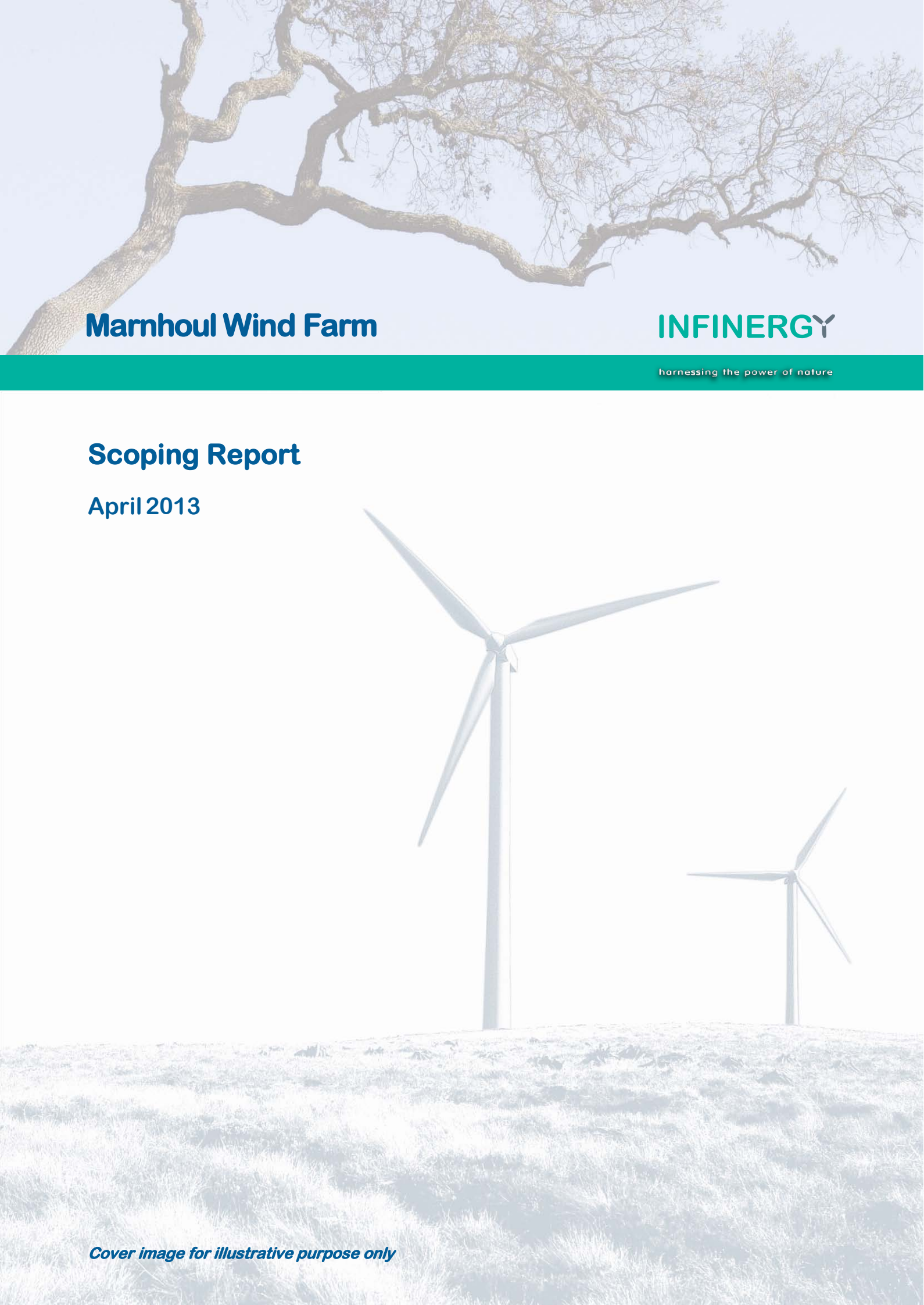
Marnhoul Wind Farm

INFINERGY

harnessing the power of nature

Scoping Report

April 2013



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INFINERGY

Marnhoul Wind Farm

Scoping Report

Developer

Co-ordinating consultant

Contributing consultants

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INTRODUCTION

Purpose of the Scoping Report

1.1. This report constitutes the request for a Scoping Opinion for a proposed wind farm on land at Marnhoul (the "Development"), approximately 7.5 km east of New Galloway, Dumfries and Galloway. The site encompasses approximately 222 hectares (ha) within an upland rural area dominated by forestry plantation. The location is shown in Figure 1: Site Location in Appendix A. This Scoping Request has been prepared by Arcus Consultancy Services Ltd ("Arcus") on behalf of Infinergy Ltd ("the Applicant").

1.2. It is intended that an application for planning permission for the Development will be made under the Town and Country Planning (Scotland) Act 1997 (as amended) and it is anticipated that this application will require an Environmental Impact Assessment ("EIA") under Schedule 2 of the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011 ("the EIA Regulations"). The findings of the EIA will be presented within an Environmental Statement ("ES") which will accompany the planning application.

1.3. The aim of the Scoping process is to identify key environmental issues at any early stage, to help determine which elements of the proposal are likely to cause significant environmental effects and identify issues that can be 'scoped out' of the assessment. This Scoping Request has been prepared with a view to providing structure for consultation on the approach to EIA and the work required for preparation of the ES. Comments are invited from consultees listed and any other interested parties.

The Applicant

1.4. Infinergy is a renewable energy organisation with a strong focus on onshore wind development. The company possesses in-house expertise along with the experience needed to design, develop, build and operate wind energy schemes.

1.5. Infinergy believes wind energy has an important role to play in reducing the combined threats of decreasing energy security, climate change and energy poverty, all of which have been identified by successive governments as key issues facing the energy supply of the United Kingdom (UK). In response to these threats the UK has committed to renewable energy targets to ensure that 15% of energy is derived from renewable sources by 2020 (DECC 2009).

1.6. When developing a wind energy scheme Infinergy aims to put the right sized wind farm in the right place, whilst in close consultation with statutory consultees and local communities. This approach allows Infinergy to consistently design wind developments that are sympathetic

to local landscapes while maximising operational efficiency and hence energy output.

1.7. Infinergy is a member of the trade organisations Renewable UK (formerly known as BWEA) and Scottish Renewables. The company has offices in Wimborne (Dorset) and Inverness in Scotland. For more information please visit http://www.infinergy.co.uk.

ENVIRONMENTAL IMPACT ASSESSMENT

2.1. EIA is a legal requirement for certain types of development. In assessing the EIA requirement for wind turbine developments, the decision on whether or not an EIA is required is delegated to local authorities. The EIA is an iterative process of assessment and design, whereby prediction and assessment of effects will inform the eventual design of the proposal. The proposal can then be refined in order to avoid or reduce potential environmental effects where necessary.

2.2. The ES, which reports the findings of the EIA as set out in the EIA Regulations, is required to "describe the likely significant effects" of a development; effects that are not considered significant do not need to be described to meet the requirements of the EIA Regulations.

2.3. EIA is a process, which identifies the potential environmental effects of a development and then seeks to avoid, reduce or offset any adverse effects through 'mitigation measures'. EIA follows a series of stages:

- Site selection and feasibility;
- Screening - is an EIA required;
- Pre application consultation and scoping;
- Baseline studies to establish the current environmental conditions at the site;
- Identification of potential environmental effects;
- Mitigation to avoid or reduce the effects through iterative design process;
- Assessment of residual effects;
- Preparation of an ES;
- Submission of the ES;
- Consideration of application and environmental information by Dumfries and Galloway Council and consultees;
- Determination of application (with or without conditions); and, if approved
- Implementation and monitoring.

2.4. In reality EIA is an iterative process of assessment and design, during which prediction and assessment of potential effects will inform the evolving design of the Development. Consultation, a vital component of the EIA process, continues throughout each stage and contributes both to the identification of potential effects and mitigation measures.

PROJECT DESCRIPTION

3.1. The site infrastructure required will include:

- Wind turbines and turbine foundations:
- Access tracks and crane pads;
- On site power collection system (transformers and underground cables);
- Substation building; and
- Permanent meteorological mast.

Turbines

3.2. The proposed details are as follows:

- Number of turbines — Up to 16
- Maximum height to blade tip[1] — 146.5 metres (m)
- Maximum generating capacity (per turbine) — Between 2 and 3 MW
- Total generation capacity — Between 32 and 48 MW

3.3. It is yet to be determined how the existing forestry will be managed to accommodate the wind farm. Turbines with dimensions of up to 146.5m tip height are being considered to ensure there is adequate separation between the lower rotor swept height (i.e. the bottom of the blades) and the tops of trees to maximise the generating potential of the turbines.

3.4. An indicative turbine layout is shown in Figure 2: Preliminary Site Layout of Appendix A.

3.5. For the purposes of the EIA, a precautionary approach will be taken and the largest prospective turbine will be assessed as the selected option. This allows a worst case scenario to be evaluated, for example, during both the collision risk modelling and landscape and visual assessment.

3.6. Sufficient wind speeds are required on site for turbines to be economically viable, and after consultation with NOABL wind speed data[2] it has shown that average wind speeds are good for a wind energy development, shown in Table 3.1.

Table 3.1 Averaged NOABL Wind Speed Data for Site

Height Above Ground (m)	Wind Speed (m / s)
45	7.6 – 8.2
25	7.0 – 7.7
10	6.3 – 7.1

[1] The exact turbine specifications vary between turbine manufacturers however; the maximum height to blade tip will not exceed 146.5 m
[2] Available online at http://www.rensmart.com/Weather/BERR

3.7. More detailed study of the available wind resource will be undertaken at the site which will also be used to determine an appropriate turbine type.

Access Tracks

3.8. The turbine components would be delivered to the site using the existing road network. The use of public roads will require consultation with the appropriate bodies and an "abnormal load" assessment will be undertaken to demonstrate the availability of a suitable route.

3.9. An initial site visit and route inspection suggests that turbine components could be delivered to site from the Port of Ayr via the A77, A713 and finally the A712. However, a detailed abnormal loads assessment will be undertaken to determine the most suitable route of turbine delivery to the site. The traffic assessment would determine any requirements for upgrading of junctions or minor roads and would include swept path diagrams.

3.10. Existing forestry access tracks on site will be used as far as possible to provide access to the turbines, construction compound, substation and meteorological mast. Where required, new tracks will be constructed of a graded stone and be up to 6 m in width.

3.11. An access and traffic assessment will be conducted as outlined in section 12 (page 57) of this scoping report.

Forestry and Felling

3.12. The site is largely forested apart for open ground for management boundaries, roads, unplantable land and margins. The woodland within the site is all privately owned. The forestry baseline will describe the crops existing at time of preparation of the ES including species, planting year, felling and restocking plans (where available). Forestry input will be provided by DGA Forestry (David Goss and Associates).

Potential Impacts

3.13. Areas of woodland will need to be cleared for the construction and operation of the wind farm including access roads, turbine locations and other infrastructure. In addition areas of woodland may need to be cleared for wind resource purposes. The potential impact will be changes to the structure of the woodlands, which may result in the loss of woodland area.

3.14. In the UK there is a presumption against permanent deforestation unless it addresses other environmental concerns. In Scotland such deforestation is dealt with under the Scottish Government's 'Control of Woodland Removal Policy'. The purpose of the policy is to provide direction for decisions on woodland removal in Scotland. It will be essential that the requirements of the Policy are addressed within the

forestry section of the ES whilst ensuring that the forestry proposals do not compromise the wind flow and yield for the proposed wind farm.

3.15. The main forestry consultee is Forestry Commission Scotland (FCS) who will be consulted throughout the development of the proposals to ensure that the proposed changes to the woodlands are appropriate and address the requirements of Scottish Government's Control of Woodland Removal Policy.

Impact Prediction and Evaluation

3.16. Forestry does not fit well into the standard EIA assessment process. Effectively it is a description of the changes to the woodland structure resulting from the incorporation of the wind farm into the forest, rather than a formal EIA assessment. This will include the changes to, for example, the woodland composition including species, age class, and felling programmes. The baseline will be compiled from data provided by the landowners/forest managers, updated from desk based surveys, such as recent aerial photographs, and field visits.

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

Reporting

3.18. The forestry report will be presented in a separate Forestry Technical Appendix, together with a summary in the main Project Description. Information will be presented in text, tables and diagrams together with maps as necessary.

3.19. 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 Scotland (2006). The Scottish Forestry Strategy, Forestry Commission, Edinburgh;
- UKWAS (2012). The UK Woodland Assurance Standard Third Edition. UKWAS, Edinburgh;
- Forestry Commission Scotland (2009). The Scottish Government's Policy on Control of Woodland Removal. Forestry Commission Scotland, Edinburgh;
- Forestry Commission (2003). Forests and Water Guidelines (Fourth Edition). Forestry Commission, Edinburgh; and

- Forestry Commission (1995). Forests and Archaeology Guidelines (and other guidelines in the same series). Forestry Commission, Edinburgh.

Construction of the Proposed Wind Farm

3.20. The construction phase of the proposed wind farm will comprise on-site site preparation and construction activities, supported by deliveries of materials, components and staff to the site.

