to reduce any adverse effects and summarise the residual effects regarding all of the proposed work in relation to the construction, operation and decommissioning of the proposed development.

19. EIAR Accompanying Documents

19.1. Non-Technical Summary (NTS)

The NTS details the main components of the proposed development and summarises the main findings of the environmental studies carried out to build and operate the proposed development. It is designed to be an easily readable document that will communicate the main elements of the EIA to any interested party without the need for the reader to have specialist background knowledge. It will also contain maps that show the extent and geographical location of the development.

19.2. Planning, Design & Access Statement (PDAS)

A PDAS may be produced and would seek to highlight the design principles and concepts behind the proposed development. It would detail how the developer has applied these principles to the proposed development in tandem with input from consultation activities and would review how successful the proposed development has been in realising the design strategy.

The PDAS will also provide a commentary of the EIA findings and assess the proposed development accounting for residual effects (both positive and negative) against national policy and legislation, the Development Plan and other material planning considerations relevant to the proposed development.

19.3. Pre-Application Consultation (PAC) Report

Although not a statutory requirement for applications submitted under Section 36 of the Electricity Act 1989, the applicant intends to submit a PAC Report to accompany the application.

It is proposed that the legislation and best practice guidance in relation to public consultation for Major Developments will be broadly followed as contained in PAN 3/2010 - Community Engagement - Planning with People.

The PAC report would:

- outline the scope of the consultation programme including when and who has been consulted;
- confirm how the consultation programme meets the best practice standards;
- set out how the applicant has responded to the comments made, including whether and the extent to which the proposals have changed as a result of PAC;
- provide documentary evidence that the planned consultation programme has taken place e.g. copies of advertisements of the public events and reference to display materials and records of response from such events;
- demonstrate that steps were taken to explain the nature of PAC i.e. that it does not replace the application process whereby representations can be made to the planning authority; and
- make an assessment of the success of the Pre-application Consultation activities.

20. Responding to this Scoping Report

This document has been prepared by Natural Power on behalf of E.ON in anticipation of an application under Section 36 of the Electricity Act 1989 for a wind farm adjacent to Daer Reservoir in South Lanarkshire and Dumfries and Galloway.

Consultee responses to this report should be directed to the Energy Consents Unit which will form a Scoping Opinion. The Applicant will welcome such response to inform the scope of EIA to be undertaken for the proposed development and further consultation to be undertaken with each consultee as the EIA progresses.

Appendices

A. Figure List

- Figure 1 – Site Layout and Location (IFS ref: 1181596 A, map ref: GB200492_M_052)
- Figure 2 – Regional Context (IFS ref: 1181598 A, map ref: GB200492_M_054)
- Figure 3 – Site Constraints (IFS ref: 1181597 A, map ref: GB200492_M_053)
- Figure 4 – ZTV (IFS ref: 1182371 A, map ref: GB200492_M_055)
- Figure 5 – Vantage Points (IFS ref: 1172659 B, map ref: GB200492_M_050)

What we do

- Leading independent renewable energy consultancy
- Analysis, engineering, planning & permitting, environmental, project management and due diligence services
- Onshore wind, offshore renewables, solar, hydro, renewable heat and grid & infrastructure
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Our global expertise

Natural Power delivers services and operates assets globally for our clients, with eleven offices across Europe and North America and agencies active in South America and Asia Pacific.

UK & Ireland

Registered Office, Scotland
The Greenhouse
Forrest Estate, Dalry
Castle Douglas, DG7 3XS
SCOTLAND, UK

Stirling, Scotland
Ochil House
Springkerse Business Park
Stirling, FK7 7XE
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