3.21. Construction will consist of the following principal operations and is expected to take approximately 12 months, depending on weather and ground conditions:

- Forestry activities;
- Extraction of stone from on-site borrow pits (if suitable stone is identified) or import of suitable stone from elsewhere;
- Construction and upgrading of site tracks including water crossings/ culverts;
- Construction of a temporary construction compound and office facilities;
- Construction of the substation buildings/ compounds;
- Construction of turbine foundations;
- Construction of crane hardstanding areas;
- Excavation of cable trenches and cable laying adjacent to the site tracks;
- Installation of temporary and permanent drainage;
- Erection and commissioning of wind turbines; and
- Reinstatement of borrow pits (if utilised) and temporary construction compounds.

Grid Connection

3.22. Underground cabling, laid where possible alongside the access tracks, will link the turbine transformers to a single storey control building. Each turbine transformer will be located either within the turbine nacelle, within the base of the tower or in a small enclosure at the base of the turbine.

3.23. The connection to the grid falls under a separate consent process and will be subject to a separate environmental investigation and planning application if required. As such it will not be considered as part of this EIA.

Decommissioning

3.24. The Development will be designed to operate for a period of 25 years. Provision will be made for the Development to be decommissioned and the site restored at the expiry of planning permission. Typically all above ground infrastructure will be dismantled and removed from the site, cables and turbine foundations will be cut 1 m below ground level and covered with topsoil. Alternatively, the Applicant may apply for planning permission to extend the operational life of the Development in accordance with the relevant environmental impact legislation at the time of any such application.

SITE SELECTION AND DESIGN EVOLUTION

4.1. The Applicant has identified the site through an iterative site selection process seeking to avoid areas of high environmental sensitivity whilst choosing sites which are technically and economically viable. In doing so the following criteria have been used:

- No international or national landscape designations within the site boundary;
- No European Protected Species listed on Annex 1 of European Council Directive 2009/147/EC on the conservation of wild birds or species listed in Schedule 1 to the Wildlife and Countryside Act 1981, as amended, located within the turbine envelope area;
- Located more than 2 km from densely populated settlements;
- Exposed location with good wind speeds;
- Close proximity to a potential grid connection point;
- Land area available to accommodate sufficient viable generating capacity;
- Availability of a good access route options to the site involving minimal environmental disruption; and
- No, or potentially resolvable, civil and military radar issues.

4.2. The purpose of a wind farm is to harness energy from the wind. It is important that wind turbines are sited in the optimum position to maximise the wind yield whilst minimising environmental effects.

4.3. The optimum layout of a wind farm depends on a range of criteria. These vary depending on the type and size of turbine as well as the local topography and the turbulence created by the ground conditions within and around the site. Turbine manufacturers recommend that the turbines be spaced between three and six rotor diameters apart depending on the prevailing wind direction, turbine type and site characteristics. The available capacity of the electricity grid into which a wind farm will connect can also limit its size.

4.4. Throughout the EIA process, the layout will evolve to take into consideration the results of surveys and data gathered through the baseline assessment process. This iterative design process ensures that the final layout of the wind farm submitted to planning responds to the constraints identified onsite. The iterative design process and the reasoning behind the key changes will be reported in the ES.

PLANNING POLICY CONTEXT

Introduction

5.1. The EIA will require the consideration of the Development in the context of applicable policy and guidance. This includes renewable energy policy at European, UK and Scottish Government levels, as well as the Statutory Development Plan and other material planning considerations.

5.2. This section identifies the key policy documents of relevance that will be considered throughout the preparation of the ES.

European Context

5.3. In January 2008 the European Commission (EC) published a '20% by 2020' package. This included proposals for reducing the European Union's (EU) greenhouse gas emissions by 20% and increasing the proportion of final energy consumption from renewable sources to 20%. Both targets are to be achieved by 2020, as set out in the EC Renewables Energy Directive (2009)[3].

5.4. The EU aims to see 20% of all energy consumed to be from renewable sources. This 20% is split between Member States. For the UK, the EC's proposals include a requirement for 15% of all energy consumed in the UK to come from renewable sources by 2020[4].

UK Context

5.5. Climatic research and apparent changes in world weather systems have brought the issue of climate change to the forefront of the political agenda. Through the Climate Change Act 2008[5], the UK Government has set a binding commitment to cut the UK's carbon emissions by 80% by 2050. The UK Government further requires through this Act that limits be set on the total amount of emissions in successive five year periods (carbon budgets), with a minimum 34% reduction by 2020, against 1990 levels. This makes the UK the first country in the world to introduce such a long-term and significant carbon reduction target into law.

5.6. In 2011, the UK Renewable Energy Roadmap[6] was published which reaffirms the UK Government's commitment to increasing the use of renewable energy, and outlines that the UK has the potential to meet its 2020 target of 15% of UK energy consumption from renewable resources, and deliver an operational capacity of 29 gigawatts (GW) of renewable energy by this same year.

[3] Directive 2009/28/EC of the European Parliament and of the Council on the promotion on the promotion of use of Energy from Renewable Sources, Commission of the European Communities.
[4] MTCO2e/yr = Millions of tonnes of carbon dioxide equivalent emitted per year.
[5] Climate Change Act 2008. London: HMSO.
[6] Department of Energy and Climate Change (2011) UK Renewable Energy Roadmap, TSO.

5.7. Estimates show that in 2008, the net UK Carbon Dioxide (CO_2) emissions [7] were 10.5% (532 $MTCO_2e/yr$) below 1990 levels which was 2% lower than 2007[8],[9]. Further action is needed to curb CO_2 emissions over the next few years if the Government's targets are to be met. The UK Government has set a target of 20% of the UK's electricity supply to come from renewable sources by 2020. The published Renewable Energy Strategy 2009 (which is a part of the Government's Overall UK Low Carbon Transition Plan) states that renewable sources could provide 30% of electricity by 2020, of which two-thirds is expected to come from onshore and offshore wind[10].

5.8. Wind energy is seen as the most significant renewable energy source for achieving these targets in the short and medium term. Wind power does not create CO_2 emissions during its operational life and displaces other fuel sources generating greenhouse gas emissions. In 2011, electricity supplied from renewable sources stood at 34.4 Terra Watt hours (TWh)[11], 9.8% of the electricity generated.

Scottish Context

5.9. The Climate Change (Scotland) Act 2009[12] creates a long-term framework for the reduction of greenhouse gas emissions of 80% by 2050. This underlines the Government's commitment to reducing greenhouse gases.

5.10. Securing low carbon energy supplies is a key element in achieving this target and, in recognition of this, the Scottish Government has committed to producing 100% of the country's demand for electricity from renewable sources by 2020 through its publication, the 2020 Routemap for Renewable Energy in Scotland (2011)[13]. In October 2012 the Scottish Government issued the 2020 Renewable Routemap for Scotland – Update[14] which announced a new interim target for renewable

[7] CO2 emissions contribute to 70% of the potential global warming effect of anthropogenic emissions of greenhouse gases and in the UK CO_2 accounts for about 85 % of the total greenhouse gas emissions.
[8] MTCO2e/yr = Millions of tonnes of carbon dioxide equivalent emitted per year.
DECC (2009) Special Feature – CO_2 Emissions [online]. Available at: http://www.berr.gov.uk/files/file50671.pdf [Accessed 20/03/2012].
[9] DECC (2009) Special Feature – CO_2 Emissions [online]. Available at: http://www.berr.gov.uk/files/file50671.pdf [Accessed 20/03/2012].
[10] HM Government (2009) The UK Renewable Energy Strategy 2009. Surrey: OPSI [online]. Available http://www.decc.gov.uk/assets/decc/what%20we%20do/uk%20energy%20supply/energy%20mix/renewable%20energy%20strategy/1_20090717120647_e_@@_theukrenewableenergystrategy2009.pdf [Accessed 20/03/2012].
[11] DECC (2012) Digest of UK Energy Statistics 2012 (DUKES) [online]. Available at: http://www.decc.gov.uk/assets/decc/11/stats/publications/dukes/5949-dukes-2012-exc-cover.pdf [Accessed 20/03/2013].
[12] Office of Public Sector Information (OPSI) (2009) Climate Change (Scotland) Act 2009 [Online] Available at: http://www.opsi.gov.uk/legislation/scotland/acts2009/pdf/asp_20090012_en.pdf [Accessed 20/03/2013].
[13] The Scottish Government (2011) 2020 Routemap for Renewable Energy in Scotland [Online] Available at: http://www.scotland.gov.uk/Publications/2009/07/06095830/2020Routemap [Accessed 20/03/2013].
[14] The Scottish Government (2012) 2020 Renewable Routemap For Scotland – Update [Online] Available at: http://www.scotland.gov.uk/Resource/0040/00406958.pdf [Accessed 20/03/2013].

generation to account for the equivalent of 50% of Scottish demand by 2015.

Planning Policy

5.11. It is important to note that the Planning Context Chapter will not include an assessment of the Development's accordance with statutory Development Plan policy and other material considerations. This would inevitably involve a degree of subjective interpretation which is contrary to advice on ES preparations, including good practice guidance on EIA which states that discussions on planning policy in an ES should be objective. The Applicant therefore intends to submit a separate Planning Statement that will address policy matters in detail and which will reach conclusions on the acceptability of the Development in planning policy terms.

5.12. The Planning Statement will not form part of the ES.

National Planning Policy

5.13. Within Scotland, there is a multi-tiered structure of plans and guidance which cover national, regional and local planning policy.

National Planning Framework 2

5.14. The National Planning Framework 2 (NPF 2) was approved on 25th June 2009. It guides Scotland's development to 2030, setting out strategic development priorities to support the Scottish Government's central purpose of increasing sustainable economic growth. The NPF 2 is a material consideration in the determination of planning applications. It identifies climate change as *"one of the principal challenges*" for sustainable development. One of the key elements of the spatial strategy to 2030 is to:

> *"realise the potential of Scotland's renewable energy resources and facilitate the generation of power and heat from all clean, low carbon sources"*

5.15. The NPF 2 further acknowledges that hydro power and onshore wind are the renewable technologies most likely to make the largest contributions in the initial period with biomass making a larger contribution in the next decade.

Scottish Planning Policy and National Planning Policy Guidance

5.16. Scottish Planning Policy and guidance was until recently set out in a series of Scottish Planning Policy (SPPs) and National Planning Policy Guidance notes (NPPGs), which contain guidance that Local Authorities and others can relate to planning policy and the operation of the planning system. However the Scottish Government are in the process of streamlining this system and have recently replaced these documents

with a Consolidated Scottish Planning Policy (SPP), published in February 2010.

5.17. The consolidated SPP is a statement of Scottish Government policy on land use planning. Polices expressed in the consolidated SPP are intended to inform the content of development plans, should be a consideration in decisions on planning applications and should be used to inform development proposals.

5.18. SPP contains subject planning policies on Renewable Energy and Wind Farms and supersedes SPP 6 Renewable Energy. The document outlines the commitment by the Scottish Government to increase the amount of electricity produced from renewable sources in order to tackle the issue of climate change and to contribute to more secure and diverse energy supplies and support sustainable economic growth. Paragraph 182 states:

> *"…The current target is for 50% of Scotland's electricity to be generated from renewable sources by 2020 and 11% of heat demand to be met from renewable sources. These targets are not a cap. Hydro electric and onshore wind power are currently the main sources of renewable energy supplies. This is expected to continue but will increasingly be part of a wider renewables mix as other technologies become commercially viable. …"*

5.19. Development planning has a key role to play in assisting with Government objectives. Paragraph 187 on Wind Farms states that:

> *"Planning authorities should support the development of wind farms in locations where the technology can operate efficiently and environmental and cumulative impacts can be satisfactorily addressed. Development plans should provide a clear indication of the potential for development of wind farms of all scales, and should set out the criteria that will be considered in deciding applications for all wind farm developments. …"*

5.20. SPP goes on to state that planning authorities should set out in the development plan a spatial framework for onshore wind farms over 20 MW and that this framework should identify: areas requiring significant protection because they are designated or where cumulative impact limits further development; areas with potential constraints where proposals will be considered against identified criteria; and areas of search where appropriate proposals are likely to be supported. However it adds that spatial frameworks should not be used to put in place a sequential approach to determining applications which requires applicants proposing development outwith an area of search to show that there is no capacity within areas of search.

5.21. Planning Advice Note 45: Renewable Energy (PAN45)[15] revised in 2002, provides further information and advice relating to harnessing energy from renewable resources.

Local Planning Policy

The Development Plan

5.22. The Development Plan includes planning policies that form the land use planning framework for the Development site. All of the relevant provisions of the Development Plan will be described in the Planning Chapter of the ES.

5.23. The Development Plan which covers the Development site compiles:

- The Dumfries and Galloway Structure Plan (1999); and
- The Stewartry Local Plan (2006).

The Wind Energy Development Interim Planning Policy

5.24. The Wind Energy Development Interim Planning Policy (the IPP) (2012) provides Dumfries and Galloway Council's most up to date position in respect of assessing wind energy proposals.

5.25. The IPP is an interim document which will be superseded by emerging supplementary planning guidance (SPG) discussed below in paragraph 5.30. The IPP is a material consideration in the assessment of wind energy applications and will remain so until it is superseded. As the SPG progresses less weight should be placed on the IPP as tension exists between it and SPP.

Emerging Local Development Plan

5.26. As part of planning modernisation under the Planning etc. (Scotland) Act 2006, local planning authorities are required to produce Local Development Plans (LDPs) to replace the current system of Structure Plans and Local Plans. The LDP will set out the vision for how the region should develop and will form the framework for making decisions on planning applications.

5.27. The Proposed Local Development Plan (PLDP) for Dumfries and Galloway was published on January 28th 2013 and was subject to consultation until March 11th 2013. The PDLP is expected to be adopted in summer 2014 following final examination by the Scottish Government.

5.28. Prior to adoption, the PLDP will be a material consideration in the assessment of planning applications and will be given increasing weight as a material consideration as it progresses towards adoption.

[15] Scottish Executive (2002) 'Planning Advice Note 45 (Revised 2002): Renewable Energy Technologies'.

5.29. Following adoption the PDLP will become the LDP and will be the principle document against which planning applications will be assessed in Dumfries and Galloway.

Emerging Supplementary Planning Guidance

5.30. Alongside the emerging LDP discussed above, Dumfries and Galloway Council is also producing a Wind Energy Development SPG, which is currently at the consultation draft stage. The SPG will provide additional guidance to support policies within the emerging LDP.

LANDSCAPE AND VISUAL IMPACT ASSESSMENT

Overview

6.1. The landscape and visual impact assessment (LVIA) of the environmental statement will address effects on the receiving landscape (capacity, character, quality and value) and the visual effects of the development on views within a pre-defined study area. The assessment will include consideration of visual effects on nearby residential properties if necessary (i.e. if there is a possibility that the views of the wind farm will be overbearing or dominating).

6.2. It will be prepared in parallel with the emerging design proposals to ensure that particular landscape and visual sensitivities identified for the site are taken into account in determining the final turbine heights, numbers and layout, as well as other design details for the Development. In this way, primary mitigation in the form of the 'best landscape fit' will be embedded within the submitted proposals.

6.3. The Landscape and Visual Impact Assessment will be undertaken by Geddes Consulting.

Assessment Methodology

Guidance

6.4. The LVIA will be prepared with reference to a number of 'best practice' documents. In particular, reference will be made to the following publications, policy and guidelines:

- *Guidelines for Landscape and Visual Impact Assessment* 2nd Edition, edited by the Landscape Institute and Institute for Environmental Management and Assessment (2002);
- *Landscape Character Assessment Guidance for England and Scotland*, Countryside Agency in conjunction with Scottish Natural Heritage (2002);
- *Visual Representation of Windfarms Good Practice Guidance*, horner + maclennan and Envision, prepared for Scottish Natural Heritage, Scottish Renewables Forum and Scottish Society of Directors of Planning (Report F03 AA 308/2) (29 March 2006);
- *Guidance on the Cumulative Effect of Windfarms*, Scottish Natural Heritage (Version 2 April 2005);
- *Strategic Locational Guidance for Onshore Wind Farms in respect of the Natural Heritage*, Scottish Natural Heritage, Policy Statement 02/02 (Update March 2009, latest version now out for consultation);
- *Siting and Designing Windfarms in the Landscape*, Scottish Natural Heritage (2009);

6.5. Approved development plans, comprising

- Dumfries and Galloway Structure Plan, approved 1999;
- Dumfries and Galloway Local Plan, Stewartry Area, adopted July 2006;
- Dumfries and Galloway Interim Planning Policy, Wind Energy Development, February 2012; and
- Dumfries and Galloway Local Development Plan, Proposed Plan, January 2013.

Study Area

6.6. The LVIA for the development will be based on a 35 km radius study area, with more focussed assessment of effects on landscape character within a 15 km radius.

6.7. This is in accordance with SNH's 'Visual Representations of Windfarms Good Practice Guide'. This provides recommendations on the distance of Zones of Theoretical Visibility (ZTV) relative to turbine height in Table 2 (p.36).

6.8. It is proposed that the cumulative assessment search area extends to 60 km to establish the cumulative baseline; with the assessment primarily focused on proposals within 35 km, and detailed assessment of proposals within a 15 km radius.

6.9. It is proposed that the residential assessment will consider towns and villages within the 35 km study area and individual properties within 2 km (of the nearest turbine) study area and visible on the ZTV.

Methodology

6.10. Full details of the methodology will be set out in the ES. The following provides a summary of the key aspects of the approach.

Desk Study

6.11. The desk study element of the assessment makes use of a range of published sources and mapping; and illustrative tools prepared using specialist software, in particular ZTV mapping and wirelines.

Field Study

6.12. The field survey includes viewpoint photography for the agreed viewpoint locations and field observation of other static receptors such as residences. It allows observation of the landscape of the site and the landscape character of the wider area. It also enables sequential routes to be experienced and the characteristics of cumulative effects to be observed.

Types of effects

6.13. The assessment of effects will consider the following:

- Physical effects, arising from the direct effects of the Development on the land cover, landform, and landscape features of the site;
- Landscape character effects, arising from perceptual changes to the wider character of the landscape;
- Landscape designation effects;
- Residential amenity (visual) effects;
- Static visual effects, assessed through in-depth analysis of agreed representative viewpoints;
- Sequential visual effects, which arise from changes to the visual experience when travelling a route; and
- Cumulative effects, arising from the Development in combination with other wind turbine development and which is considered for landscape character; landscape designations; residential amenity; and static and sequential visual effects.

Nature of effects

6.14. In assessing the landscape and visual effects, this assessment will be undertaken in a systematic and comprehensive manner, in accordance with the most recent best practice guidance; however, the assessment will not make a distinction between positive and negative effects, as this will depend on the perspective of the viewer. It is acknowledged that people have wide ranging opinions about wind farms, their appearance and whether they are a positive or negative addition to the landscape. This is often a highly emotive issue, both for and against.

6.15. A neutral or objective perspective will therefore be adopted and the assessment is limited to assessing the scale of the effect, based on a professional judgement informed through desk and field survey.

Sensitivity of Receptor

6.16. The sensitivity of a landscape or a view to change (i.e. receptors) varies according to the nature of the existing resource and the nature of the proposed change.

6.17. Consideration of value, integrity and capacity are relevant when assessing sensitivity and for this purpose, are defined as follows:

- Value: the value or importance attached to a landscape for its scenic or aesthetic qualities, or cultural association, can be recognised through national, regional or local designation. Views tend not to be designated, but can be recognised through a name or shown on a map, or through the creation of a parking lay-by or location of a bench;
- Integrity: the degree to which the value has been retained, the condition and integrity of the landscape or the view; and
- Capacity: the ability of a landscape or view to accommodate the proposed change while retaining the essential characteristics which define it.

6.18. Table 6.1 defined the criteria which will guide the judgement as to the sensitivity of the receptor.

Table 6.1: Sensitivity of Receptor

Sensitivity	Landscape Effects	Visual Effects
Low	Landscape value is low, with no designations; landscape integrity is low, with a landscape in poor condition and a degraded character; the landscape has the capacity to potentially accommodate significant change.	Small number or low sensitivity of viewers assumed. Viewers' attention not focussed on landscape, e.g. workers.
Medium	Landscape value is recognised locally, but is not nationally designated; the landscape is relatively intact, with a distinctive character; and, the landscape is reasonably tolerant of change.	Viewers' attention may be focussed on landscape, such as road or rail users and people engaged in outdoor sport or recreation, e.g. fishing, water sports or golf.
High	Landscape value recognised by existing or proposed national or regional designation. Sense of tranquillity or remoteness and a high sensitivity to disturbance specifically noted in Landscape Character Assessment. The qualities for which the landscape is valued are in a good condition, with a clearly apparent and distinctive character which is susceptible to relatively small changes.	Large number or high sensitivity of viewers assumed and viewers' attention very likely to be focussed on the landscape, e.g. residents experiencing views from dwellings; users of strategic recreational footpaths and cycleways; people experiencing views from important landscape features of physical, cultural or historic interest, beauty spots and picnic areas.

Magnitude of Change

6.19. The effect of the Development on each landscape or visual receptor is referred to as the magnitude of change. The following considerations are relevant when evaluating the magnitude of change:

- Distance: the distance between the receptor and the Development. Generally, the greater the distance, the lower the magnitude;
- Extent: the extent of the Development which is visible;
- Proportion: the arc of view occupied by the Development in proportion to the overall field of view. A panoramic view, where the Development takes up a small part of it, will generally be of lower magnitude of change than a narrow, focussed view, even if the arc of view occupied by the Development is similar;
- Duration: the duration of the effect. An effect experienced in a single location over an extended period of time is likely to result in a higher magnitude of change than an effect which is of a short duration, such as a view from a road;

- Orientation: the angle of the view in relation to the main receptor orientation, where there is a dominant direction to the vista;
- Context: the elements which in combination provide the setting and context to the Development. In particular, vertical man-made structures within the context can decrease the magnitude of change; and
- Background: the colour of the turbines has been selected on the basis that the majority of views will see the turbines against the sky. Where landform forms the background to the view rather than skyline, this can have an effect on the magnitude of change.

6.20. The magnitude of change will be assessed according to these parameters, which are largely quantifiable. Table 6.2 defines the categories which will be used within the assessment to guide professional judgement.

Table 6.2: Magnitude of Change

Sensitivity	Landscape Effects	Visual Effects
Negligible / No Change	The effect of change on the perception of the landscape, the physical landscape or the landscape character is minimal or there is no change.	There is either no view or the character of the view will not be altered by the Development. The Development is at such a distance as to be imperceptible and may only be discernible in clear conditions. May go unnoticed.
Small	Changes to the physical landscape, its character and the perception of the landscape are minor. Long distance to affected landscape type and/or intervening transitional types. Effects reduced by presence of many built elements.	Visible but not prominent.
Medium	The Development forms a visible and recognisable feature in the landscape. Development some distance from affected landscape type. Other built elements or human activities in views. Scale of turbines fits with existing features.	Conspicuous: Clearly visible and well defined but not defining influence on the view and is a key element in the view.
Large	Where there are major changes affecting the character of the landscape, or the important elements of the landscape. Development within or close to the affected landscape type. Size of turbines out of scale with existing elements.	Prominent: Stands out as an important, but not defining influence on the view and is a key element in the view. Dominant: Has a defining influence on views.

Significance of Effect

6.21. The significance of the landscape and visual effects are assessed through a combination of the sensitivity of the receptor with the magnitude of change. Table 6.3 defines the categories for significance of effect:

Table 6.3: Significance of Effect

Sensitivity	**Magnitude of Change**			
	High	**Medium**	**Low**	**Negligible / No Change**
High Sensitivity	**Major**	**Major / Moderate**	Moderate / Minor	Negligible / No Change
Medium Sensitivity	**Major / Moderate**	**Moderate**	Minor	Negligible / No Change
Low Sensitivity	**Moderate**	Minor	Negligible / No Change	Negligible / No Change

6.22. The landscape and visual effects which are classified as Major, Major / Moderate and Moderate are considered by the assessor as significant effects within the context of the EIA Regulations 2011.

6.23. A conclusion that an effect is significant should not be taken to imply that the Development is unacceptable. Significance of effect needs to be considered with respect to the scale over which it is felt.

6.24. An effect which is significant can be understood to have the potential to be a material consideration in the determination of the planning application.

6.25. By its very nature, a wind farm proposal, with a number of tall turbines may potentially have major local effects, but these must be considered within a wider context, including the regional and national planning context and the overall capacity of the receiving landscape for wind farm development.

Landscape Baseline Conditions

6.26. This section of Landscape Baseline Conditions identifies key issues relating to the LVIA.

6.27. The site is located within the DGW 16: Upland Fringe landscape character type, landscape character unit *Corsock*. The Dumfries and Galloway Wind Farm Landscape Capacity Study identifies this landscape character unit as an anomaly and reclassifies it as part of the *Stroan* landscape character unit within the *Foothills with Forest* landscape character type (DGW 18a) This is a medium – large scale landscape defined by extensive forestry, characterised by a dark green blanket of plantation forestry covering undulating foothills, with the various stages of forest rotation evident in the landscape, from young plantation to clearfell and deep ploughing. Roads in this area tend to be surrounded by tall

conifers. In areas where there is no plantation, land use is generally semi-improved pasture with walled enclosures.

6.28. The issues section of the *landscape assessment* for both the *Corsock* and *Stroan* landscape character units identify potential wind farm developments as a need for consideration and the character type for the Stroan landscape character unit is identified in the Dumfries and Galloway Wind Farm Landscape Capacity Study[16] as being of medium landscape sensitivity, high – medium visual sensitivity and low sensitivity in respect of landscape values in relation to large wind farm typologies (defined as developments over 10 turbines, 80-150 m in height[17]).

6.29. Interim Planning Policy – Wind Energy Developments, map 8 shows *Areas where the Potential for Large Typology Turbines is limited by Landscape Sensitivity*. Using a broad brush approach, this identifies landscape character areas of higher and lower sensitivity. This indicates that the site is located within the area of higher sensitivity to large typology turbines, which covers the majority of Dumfries and Galloway.

6.30. The site is located within an area of zone 1 - 2: low - medium sensitivity to natural heritage, as defined by Map 5 of Strategic Locational Guidance for Onshore wind farms in respect of the Natural Heritage[18].

6.31. The site is free from landscape designations although the nearest turbine lies approximately 2.6km to the east of the *Galloway Hills* Regional Scenic Area (RSA), approximately 9km to the south of the *Thornhill Uplands* RSA and 11km to the west of the *Terregles Ridge* RSA, identifies in the adopted Dumfries and Galloway Local Plan and described in the approved Structure Plan as *"…scenically valued landscape character types and combinations of elements, their juxtapositions and associations; rarity and representativeness or typicality; accessibility and visibility; sensitivity to and pressure for change…"*[19]. These are identified in both the adopted Local Plan and approved Structure Plan, and Dumfries and Galloway LDP Technical Paper: Regional Scenic Areas[20].

6.32. There are a further six RSAs located within 35km of the site:

- Torthorwald Ridge RSA, located 28.5km from the nearest turbine (within Dumfries and Galloway);
- Solway Firth RSA, located 18km from the nearest turbine (within Dumfries and Galloway);
- Clydesdale RSA (South Lanarkshire RSA), located 32km from the nearest turbines (within South Lanarkshire);
- Two East Ayrshire Sensitive Landscape Areas[21], both located approximately 25km from the nearest turbines (within East Ayrshire); and

[16] p.157 & 350, Dumfries and Galloway Wind Farm Landscape Capacity Study, C.Anderson, Alison Grant (January, 2011).
[17] p.10, ibid.
[18] SNH, March 2009.
[19] p.51 Dumfries and Galloway approved Structure Plan, 1999.
[20] Dumfries and Galloway LDP Technical Paper: Regional Scenic Areas (January 2013).
[21] In the Joint Ayrshire Structure Plan the Scenic Areas are referred to as Sensitive Landscape Areas.

- South Ayrshire Sensitive Landscape Area[22], located 30km from the nearest turbines (within South Ayrshire).

6.33. These turbines also fall within an area identified within the approved Structure Plan[23] as Enhance and / or Restore, areas with a less strongly developed landscape character or that have been subject to landscape change through development activity which has reduced the local distinctiveness. Such landscapes are considered as being more flexible in accommodating the impacts of future change.

6.34. There is one Garden and Designed Landscapes (GDL) located within 10 km of the site: Brooklands GDL is located 9.2 km from the nearest turbine.

6.35. There are three National Scenic Areas (NSA) located within 35 km of the site: Fleet Valley NSA, East Stewartry Coast and Nith Estuary located approximately 17.9 km, 19.6 km and 22.1 km respectively from the nearest turbine. This is shown in Figure 3 in Appendix A.

6.36. A ZTV was prepared to assess theoretical visibility across the Study Area. This identifies that visibility in the area surrounding the development is largely contained within 10 km of the site. Beyond this, areas of visibility largely reflect the underlying landform, with visibility mainly concentrated to the west on the rising slopes of the Galloway Hills.

6.37. The cumulative assessment has identified a number of existing / consented wind farm developments within or around 10 km of the site, including:

- Blackcraig; and
- Margree.

Proposed Viewpoint Locations

6.38. The assessment of landscape and visual effects will be illustrated with reference to viewpoint photographs from key viewpoints, to be agreed with Dumfries and Galloway Council and SNH within the Study Area.

6.39. A provisional list of viewpoint locations has been selected with reference to the ZTV (Figure 4 in Appendix A) to represent a range of views and viewer types from where the proposed development is theoretically visible and the effects may be potentially significant. Locations are at this stage approximate, and will be informed by local conditions relating to accessibility and viability (Table 6.4).

[22] In the Joint Ayrshire Structure Plan the Scenic Areas are referred to as Sensitive Landscape Areas.
[23] P.52 Dumfries and Galloway approved Structure Plan, 1999.

Table 6.4: Proposed Viewpoint Locations

VP No.	Viewpoint Description	NGR (approx.)	Approx. Distance to Nearest Turbine	Reason
1	Bardennoch Hill	256630, 591410	19.5km	Views from the NW Local walking route Views from Galloway Hills RSA
2	Dunveoch Hill	258514, 581085	12.6 km	Views from the NW Views from Galloway Hills RSA Local hilltop
3	A762 south of New Galloway	263354, 576025	11.5 km	Views from the W Views from Galloway Hills RSA Settlement to the W
4	Airlie Hill	262280, 568660	11.5 km	Views from the SW Views from local walking route Views from Galloway Hills RSA
5	Bridge of Dee	273290, 560130	13.6 km	Views from the S Views from settlement to the S Sequential views from A75
6	Haugh of Urr	281170, 565940	13.6 km	Views from the SE Views from settlement to the SE
7	NE of Parton, nr. Diamonds Laggan	271060, 571800	4.1 km	Views from the S Views from minor roads and dwellings to the S
8	A712 NW of Corsock	275630, 579530	3.6 km	Views from the E Settlement to the E Sequential views on A712
9	Junction of minor roads at Glaisters	275954, 580545	5.2 km	Views from the NE Minor roads and settlements to NE of site
10	The Mull	285600, 589100	18.1 km	Views from the NE Views from the Keir Hills Views from Torthorwald Ridge RSA
11	Walton Park	276362, 571008	6.6 km	Views from the SE Views from settlement to the SE
12	Southern Upland Way nr. Benbrack	268080, 596960	19.2 km	Views from the N Views from popular recreational walking route

VP No.	Viewpoint Description	NGR (approx.)	Approx. Distance to Nearest Turbine	Reason
13	A712 nr. Bread & Beer Cottage	269920, 579200	1.5 km	Views from the NW Views from crossroads of minor roads to NW Views from dwellings to NW
14	Southern Upland Way NE of St. Johns Town	263110, 582240	8.7 km	Views from the NW Views from popular recreational walking route Views from area around St. Johns Town of Dalry Views from Galloway Hills RSA

Proposed Sequential Assessment

6.40. The following road and rail routes have been identified as potentially requiring consideration as part of the sequential impact assessment:

- A712;
- A713;
- A762;
- A75;
- A702;
- B794;
- National Cycle Route 7 – Carlisle to Glasgow; and
- The 'Robert the Bruce' Trail*

6.41. There are a number of walking routes in this area, along a variety of tracks, including the Southern Upland Way*, Galloway Kite Trail* and a number of Core Paths, which should be considered. (Routes marked with * are identified within the Dumfries and Galloway Interim Planning Policy, Map 22 as Main Tourist Routes).

Cumulative Assessment Baseline

6.42. The cumulative assessment will examine the cumulative visibility of wind farms in terms of 'intervisibility' (either simultaneous or successive) and sequential visibility of different wind farms from existing routes of travel.

6.43. In line with the recommendations of SNH in *Guidance on the Cumulative Effects of Windfarms* (para.43), the baseline search area for the assessment of cumulative effects will extend to 60 km from the site.

6.44. Interim Planning Policy: Wind Energy Development (Map 6) highlights areas identified by Dumfries and Galloway Council as Cumulative

Sensitivity Zones, where the cumulative impact of existing and consented wind energy developments limits further development. The site is not located within a Cumulative Sensitivity Zone.

6.45. A preliminary cumulative list of proposals has been compiled in Appendix C.

Key Questions

6.46. The following are what are thought to be the key issues which require consideration by the consultees:

- Do the Council/Consultees have any comments on the designated areas and are there any additional landscape receptors to be considered in the assessment?
- Do the Council/Consultees have any comments on the selected viewpoints and are there any additional viewpoints that should be considered in the assessment?
- Can the Council/Consultees provide further information on other wind farm sites which may be included in the cumulative landscape and visual assessment?
- Are there any specific consultees who should be contacted?

ECOLOGY

7.1. Climate change is recognised by Scottish Natural Heritage (SNH) as *"… the most serious threat over coming decades to Scotland's natural heritage"*[24]. It is now widely acknowledged that appropriately sited wind farms can help to address the effects of climate change without adversely affecting local ecology. Furthermore, a recent report by the Institute for European Environmental Policy commissioned by the RSPB states that *"Well conceived and planned windfarms can give rise to local offsite nature conservation benefits..."*[25].

7.2. SNH also states that *"We encourage the assessment of all renewable energy schemes for their natural heritage impacts. We encourage a proportionate approach to such assessments, taking into account the scale of the proposals and the sensitivity of the natural heritage interests involved"*[26]. Therefore, the key ecological issues to be addressed in detail as part of the EIA process are the potential of indirect and direct effects on species, habitats and ecological processes, as well as on sites designated for their nature conservation value.

7.3. This section describes the study methods that will be followed to establish the ecological baseline relevant to the Development, as well as the methods and approach that will be followed to assess the potential effects of the Development on the ecological baseline. A discussion of ornithological methods and assessment is provided separately in Section 8.

Potential Effects of the Development

7.4. The site lies in forestry plantation and is interspersed by minor tributaries of Urr Water. The remainder of the site is surrounded by open moorland and other areas of forestry plantation.

7.5. The scale and location of the Development will limit potential ecological effects since the turbines and most other infrastructure will be located within commercial forestry, a habitat generally considered to be of limited ecological value. The key issues for the assessment are likely to include:

- Loss of, and disturbance to, terrestrial habitats due to land take by the wind turbines and associated infrastructure;
- Loss of habitat important for the maintenance of species' conservation statuses;
- Direct disturbance of, and harm to, animals, including the displacement of species from the proximity of the Development; and

[24] SNH (2012) *Climate change and the Natural Heritage – SNH's Approach and Action Plan*.
[25] Bowyer, C. *et al*. (2009) *Positive Planning for Onshore Wind: Expanding onshore wind energy capacity while conserving nature*. A report by the Institute for European Environmental Policy commissioned by the Royal Society for the Protection of Birds. Institute for European Environmental Policy (IEEP).
[26] SNH (2010) *Renewable Energy and the Natural Heritage*.

- Potential legal offences, even if significant adverse ecological effects are unlikely.

Statutory Designated Sites

7.6. A review of the Scottish Natural Heritage Information service (SNHi[27]) and other publicly available resources identified a number of sites of nature conservation value within the area (Table 7.1; Figure 5). A radius of 5 km was searched for all statutory designated sites except Special Areas of Conservation (SAC), for which a radius of 10 km was searched. A radius of 2 km was searched for non-statutory designated sites (Scottish Wildlife Trust Reserves, SWTR and woodlands included in the Ancient Woodland Inventory, AWI).

Table 7.1 Summary of designated sites within search areas

Site	Designation	Distance and Direction	Description / Principal Interest
Knowetop Lochs	SWTR	Bordering the N	Diversity of habitats including woodland, open water, heath and bog which supports notable vertebrates (otter, water vole, adder, barn owl) and invertebrates (butterflies)
Craigenvolly Plantation	AWI	0.6 km N	Several areas of potential ancient woodland, most of which appear to have been supplanted with commercial coniferous plantation.
Long Wood	AWI	0.9 km N	
Caldow Wood	AWI	0.3 km NE	
Elder's Wood	AWI	1 km E	
Marnhoul Wood	AWI	Within and extending E	
Mochrum Plantation	AWI	1.5 km SE	

Desk Study

7.7. Key to the assessment process will be the collation of historical ecological records through a desk study and consultations. These records will inform ongoing survey efforts and provide a historical and regional context for the assessment. In the first instance, data will be obtained or requested from the following sources:

- Scottish Natural Heritage (SNH);
- Dumfries and Galloway Environmental Resources Centre (DGERC);
- Dumfries and Galloway Bat Group;
- Red Squirrels in South Scotland;
- Scottish Wildlife Trust;
- Local District Salmon Fishery Board;
- Dumfries and Galloway Biodiversity Action Plan; and

[27] http://www.snh.gov.uk/publications-data-and-research/snhi-information-service/ .

- National Biodiversity Network.

7.8. In light of initial requests and survey results, further information and data requests will be made to other sources, such as specialist species recorders.

Baseline Survey

7.9. Ecological surveys are necessary to provide an up-to-date baseline against which the potential effects of the Development can be assessed. The limit of baseline surveys has been defined by the application site boundary and thus encompasses all areas in which development may take place. Where necessary and accessible, some surveys have extended beyond this boundary to provide the required baseline information. All surveys will be undertaken in 2013 and the results discussed with SNH to help identify constraints and the need for further surveys.

Habitats and Vegetation

7.10. A Phase 1 habitat survey will be carried out during the optimum period (April to September) following standard methods[28]. The survey will cover the Development site and immediately adjacent areas, with additional effort targeted at identifying the locations of any rare or scarce plants or invasive species. Target notes will be taken to provide further information about features of ecological interest and plant species recorded to check the existence of notable plant species. The extended Phase 1 habitat survey will allow an assessment of the potential impact of habitat loss due to the construction of the Development and will also help to guide the scope of other ecological surveys by assessing the potential of habitats to support notable fauna.

7.11. An initial review of the Ordnance Survey mapping and aerial photography suggests that the site is dominated by commercial forestry plantation. However, areas of open ground appear to be present which may require more detailed survey to establish the presence of notable habitats, peatlands or Ground Water Dependant Terrestrial Ecosystems (GWDTE). Priority habitats within the survey area (as identified by the Phase 1 habitat survey) will be subject to National Vegetation Classification (NVC)[29] survey and the location of GWDTEs mapped in accordance with current guidance[30].

7.12. A large part of the Development site is included in the Ancient Woodland Inventory (Marnhoul Wood; see Table 7.1) but it appears that most, if not all, of this has been supplanted by commercial coniferous plantation. Habitat surveys will assess the status of this woodland.

[28] Joint Nature Conservation Committee (JNCC) (2004) *Handbook for Phase 1 habitat survey: a technique for environmental audit*. JNCC.
[29] Rodwell, J. S. *et seq*. (1992) *British Plant Communities Vols 1–5,* Cambridge University Press: Cambridge.
[30] Scottish Protection Agency (SEPA) (2011). Land Use Planning System SEPA Guidance Note 4. Planning advice on wind farm developments.

Invertebrates

7.13. Habitats will be assessed for their potential to support important arthropod assemblages and appropriate avoidance or mitigation will ensure that high-value habitats are not adversely affected by the Development. Given the intensive, dense coniferous plantation across most of the site, detailed entomological surveys will not be undertaken.

Fisheries

7.14. A range of fisheries of surveys will be undertaken between July and October 2013 to assess potential effects to sensitive watercourses, notably Urr Water which is classified by SEPA as having a 'Moderate' ecological status under the Water Framework Directive. Urr Water is also noted as a fisheries resource for salmon under the Fresh Water Fish Directive.

7.15. It is anticipated that freshwater pearl mussel surveys will not be necessary, as there are no known recent records of this species within the local area. As such, requirements for undertaking this work are not included.

Fisheries Habitat survey

7.16. A Fisheries Habitat Survey will be carried out by qualified surveyors (Scottish Fisheries Co-ordination Centre (SFCC) for all representative / suitable survey locations) following standard methods[31]. A detailed assessment of fish habitat quality will be undertaken based on information collected from literature review, consultation and field survey.

Electrofishing

7.17. An assessment of the composition, abundance and age class of fish will be carried out following electrofishing techniques developed by the SFCC and the EU LIFE in UK Rivers Protect and confirming to British Standard guidance (BS EN 14011:2003). The survey team will comprise two experienced surveyors, both of whom are accredited by the SFCC and qualified to SVQ Level III (leading electrofishing operations and undertaking fisheries habitat surveys). The surveys will be undertaken using a Smith Root LR24 Electrofishing unit (battery powered) with a single anode. All surveys will be carried out in reasonable accordance with SFCC guidelines and under licence from the local DSFB or the Scottish Government.

7.18. Where possible, a fully quantitative sampling method will be undertaken for all watercourses. Fully quantitative sampling is the preferred method as it allows for enumeration of a stock, or stock component, within a given site and provides a reasonably accurate estimate of a given population. Any areas identified as suitable nursery habitat for lamprey

[31] Scottish Fisheries Co-ordination Centre (2007). *Electrofishing Team Leader Training Manual*. Fisheries Management SVQ Level 3: Manage Electrofishing Operations. Inverness college.

will also be subject to a fully quantitative survey to determine their presence/likely absence. Surveys will be undertaken following techniques developed by the EU LIFE in UK Rivers project[32].

Kick sampling

7.19. Benthic invertebrate fauna will be sampled at the electrofishing locations using a standard three minute 'kick sample' technique to determine diversity. A manual search of watercourse beds will also be undertaken by lifting stones and cobbles. Benthic invertebrate fauna samples will be stored in a fixative in air-tight containers to preserve them until laboratory identification. Invertebrates will be identified to family level and the assemblage at each sample location scored using the Average Score per Taxon (ASPT)[33] system.

Water Quality

7.20. The sampling locations for surface water quality will be set in the context of the representative/suitable survey locations and selected to provide a suitable baseline for the Development. Temperature, conductivity, pH and total dissolved solids will be recorded.

Amphibians

7.21. The great crested newt is a UKBAP priority species and receives strict protection under the Conservation (Natural Habitats, &c.) Regulations 1994 (the 'Habitat Regulations') as a European protected species.

7.22. A search for ponds and other water bodies within 500 m of the proposed development has been undertaken, supported by an examination of maps and aerial photographs. No water bodies were identified within the site boundary and those outside the boundary (e.g. Knowetop Lochs) are unlikely to be situated within 500 m of construction activities. Detailed presence/absence surveys for great crested newt will therefore not be required, although observations of amphibians (which inhabit terrestrial habitats), including common toad (a UKBAP priority species), will be made during the course of other surveys.

Reptiles

7.23. The three common and widespread species of Scottish reptile (i.e. adder, common / viviparous lizard and slow-worm) are protected from intentional or reckless killing by the Wildlife and Countryside Act 1981 (as amended). Habitats will be assessed for their potential to support reptiles and appropriate avoidance or mitigation (during construction) will ensure that high-value habitats are not adversely affected by the Development. Detailed reptile surveys are considered unnecessary since

[32] Harvey, J. & Cowx, I. (2003). *Monitoring the River, Brook and Sea Lamprey, Lampetra fluviatilis, L. planeri and Petromyzon marinus*. Conserving Natura 2000 Rivers Monitoring Series No. 5. English Nature.
[33] Armitage, P.D., Moss, D. Wright, J.F. & M.T. Furse. 1983. The performance of a new biological water quality score system based on macroinvertebrates over a wide range of unpolluted running-waters. Water Research 17: 333–347.

habitat losses are relatively limited in extent and in sub-optimal habitats, so careful planning and mitigation will avoid adverse effects on these species.

Bats

7.24. All bats in Scotland receive strict protection under the Conservation (Natural Habitats, &c.) Regulations 1994 (the 'Habitat Regulations') as a European protected species. Seven bat species are also UKBAP priorities.

7.25. Arcus has extensive experience of undertaking bat surveys in Dumfries and Galloway and has worked on sites requiring assessments of a range of both common species (e.g. common pipistrelle, soprano pipistrelle and Myotis sp.) and less common (e.g. Noctule, Leisler's bat and Nathusius pipistrelle) species in this county. Bat activity at the site will be surveyed according to SNH and Natural England (NE)[34] and Bat Conservation Trust (BCT) guidance[35] as follows:

- Transect surveys - Habitats within the survey area will be walked and/or driven, where accessible, to provide a transect route with five-minute point counts at regular intervals. Transect surveys will be carried out monthly on three separate occasions between May and September;
- Automated Surveys - AnaBat detectors will be deployed to automatically record bat activity on three occasions between May and September 2013; on each occasion the AnaBat detectors will be deployed for a minimum of five consecutive nights. The AnaBats will be located within the potential turbine layout, as well as a range of representative habitats and control sites; and
- Roost surveys - Data searches will be conducted to identify any known roost sites in the vicinity of the development site. Potential bat roosts on site will be identified and, if necessary, emergence/re-entry surveys will be conducted at potential roost sites considered to be at risk. As habitats are dominated by commercial conifer plantation, roost sites are considered unlikely to occur within the site, therefore our proposal does not include costs for emergence/re-entry surveys at this stage.

7.26. If surveys record high levels of bat activity, or high-risk species such as noctule or Leisler's bats are recorded in abundance, then additional targeted surveys (e.g. monitoring at height) may be required.

Otter and Water Vole

7.27. Otter receives strict protection under the Conservation (Natural Habitats, &c.) Regulations 1994 (the 'Habitat Regulations') as a European protected species. Water vole is partially protected under the Wildlife and Countryside Act (as amended). Both species are UKBAP priority species. Surveys for evidence of otter and water vole will be undertaken along the margins of suitable watercourses and water bodies. Surveys

[34] SNH has adopted NE guidelines in relation to bats and wind farm developments.
[35] Hundt, L. (ed.) (2012) *Bat Surveys: Good Practice Guidelines* (2nd Edition). BCT.

will be carried out in accordance with standard methods[36,37], during spring to autumn 2013.

Badgers

7.28. Badgers receive protection under the Protection of Badgers Act 1992. All areas within 50 m of the Development will be surveyed for evidence of badgers as part of the extended Phase 1 habitat survey following standard methods to record field signs and describe setts[38,39]. Search effort will concentrate on areas in which ground works are most likely.

Red squirrel

7.29. Suitable habitats (particularly mature coniferous plantation) that may be affected by the Development will be assessed for their potential to support red squirrel and surveyed for evidence by searching for dreys and feeding cones. A watching brief will also be maintained for the species during the course of other ecological surveys. If necessary, further detailed surveys will be undertaken following best practice guidance[40].

Pine marten

7.30. A walkover survey will be undertaken along tracks and rides during summer to assess the suitability of habitats for pine marten and to record field signs indicating the presence of the species, such as prints and scats.

Other species

7.31. Habitats will be assessed for their potential to support other notable species and a watching brief will be maintained during ecological surveys to record observations. Additional species-specific surveys will be undertaken as dependent on the results of consultation, desk study and field observations.

Ecological Assessment

7.32. Information from the above survey work will be analysed and collated into technical reports detailing the baseline conditions at the site. The reports will include, as appropriate, data appendices, figures and confidential annexes. The assessment of potential effects on ecological interests will follow guidelines published by the Institute of Ecology and Environmental Management (IEEM)[41] and will take into account the

[36] Chanin, P. (2003) *Monitoring the Otter Lutra lutra*. Conserving Natura 2000 Rivers. Monitoring Series No. 10. English Nature.
[37] Strachan, R. and Moorhouse (2003) *The Water Vole Conservation Handbook (2nd ed.)*. Wildlife Conservation Research Unit.
[38] Harris, S., Cresswell, P.& Jeffries, D.(1991) *Surveying for Badgers*. Mammal Society.
[39] Neal, E.& Cheeseman, C. (1996) *Badgers*.
[40] Gurnell, J. Lurz, P. and Pepper, H. (2001) *Practical Techniques for Surveying and Monitoring Red Squirrels*. Forestry Commission.
[41] IEEM (2006) *Guidelines for Ecological Impact Assessment in the United Kingdom*. IEEM.

considerations of legislation, planning policy and statutory guidance. The assessment will include proposals for the avoidance and mitigation of potentially adverse effects and will consider enhancement measures to increase biodiversity in the area. Potential cumulative ecological effects with other nearby developments will also be addressed. Alternative solutions and mitigation will be identified where the assessment indicates that there is a potential significant impact on important habitats and species as a consequence of the Development.

Key Questions

7.33. The following are what are thought to be the key issues which require consideration by the consultees:

- Are the consultees content with and/or have any comments on the list of effects and key sensitive receptors?
- Are the consultees content with and/or have any comments on the baseline survey methods and level of proposed survey effort taking into consideration current guidance, the proposed scale and location of the wind farm, survey work completed to date and the key findings and identified sensitive receptors?
- Are the consultees content with and/or have any comments on the proposed receptor evaluation and impact assessment methods?
- Are there any specific consultees who should be contacted?

ORNITHOLOGY

Introduction

8.1. This section of the Scoping Request has been prepared by Natural Research Projects Ltd (NRP) and describes the proposed approach to the assessment of potential effects from the wind farm on bird populations and their supporting habitats (i.e. key ornithological receptors). It includes the proposed methods for desk study, baseline survey, constraints analysis, receptor evaluation and the assessment of impact significance.

8.2. The key potential effects on sensitive ornithological receptors arising from a proposed wind farm development can be summarised as follows:

- Disturbance and/or displacement from supporting habitats during construction works;
- Loss/degradation of habitats through construction works, permanent structures and access tracks;
- Displacement from and disturbance to foraging, nesting, roosting habitat from the operating wind farm; and
- Mortality from collision with wind turbines.

8.3. There is also the potential for cumulative effects on birds arising from the combined effects of other existing and proposed developments within the wider area.

8.4. Particular consideration will be given in the assessment to potential effects on bird species whose populations are of moderate to high conservation concern and that belong to taxonomic groups that are considered to be particularly susceptible to impacts from wind farm development (e.g. divers, grebes, herons, wildfowl, waders and raptors):

- Species listed on Annex1 of European Council Directive 2009/147/EC on the conservation of wild birds (i.e. 'Annex 1' species), in particular those that may be associated with populations of species that are qualifying interests of Special Protection Areas in the wider area;
- Species listed in Schedule 1 to the Wildlife and Countryside Act 1981, as amended (i.e. 'Schedule 1' species); and
- Species of national conservation concern, not included within the above categories, but that are present within the study area in nationally or regionally important numbers.

8.5. The methods proposed in this scoping request are intended to provide a suitably detailed set of ornithological baseline data against which an assessment of these potential impacts on key receptors can be undertaken.

8.6. Ornithological baseline surveys were commissioned by the Applicant and undertaken by NRP from October 2012 (the survey area and vantage point locations for the flight activity surveys are shown in Figure 6:

Ornithology Vantage Point Locations and Viewsheds, Appendix A). These surveys are ongoing and are summarised as follows (further detail is provided in the Baseline Data section and Table 8.1 below):

- Winter, Spring, Summer and Autumn Flight Activity Surveys;
- Winter Bird Surveys; and
- Moorland, Woodland and Raptor Breeding Bird Surveys.

8.7. All surveys have and will be carried out in compliance current SNH guidance for survey methods to inform the assessment of impacts on onshore wind farm development. It is intended that the surveys and flight activity surveys will continue until the end of September 2013 (providing one year of data).

Relevant Guidance, Legislation and Policies

8.8. In addition to the EIA regulations, consideration will also be given to the requirements of the Wildlife and Countryside Act 1981 as amended and all other relevant legislation, directives and conventions.

8.9. The assessment of effects on birds will also be carried out in line with the following guidance:

- SNH (2005a) Survey Methods for Use in Assessing the Impacts of Onshore Windfarms on Bird Communities;
- SNH (2005b) Guidance. Cumulative Effects of Windfarms;
- SNH (2006) Assessing the Significance of Impacts from Onshore Windfarms on Birds outwith Designated Areas; and
- SNH (2010) Guidance. Use of Avoidance Rates in the SNH Wind Farm Collision Risk Model.

Suggested Methodologies

Desk Study and Consultations

8.10. Having conducted many baseline surveys for wind farm developments in Dumfries and Galloway over recent years, NRP is familiar with the general area and its associated ornithological interest. In addition, the NRP principal surveyor lives locally to the Development site and has a sound historical knowledge of the area.

8.11. The Applicant consulted with SNH regarding the need for migration watches and SNH commented, via John Gibson (Operations Officer, South of Scotland[42]), that there was not felt to be a need for Migration watches.

8.12. Desk based searches for Designated Areas in the vicinity revealed that the Loch Ken and River Marshes SPA is designated for wintering geese and is approximately 13km from the Development. Potentially geese

[42] Email from J Gibson (SNH) to Infinergy 13/09/12.

may over fly the site, although SNH had indicated that numbers of geese were relatively small at the SPA.

8.13. Requests for recent ornithological information will be made to SNH and RSPB and the Dumfries and Galloway Study Group.

Constraints Analysis

8.14. Mapped data from the various ornithological surveys would be collated and important areas (i.e. nest sites of Schedule 1 and Annex I species, areas of critical supporting habitat, areas where there is a concentration of flight activity at wind turbine collision risk height) identified with appropriately sized set-back zones, for consideration in developing the wind farm layout. Historical breeding sites (i.e. records of nest locations, territory centres) of Schedule 1 raptor species, for example, will also be identified as a design constraint where there is a reasonable expectation that breeding attempts may occur in the future (i.e. where there remains adequate supporting habitat and an extant population in the surrounding area).

Evaluation and Impact Assessment

8.15. The assessment of effects on birds will be carried out in line with relevant legislation and standards, as described above (Relevant Guidance, Legislation and Policies section).

8.16. The assessment will follow the process set out in the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2011 ("the EIA Regulations") and guidance on the implementation of the Birds and Habitats Directives (SERAD 2000). The process of evaluating the effects of the Development on birds will seek to ensure that the competent authority has sufficient information to determine whether the Development (either alone or in combination with other developments) is likely to have a significant effect on bird interests.

8.17. The following types of potential effects resulting from the Development on birds will be considered in depth:

- Construction: habitat modification, land-take, disturbance and displacement;
- Operation: disturbance and displacement, collision mortality;
- Decommissioning: similar effects as for construction but of lower intensity temporally and spatially; and
- Cumulative: combined effects across projects within the region, largely or entirely relating to overlap on operation effects.

8.18. Effects will be assessed against the existing baseline conditions, i.e. without the Development present. This assessment will be carried out assuming that there are no existing significant adverse effects on the population, range or distribution of a species (i.e., no significant effect on the species' conservation status); and no significant interference with the flight paths of migratory birds.

8.19. The assessment will therefore first identify the possible effects of the Development and will then consider the likelihood of their occurrence. A judgement will then be made as to whether or not these effects are significant with respect to the EIA Regulations. In judging whether a possible effect is significant or not, two principal factors will be taken into account:

- The nature conservation importance of the bird populations present; and
- The magnitude of the likely effect.

8.20. In assessing the effects, emphasis will be given to the national and regional populations of the species. Trivial or inconsequential effects will be excluded.

8.21. The final report will include proposals for measures to mitigate any identified adverse effects of the Development on bird species. Potential measures including micrositing, the review of construction timing and land management regimes will be considered, as appropriate, in consultation with the appropriate statutory consultees. The need for, and scope of, further monitoring of bird activity in relation to the development site will also be defined as part of the assessment process.

Assessment under the Environmental Impact Assessment Regulations

8.22. Impacts will be assessed in relation to species' population, range and distribution. Key considerations will include territory occupancy, breeding success, foraging success and ranging behaviour. The assessment will:

- Evaluate the nature conservation importance of the bird interest in a systematic manner; and
- Estimate the magnitude of likely effects on each species as a result of the proposals.

8.23. The significance of each potential effect will be judged by integrating scales relating to ecological value, behavioural sensitivity and effects magnitude in a reasoned way, in the context of the status of, and trends within, species' regional populations (as defined by SNH Natural Heritage Zones [NHZ]). Measures will be presented to mitigate any effects deemed to be significant in terms of the EIA Regulations.

8.24. The effects of the Development will be assessed in isolation and in combination with predicted effects of other wind farm developments in the same NHZ. As part of this process, ES data for other wind farm developments will be sought.

Summary of Baseline Data

8.25. The nearest Designated Site for birds within 20 km is the Loch Ken and River Dee Marshes SPA (also a RAMSAR site) and is located approximately 6 km from the proposed Development site.

8.26. The site qualifies under Article 4.1 by regularly supporting, in winter, internationally important numbers of Greenland white-fronted goose (*Anser albifrons flavirostris*). In the five-winter period 1985/86 to 1989/90 the average peak count was 360 birds (2% of the world population; 4% of the numbers wintering in Britain).

8.27. The site also qualifies under Article 4.2 by supporting an internationally important wintering population of greylag goose (*Anser anser*). An average peak count of 1,150 birds was recorded in the five year period 1985/86 to 1989/90, representing 1% of the total Icelandic population, all of which winters in Britain.

8.28. The Loch Ken and River Dee Marshes also support important assemblages of breeding and wintering birds typical of open water and associated wetlands.

8.29. There are two Sites of Special Scientific Interest (SSSIs) within 10 km of the proposed wind farm site, Cleugh and Stenhouse Wood, neither of which is designated for bird interest.

8.30. The locations of these sites are shown on Figure 5: Ecological and Ornithological Designations, Appendix A.

Baseline Surveys

8.31. Baseline data on the survey area relevant to the Development has been collected following a desktop study of previous surveys in the wider area and given knowledge of the birds in the general area.

8.32. It is important to note that the proposed survey methods are indicative only and the overall approach will be flexible. Therefore, if information gathered during the surveys counters the initial assumed requirement for survey and observation effort, a revision to the effort requirement may be deemed necessary.

8.33. On-site surveys commenced in October 2012, and are ongoing. The prime objectives are to survey breeding, migrating and wintering birds within the Development area and quantify bird foraging activity during the breeding and non-breeding periods, over a 12 month period.

8.34. Surveys between October 2012 and February 2013 have not recorded any species listed in Annex 1 of the EU Birds Directive (79/409/EEC) on the Conservation of Wild Birds 1979 (the Birds Directive). The only species listed in Schedule 1 of the Wildlife and Countryside Act 1981 (WCA) to have been recorded is crossbill (*Loxia curvirostra*). Surveys are scheduled to continue until the end of September 2013.

8.35. Broad descriptions of the surveys to be conducted at the site are given below. Full details of the Methodology for each survey type are given in Appendix B.

8.36. A programme of Vantage Point (VP) watches was instigated in October 2012 and is ongoing (to be completed September 2013). This involves a minimum of 79 hours from each of the VPs during the 12 month period. Further detail regarding the hours of observation is given in "Flight Activity Survey" in Appendix B.

8.37. Targeted surveys to establish the breeding distribution of scarce breeding birds and diurnal raptors will be undertaken within distance buffers around the Development appropriate to the ranging behaviour of the species concerned. Proposed surveys cover all species considered likely to breed in the area including goshawk, hen harrier, merlin, peregrine and short-eared owl.

8.38. Surveys to locate barn owl nest and roost sites will also be undertaken.

8.39. Birds of open ground habitats will be surveyed using a modified Brown and Shepherd (1993)[43] method and woodland bird species will be surveyed using a selection of woodland count points.

8.40. Surveys to assess the abundance of prey items for raptors (field voles and skylarks) will also been undertaken.

8.41. The following surveys will have been undertaken by the end of September 2013 as noted under each survey type:

Table 8.1 Ornithology Baseline Surveys

Survey period	Survey type	Survey Description
Autumn/winter 2012 2013	Habitat mapping and initial visits	The site was visited in October 2012 and the habitat assessed for suitability for breeding bird species. A comprehensive habitat map of the area has been drawn up for a 2 km buffer around the proposed wind farm area. This map and visit information was used to inform the choice of surveys to be completed.
	Autumn and Winter transects /scans	The aim is to formally record bird activity over large areas relatively quickly. The method involves a series of shortened (~1 hour) vantage point watches linked by a walk route designed to maximise coverage of the survey area. This survey has been conducted October 2012 to March 2013 inclusive.

[43] Brown, A.F. and Shepherd, K.B. (1993) A method for censusing upland breeding waders. Bird Study 40: 3 pp189-195.

Survey period	Survey type	Survey Description
Summer 2013	Moorland breeding bird survey	Open land (to include scrub, isolated trees and copses) will be surveyed using a modified version of the Brown and Shepherd (1993) method for upland bird survey during April – June 2013. The objectives are to map the distribution of breeding territories of birds of conservation importance. The survey aims to cover all areas within 500 m of the location of components of the Proposal, as currently envisaged. The species surveyed include, but is not restricted to, birds of conservation concern (Eaton, et al 2009)[44].
	Woodland breeding bird survey	Patches of scrub and isolated trees will be surveyed as part of the breeding bird survey of open habitats (see above). Woodland/forest breeding birds will be surveyed from approximately 25 woodland count points stratified spatially across the proposed wind farm area and the 500m buffer. The objectives are to describe the species composition of the woodland bird community.
	Black grouse survey	It is proposed that black grouse will be surveyed, only in suitable habitat, during the course of breeding bird surveys of moorland, farmland and woodland as described. In these areas surveys will be conducted within two hours of dawn to target potential black grouse leks. Any identified leks will be observed carefully to record the direction and height of birds flying to/from the lek site. Methods will follow those in Gilbert et al (1998)[45]. At other times of year, suitable habitat will be searched for evidence of occupation, (such as feathers, droppings etc).

[44] Eaton, M.A., Brown, A.F., Noble, D.G., Musgrove, A.J., Hearn, R., Aebischer, N.J., Gibbons, D.W., Evans A. and Gregory, R.D. (2009) Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man. British Birds 102, pp296–341.
[45] Gilbert, G., Gibbons, D.W. and Evans, J. (1998) Bird Monitoring Methods. RSPB, Sandy, UK.

Survey period	Survey type	Survey Description
Summer 2013	Breeding diurnal raptor survey	The aim is to determine the distribution of breeding attempts of diurnal raptors within and adjacent to the Proposal. Site visit information and the habitat map suggest that for a 2 km radius of this Development the habitat is potentially suitable for breeding short-eared owl, goshawk, hen harrier, merlin and peregrine. However, evidence of breeding by any other raptor species listed in Schedule 1 of the Wildlife & Countryside Act (1981) will be investigated thoroughly. Breeding success will also be recorded wherever possible, since it is an important determinant of flight activity levels. Surveys will be undertaken under licence from SNH by experienced field ornithologists. Extreme care will be taken to avoid unnecessary disturbance to breeding birds. Methods follow those described in Hardey et al (2009)[46].
Summer 2013	Breeding barn owl survey	The aims of the survey are to determine the distribution and occupancy of potential barn owl breeding sites within 1 km of the Development.
	Assessment of field vole abundance	Field voles are important prey for some raptors and owls. Field vole abundance varies spatially and temporally and these changes can influence raptor and owl distribution and breeding success. The aim is to estimate the abundance of field voles in areas of suitable habitat.
2012/2013	Flight activity (vantage point watches)	The aims are (1) to record flight activity within the vicinity of the Proposal in order to identify areas of greatest importance to birds and (2) to quantify flight activity in the vicinity of the likely turbine locations in order to estimate collision risk. The methods given in Band, Madders & Whitfield (2007)[47] are being used. Timing: Watches are being undertaken in each month of the year. A total of at least 79 hours from each of 2 Vantage Points (VPs) will be completed during the 12 months of survey. A map of the VPs used and visible areas has been provided to SNH previously, as part of initial consultations. Care is taken to minimise possible disturbance to birds. Normally, all points within the survey area will be within 2 km of a VP. Subsequent to confirmation from SNH, migration vantage point watches have not been conducted at this site.

[46] Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B., and Thompson, D. (2009) Raptors: a field guide to survey and monitoring. The Stationary Office, Edinburgh.
[47] Band, W., Madders, M. & Whitfield, D.P. (2007). Developing field and analytical methods to assess avian collision risk at wind farms. In: de Lucas, M, Janss, G. & Ferrer, M. (eds). Birds and Wind Power. Lynx Edicions, Barcelona.

Key Sensitive Receptors

8.42. To date, field surveys have not identified any species of concern (as of March 2013).

8.43. Given the habitat within the site boundary and within a 2 km buffer, potentially sensitive receptors include mainly birds of prey (raptors) such as **merlin, peregrine, goshawk, hen harrier and short-eared owl**. Surveys to assess the status of these species during the breeding season are described above in the Baseline Surveys section and in greater detail in Appendix B. The status of these species during the non-breeding season will be ascertained following completion of the winter site transect surveys also described in the Baseline Surveys section and Appendix B.

8.44. **Black grouse** are also a potential sensitive receptor and specific surveys to assess the status of this species will be conducted in Spring 2013 and are described above in the Baseline Surveys section and Appendix B.

Key Questions for Consultees

8.45. The following are what are thought to be the key issues which require consideration by the consultees:

- Which, if any, SPAs do SNH consider the proposal could have a significant effect on and therefore for which sites the competent authority has to undertake an appropriate assessment?
- If appropriate assessment(s) is required which plans or projects do SNH advise should be taken into consideration for the 'in combination' part of the assessment(s)?
- Are the consultees content with and / or have any comments on the list of effects and key sensitive receptors?
- Are the consultees content with and / or have any comments on the baseline survey methods and level of proposed survey effort taking into consideration current guidance, the proposed scale and location of the wind farm, survey worked completed to date and the key findings and identified sensitive receptors?
- Are the consultees content with and/or have any comments on the proposed receptor evaluation and impact assessment methods?
- Are there any specific consultees who should be contacted?

CULTURAL HERITAGE

Introduction

9.1. For the purposes of the assessment, cultural heritage interests are deemed to include both above ground (the built heritage) and below ground remains. The assessment will consider both direct and indirect (largely visual) effects upon the following cultural heritage receptors:

- Archaeology – above and below ground, designated or not. Consideration will be given to the potential for currently unknown (buried) archaeological remains to exist within the Development site;
- World Heritage Sites, Scheduled Monuments, Listed Buildings, Inventoried Gardens and Designed Landscapes (GDL), Inventoried Battlefields, Protected Wrecks and Conservation Areas;
- Archaeological Areas as shown on the relevant local plan; and
- Heritage assets marked or publicised (for example archaeological/heritage trails).

Methodology

9.2. A desk-based assessment of cultural heritage records will be undertaken to establish the baseline against which the impact assessment will be carried out. Data will be gathered from the following sources:

- Dumfries and Galloway Archaeology Service which maintain the Dumfries and Galloway Historic Environment Record (HER) and which provide the archaeological services for the area;
- The Dumfries and Galloway Council Conservation Officer;
- Aerial photographs and other cartographic information on pre-recent land uses;
- The National Monuments Record of Scotland;
- Historic Scotland's databases of nationally designated sites; and
- Local Studies Libraries and other archives as appropriate.

9.3. A study area of 1 km around the Development site boundary will be used to collect data to inform on the archaeological potential of the site. For purposes of indirect impact assessment, data on nationally designated cultural heritage features will be collected to a maximum of 15 km from the proposed development site centre.

9.4. Initial information relating to cultural heritage and archaeology will be gathered through a preliminary desk top search to identify potential features of interest.

9.5. The desk-based assessment will be augmented by a walkover survey to provide information on the archaeological potential of the area, and to validate the documentary evidence. This fieldwork will be conducted to:

- Assess and validate documentary data collected;
- Identify the extent and condition of any visible monuments;
- Determine whether previously unrecorded historic features are visible; and
- Subject to the findings of the desk-based assessment the requirement for and extent of any additional surveys will be agreed in consultation with the Historic Environment Team.

9.6. An assessment will be made of the potential indirect effects upon the setting of cultural heritage features including historic landscapes. This assessment will be made against the same Zone of Theoretical Visibility used in the Landscape and Visual Impact Assessment. This may also include visual representations such as photomontages and / or wirelines.

9.7. The assessment will be supported by presentation of the data in assessment tables, with a gazetteer and location plan. The Cultural Heritage ES chapter will also include proposals for mitigation of any identified impacts where necessary.

9.8. Consultation will be undertaken with the Dumfries and Galloway Archaeologist and Historic Scotland and other stakeholders as appropriate.

Current Baseline Knowledge

9.9. Preliminary desk studies indicate that there are no World Heritage Sites or Inventoried Battlefields within 15 km of the site. However there is one Inventoried Gardens and Designed Landscapes (Brooklands) situated within approximately 9.2 km south-east of the site and one Property in Care (Threave Castle) situated 13.8 km south of the site.

9.10. There is one Scheduled Monuments within 5 km of the site, two category A and nine Category B Listed Buildings within 5 km which are considered to have the potential to receive a significant effect. These are detailed in Table 9.1.

Table 9.1 Scheduled Monuments, Category A & B Listed Buildings within 5 km of the site

Number	Name	Designation	Approximate Distance and Direction
1082	Little Merkland, fort	Scheduled Monument	3 km south-west
17094	Corsock House, Gates	Category A Listed Building	3.8 km south-east
3315	Ironmacannie Mill	Category A Listed Building	4.3 km south-west
17099	Corsock, Old Tempereance Inn	Category B Listed Building	4.4 km south-east
50001	Corsock, Signpost at Junction of A712 and B794	Category B Listed Building	4.6 km south-east

Number	Name	Designation	Approximate Distance and Direction
3317	Troquhain Sundial	Category B Listed Building	2.6 km north-west
17092	Corsock Bridge	Category B Listed Building	4.5 km south-east
17095	Corsock House, Stables	Category B Listed Building	3.8 km south-east
17080	Corsock House	Category B Listed Building	3.9 km south-east
9654	Glaisters bridge	Category B Listed Building	3.8 km north-east
9655	Holmhead	Category B Listed Building	4.5 km south-east
17093	Corsock, Chapel	Category B Listed Building	4 km south-east

9.11. Figure 7, in Appendix A, shows the location of these sites.

Key Questions for Consultees

9.12. The following information will be sought from the Council Archaeologist and Historic Scotland:

- Do the Council agree with the proposed methodology and scope of assessment?
- Does the Council have any information regarding current or recent archaeological work or projects being undertaken within or in the vicinity of the Development site, particularly those whose results may not yet be recorded in the National Monuments Record for Scotland?
- Are the Council aware of any further sites with statutory protection within the wider landscape whose settings may be affected by the Development?
- Are there any specific consultees who should be contacted?

HYDROLOGY AND HYDROGEOLOGY

Introduction

10.1. A hydrogeological survey will be undertaken in order to establish the baseline conditions and assess the potential effects of the Development, significance and the potential for mitigation.

10.2. The site occupies undulating upland area dominated by forestry. The Development site rises from approximately 165 m above ordnance datum (AOD, approximately equivalent to sea level) in proximity to Lowes Lochs (in the northern section of the site) to 282 m at Larglear Hill (in the southern central part of the Development site).

Methodology

10.3. Arcus will carry out the hydrology and hydrogeology assessment in-house. A site walkover, consultation, desk studies and data requests will be undertaken to inform the assessment.

10.4. Arcus will obtain hydrology and geology data including, (but not limited to), the following aspects:

- Review of published data and maps;
- Consultation with the Scottish Environmental Protection Agency (SEPA), Dumfries and Galloway Council and the British Geology Survey;
- Identification of solid and surface geologies;
- Review of Pollution Prevention Guidelines;
- Identification of surface water features, catchments and Groundwater Dependent Terrestrial Ecosystems (GWDTEs);
- Preparation of a catchment plan;
- Identification of data on public and private abstractions and supplies, and risk assessment of these;
- Identification of other similar developments within 10 km;
- Collation of flood plain information, water quality data and groundwater vulnerability information;
- Production of site water management plan; and
- Flood risk assessment to meet the requirements of the SPP Framework.

10.5. Arcus will provide an ES chapter assessing potential effects on hydrology, geology and hydrogeology resources. The assessment and chapter will describe the potential effects of the Development including:

- Details of consultation undertaken;
- Assessment methodologies for construction and decommissioning phases;

- Hydrological walkover survey details and results;
- Assessment of the operational and decommissioning phases of the project to establish the effect on the hydrological resource;
- Identify mitigation measures, where necessary;
- Identify any residual effects following mitigation; and
- Cumulative assessment with other developments within 10 km of the Development; and
- Statement of significance in accordance with the Environmental Impact Assessment Regulations 2011[48].

10.6. Arcus will produce a Water and Construction Management Plan (WCMP) to be included as part of the embedded development design. The WCMP will comprise methods and works that are established and effective measures to which the Developer will be committed through the development consent. Accordingly, the assessment of significance of effects of the Development should be considered with the inclusion of the WCMP. Mitigation measures in order to protect the water environment will be outlined in the WCMP.

Baseline Conditions

10.7. An initial review of the hydrological and ground conditions of the Development site has been undertaken. This section outlines the potential hydrological receptors which have been identified within Development site and its wider area.

Surface Water

10.8. The receptors which have been identified on-site include several named and unnamed tributaries of Urr Water, namely Crogo Burn and the headwaters of Auchenney Burn. Two lochs are located immediately north of the Development site, namely Lewes Loch and Knowetop Lochs, of which both feed Barlay Burn. Urr Water is classified by SEPA as having a 'Moderate' ecological status under the Water Framework Directive. Urr Water is noted as a fisheries resource for salmon under the Fresh Water Fish Directive.

Statutory Designated Sites

10.9. There are no statutory designated sites in the area surrounding the Development site which are potentially hydrologically connected to the Development site.

Peat

10.10. The superficial geology of the Development site is likely to include peat. Geotechnical and ecological work will be undertaken as part of the EIA

[48] Scottish Government, 2011, [online] Available at: http://www.legislation.gov.uk/ssi/2011/139/contents/made [Accessed 06/03/2013].

process to understand its characteristics and ensure that the embedded design and suggested mitigation (if required) is appropriate.

Groundwater Dependent Terrestrial Ecosystems (GWDTEs)

10.11. It is anticipated that peat deposits are located onsite and that GWDTEs will exist within the Development site. The location, type and extent of the GWDTEs will be determined with the aid of a National Vegetation Communities (NVC) survey, which inform the assessment of the hydrological function of the GWDTEs.

Private and Public Water Supplies

10.12. Information pertaining to the location, type and source of public and private water supplies will be identified through consultation with relevant statutory consultees.

Groundwater

10.13. The groundwater unit underlying the Development site is identified as the 'New Galloway bedrock and localised sand and gravel aquifers', which is classified as having a 'Good' SEPA RBMP quantitative and qualitative status.

Flood Risk

10.14. The Indicative River and Coastal Flood Map (Scotland) produced by SEPA shows the areas of Scotland with a 0.5 % (1:200) or greater chance of flooding. These areas are known as medium to high risk areas for flooding. No Development infrastructure is located in an area described as medium to high risk area for flooding.

Key Sensitivities

10.15. At this stage, the main key sensitivities are considered to be named and unnamed tributaries of Urr Water, peat, groundwater and the hydrological function of GWDTEs. Information pertaining to private and public water supplies is yet to be received.

Key Questions for Consultees

10.16. The following questions have been designed to ensure that the proposed methodologies and assessment are carried out in a robust manner and to the satisfaction of the determining authorities:

- Do the Council and the consultees agree with the proposed methodology and scope of the hydrology and hydrogeology assessment?
- Does the Council, SNH, SEPA or other consultees have any information that would be useful in the preparation of the hydrology and hydrogeology assessment?

- Are there any specific consultees who should be contacted?

NOISE

Introduction

11.1. Sources of noise during operation of a wind turbine are mechanical (from machinery housed within the turbine nacelle) and aerodynamic (from the movement of the blades through the air). Modern turbines are designed to minimise mechanical noise emissions from the nacelle through isolation of mechanical components and acoustic insulation of the nacelle. Aerodynamic noise is controlled through the design of the blade tips and edges. In most modern wind turbines, aerodynamic noise is also restricted by control systems which actively regulate the pitch of the blades.

11.2. While noise from the wind turbines does increase with wind speed, at the same time ambient background noise (for example wind in trees) usually increases at a greater rate. Planning conditions are used to enforce compliance with specified limits.

Operational Noise Limits

The Assessment and Rating of Noise from Wind Farms (ETSU-R-97)

11.3. The assessment methodology for operational noise is described in ETSU-R-97 'The Assessment and Rating of Noise from Windfarms'. The basic aim of ETSU-R-97 is to provide:

> *"Indicative noise levels thought to offer a reasonable degree of protection to wind farm neighbours, without placing unreasonable restrictions on wind farm development or adding unduly to the costs and administrative burdens on wind farm developers or local authorities"*.

11.4. The report makes it clear from the outset that any noise restrictions placed on a Development must balance the environmental impacts of the Development against the national and global benefits which would arise through the development of renewable energy sources.

11.5. The specific methodologies involved in applying ETSU-R-97 to a proposed new development will be detailed in full in the ES but, in summary, these provide recommendations for noise limits relating to the existing levels of background noise for quiet day-time and night-time periods.

11.6. To carry out a noise assessment in accordance with ETSU-R-97, the following steps are required:

- Specify the number and locations of the wind turbines;
- Identify the locations of the nearest, or most noise sensitive, neighbours;

- Determine the background noise levels as a function of site wind speed at the nearest neighbours, or at least at a representative sample of the nearest neighbours;
- Determine the quiet day time and night time criterion curves from the background noise levels identified at the nearest neighbours;
- Specify the type and noise emission characteristics of the wind turbines proposed for the site;
- Calculate the noise immission[49] levels due to the operation of the wind turbines as a function of site wind speed at the nearest neighbours; and
- Compare the calculated noise immission levels with the derived criterion curves and assess in the light of relevant planning requirements.

11.7. If required, a baseline noise survey will be carried out at properties situated close to the site. Background noise monitoring will be carried out at a representative selection of these receptors, subject to the agreement of residents, and in consultation with Dumfries and Galloway Council.

Prediction and Assessment of Wind Turbine Noise (Bowdler et. al. 2009)

11.8. Bowdler *et al*. (2009)[50] sets out a number of preferred procedures for the prediction and assessment of wind farm noise and the form in which certain information should be presented to support an environmental noise assessment for a proposed wind farm development. The authors included members of the Noise Working Group responsible for the preparation of ETSU-R-97, and include those who represent developers, local authorities and third party groups. The recommendations are intended to enhance the quality of wind farm noise assessments and usefully limit areas of disagreement between parties acting for developers and those acting for local authorities or third parties, and supplement the recommendations of ETSU-R-97. Appendix 1 of the Technical Advice Note: Assessment of Noise makes reference to the advice contained in Bowdler *et al*. (2009).

11.9. The following issues were addressed:

- The acquisition of baseline data;
- The prediction of wind turbine noise immission levels at receptor locations; and
- The significance of low-frequency noise, infrasound and ground-borne vibration.

11.10. The recommendations of the advice with respect to background noise data relate principally to the measurement and use of wind speed data, against which background noise measurements are correlated. The

[49] 'Immission' refers to the noise at a receiver location, whereas 'emission' relates to noise produced by a source.
[50] Prediction and Assessment of Wind Turbine Noise: Agreement about relevant factors for noise assessment from wind energy projects, Bowdler *et al*., Acoustic Bulletin, Vol 34 No2 March/April 2009, Institute of Acoustics.

article recommends measuring wind speeds at two heights, H1 and H2, H1 being not less than 60% of the proposed turbine hub height and H2 being between 40% and 50% of proposed hub height. For each ten minute period the mean wind speed measured at height H1 should be corrected to hub height using a specified procedure, which takes account of the wind shear conditions occurring during that 10 minute period. The calculated hub height wind speed is then corrected to 10 m height using the procedure specified in BS EN 61400-11:2003[51] Section 8.1, which applies a standardised wind shear profile.

11.11. The above procedure effectively correlates background and wind turbine noise levels against hub height wind speeds, albeit referenced to a height of 10 m AGL. This eliminates a potential source of error that has been identified due to the use of 10 m wind speed measurements, where the turbine noise levels may be inaccurately quantified due to the wind shear conditions on site being different to those assumed in the measurement process.

11.12. The article recommends the use of the ISO 9613-2 method in calculating the levels of wind turbine noise at receptor locations ('immission levels'), with the following specific measures:

- The turbine sound power levels should be stated, and whether these are measured levels, measured levels with an allowance for measurement uncertainty, warranted levels or generic levels;
- The atmospheric conditions assumed should be stated, with 10°C and 70% Relative Humidity preferred;
- The ground factor assumed should be either:

  (i) G = 0 (hard ground), together with measured sound power levels; or

  (ii) G = 0.5 (mixed ground); together with a receiver height of 4.0 m and either manufacturer's warranted sound power levels, or measured sound power levels plus an allowance for measurement uncertainty.
- Barrier attenuation should not be included; and
- The predicted noise levels ($L_{Aeq,t}$) may be converted to the required $L_{A90,10min}$ by subtracting 2 decibels (dB).

Good Practice Guide to the Application of ETSU-R-97 for Wind Turbine Noise Assessment

11.13. The Department of Energy and Climate Change recently requested the Institute of Acoustics (IOA) to set up a working group to prepare good practice guidelines on the assessment of wind farm noise. A draft consultation document was issued in July 2012 and subsequent to comments a final report is expected in early 2013. The

[51] BS EN (IEC) 61400-11:2003 Wind Turbine Generator Systems – Part 11: Acoustic Noise Measurement Techniques.

recommendations made in the final report will be followed in the assessment included within the ES.

Wind Energy Development Interim Planning Policy (IPP)

11.14. Reference will also be made to the requirements in terms of noise contained within Dumfries and Galloway Council's Wind Energy Development IPP.

Cumulative Assessment

11.15. ETSU-R-97 states that the noise limits that it recommends apply to the cumulative effect of noise from all wind turbines that may affect a particular location. Therefore a search will be undertaken, in consultation with Dumfries and Galloway Council, to identify any wind energy developments, either operational, consented or in planning, which may require consideration in the assessment process.

Low Frequency Noise, Infrasound and Amplitude Modulation

11.16. A study[52], published in 2006, by Hayes McKenzie on behalf of the DTI investigated low frequency noise from wind turbines. This study concluded that there is no evidence of health effects arising from infrasound or low frequency noise generated by wind turbines. It also noted, however, that a phenomenon known as Aerodynamic Modulation (AM) was in some isolated circumstances occurring in ways not anticipated by ETSU-R-97.

11.17. A further study[53] was carried out on behalf of the Department for Business, Enterprise and Regulatory Reform by the University of Salford, which investigated the incidence of noise complaints associated with wind farms and whether these were associated with AM, defined as aerodynamic noise from wind turbines with a greater degree of fluctuation than normal at blade passing frequency.

11.18. The study concluded that AM has occurred at only a small number (4 of 133) of wind farms in the UK, and only for between 7% and 15% of the time. It also states that the causes of AM are not well understood as yet, and that prediction of the effect is not currently possible. On the basis of the Salford study, a formal statement[54] issued by the Government concluded that the issue was not sufficient to warrant further investigation or review of current practices, and that the methodologies set out in ETSU-R-97 remain the current standard of assessment.

11.19. Bowdler *et al.* (2009) concludes:

[52] The Department for Trade and Industry, (2006). The measurement of low frequency noise at three UK windfarms. Hayes Mckenzie.
[53] The Department for Business, Enterprise and Regulatory Reform, (2007). Research into aerodynamic modulation of wind turbine noise. Report by University of Salford.
[54] Department for Business, Enterprise and Regulatory Reform (2007). Government statement regarding the findings of the Salford University report into Aerodynamic Modulation of Wind Turbine Noise. (http://www.berr.gov.uk/files/file40571.pdf.)

"...there is no robust evidence that low frequency noise (including 'infrasound') or ground-borne vibration from wind farms, generally has adverse effects on neighbours".

11.20. It is therefore not considered necessary to carry out specific assessments of low frequency noise, infrasound or amplitude modulation. However, further supporting information on these subjects will be provided in the ES.

11.21. Renewable UK is currently conducting further research into Amplitude Modulation, with the objectives of identifying its causes, establishing a dose-response relationship, developing measurement and assessment techniques and drafting sample planning conditions. The study is expected to report in Autumn 2012, and any recommendation made in the final report will be addressed within the ES.

Construction Noise

11.22. The following legislation and standards are of particular relevance to construction noise:

- The Control of Pollution Act 1974 (CoPA 1974);
- The Environmental Protection Act 1990 (EPA 1990); and
- BS 5228: 2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites.

11.23. CoPA 1974 provides local authorities in Scotland, England and Wales with powers to control noise and vibration from construction sites. Section 60 of the Act enables a Local Authority to serve a notice to persons carrying out construction work of its requirements for the control of site noise. Section 61 of the Act allows for those carrying out construction work to apply to the Local Authority in advance for consent to carry out the works.

11.24. The EPA 1990 applies in the UK, and specifies mandatory powers available to Local Authorities in respect of any noise that either constitutes or is likely to cause a statutory nuisance, which is also defined in the Act. A duty is imposed on Local Authorities to carry out inspection to identify statutory nuisances, and to serve abatement notices against these. Procedures are also specified with regards to complaints from persons affected by a statutory nuisance.

11.25. BS 5228 provides guidance on controlling noise and vibration from construction sites. It:

- Refers to the need for the protection against noise and vibration of persons living and working in the vicinity of and those working on construction sites;
- Recommends procedures for noise and vibration control in respect of construction operations; and
- Stresses the importance of community relations, stating that early establishment and maintenance of these relations throughout the

carrying out of site operations will go some way towards allaying people's fears.

11.26. The acceptability of construction noise is likely to be affected by the location of the site, relative to the noise sensitive premises; existing ambient noise levels; the duration and working hours of site operations; the characteristics of the noise produced and the attitude of local residents to the site operator.

Key Questions for Consultees

11.27. Key questions for the Council and Statutory Consultees are:

- Do the Council agree with the proposed method of assessment?
- What other wind energy developments should be taken into consideration in the cumulative noise assessment?
- What are the Council's requirements for information on noise during construction?
- Are there any specific consultees who should be contacted?

TRAFFIC AND TRANSPORT

Introduction

12.1. The traffic and transportation aspects of the EIA will be completed by Arcus with input from JMP Consulting. The assessment will consider the effects of the Development on the wider road network and traffic volumes.

Methodology

12.2. The methodology to be employed in the assessments has been developed from guidance given in the Guidelines for the Environmental Assessment of Road Traffic (IEMA 1993) and Guidelines for Traffic Impact Assessment (IHT 1994). Methodologies detailed in the IHT guidelines recommend that Environmental Statements should be assessed in accordance with the IEMA guidelines noted above.

12.3. The ES will contain a chapter assessing the traffic and transport effects of the proposal. This chapter will take into account relevant statutory guidance published by the Scottish Government and Dumfries and Galloway Council as well as any relevant guidance published by statutory bodies. The following guidance will be considered:

- SPP;
- PAN 75 – Planning for Transport; and
- Scottish Government Planning Specific Advice Sheet for Onshore Wind Turbines.

12.4. It should be noted that the above list may be subject to change in the case that various policies and guidance are replaced or updated during the project. In addition, other relevant guidance required by the client will be considered for inclusion.

12.5. An initial access route study has been undertaken and has identified a preferred route as being from the Port of Ayr via A77, A713 and finally the A712 from where site access would be taken. The access route is shown on Figure 8: Indicative Access Route. While this route appears to be suitable, other routes may be examined should the developing project require further consideration of alternative access routes.

12.6. The geographic scope of these studies will need to be confirmed in consultation with the relevant roads and highways authorities. However, based on the location identified for the site, it is anticipated that the study will need to encompass, the A77, A713 and the A712. All potential receptors along these routes will also need to be considered.

Assessment of Effects

12.7. In assessing traffic effects, we would make use of the findings of the access route study for the physical constraints and measures required for access.

12.8. It is possible that baseline traffic surveys will be required to supplement existing records.

12.9. The study would consider effects on:

- Road Uses (delay and safety);
- Road Infrastructure (dilapidation); and
- Adjacent community/properties (safety and congestion).

12.10. Numerical analyses of delay, etc using network modelling or junction modelling is presently assumed not to be required. The study would consider effects during construction, operation and decommissioning.

12.11. The approach to assessing sensitivity and magnitude of effects is a judgement based approach as used in recent EIA and the detailed methodology. In terms of road networks, the sensitivity to change in traffic levels of any given road segment or junction is generally assessed by considering the residual capacity of the network under existing conditions. Where there is a high degree of residual capacity, the network may readily accept and absorb an increase in traffic, and therefore the sensitivity may be said to be low. Conversely, where the existing traffic levels are high compared to the road capacity, there is little spare capacity, and the sensitivity to any change in traffic levels would be considered to be high.

12.12. The determination of the magnitude of the effects will be undertaken by reviewing the outline proposals for the development, establishing the parameters of the road traffic that may cause an effect, and quantifying these effects.

12.13. The study would consider effects during construction, operation and decommissioning.

12.14. In brief, the steps involved in this study would be as follows:

- Consultation with the relevant roads authorities and emergency services (Dumfries and Galloway Council, Transport Scotland, Police etc) as well as any local forestry interests;
- Procure existing traffic data, and arrange additional surveys where necessary;
- Route inspections including detailed observations of each community potentially affected by the proposals within the study area. We would provide general effects statements for the wider A77 corridor. However, the detailed and numeric assessment would be limited to the roads in closer proximity to the site, i.e. between the exit from the A77 and the site entrance on the A712;

- Based on the route inspections, sensitive receptors would be identified;
- In consultation with the Applicant and the relevant roads authorities, we would discuss route options to be explored;
- We would make an initial assessment of traffic generation from the proposed works would be undertaken. Assignment of traffic to the network, and an initial assessment of effects. This will be based on professional judgement rather than transportation network modelling;
- Obtain refined project needs, refine traffic generation, and re-assess effects, using obtained baseline traffic data;
- Assess residual effects following the primary mitigation built in by virtue of the above-mentioned iteration, and any required residual mitigation needs; and
- Identify and assess the potential for cumulative effects based on other known developments.

Key Questions

12.15. Key questions for the Council and Statutory Consultees are:

- Do the Council/ Statutory Consultees agree with the proposed method of assessment?
- Are the Council/ Statutory Consultees aware of any specific access restrictions or limitations on the proposed abnormal loads route?
- Are there any specific consultees who should be contacted?

AVIATION

13.1. Wind turbines have the potential to affect civil and military aviation operations.

13.2. An initial review of GIS datasets indicates that there are no CAA aerodromes within 30 km of the site; Prestwick Airport is the nearest to the site, approximately 60.9 km northwest of the Site.

13.3. No Ministry of Defence (MoD) bases are located within 50 km of the site, RAF Prestwick is the nearest lying approximately 59.6 km northwest of the Site. The Site is identified as being within an area described as 'High priority military low flying area likely to raise considerable and significant concerns' on the MoD Low Flying Consultation Zones map [55]. The MoD no longer respond to pre-application consultation requests due to resourcing issues, and have not been doing so since June 2011. Nonetheless, the Applicant has sought to consult with the MoD and has completed the pre-application consultation request proforma, submitted on 4th April 2013. No response has been received to date, however the MoD will have the opportunity to comment on the application as part of the scoping process. Should the MoD respond with concerns, then the Applicant would seek to engage with the MoD, review potential effects the site might have and consider the mitigation options that might be available to them to limit the potential effects.

13.4. Based on the NATS En-Route Plc (NERL) publically available radar maps, a turbine with a blade tip height of 146.5 m would be visible to NERL Primary Surveillance Radar (PSR). However, this should only be considered a preliminary assessment, and will be subject to further analysis by NATS at a later stage.

13.5. No meteorological radar stations have been identified within 50 km of the site boundary. Holehead Meteorological Station is the nearest, approximately 91.5 km north.

13.6. No civil airfields have been identified within 5 km of the site.

13.7. Eskdalemuir Seismic Station is located 57.4 km to the east-north-east of the site. As such it is outside the 50 km consultation zone.

13.8. A search for private airfields has been conducted involving a review of aviation maps, OS Maps and aerial photography. The only private airfield identified within 5 km of the Development site is Glenswinton Airfield[56], located approximately 1.4 km southwest of the Development site boundary. The runway, with dimensions of 430m x 15m, is approximately orientated southwest-northeast, roughly in line with the Development site. Landing approach is from the southwest and take off is towards the southwest – in both cases away from the Development site. The use of the airfield strictly requires private permission (PPR) and

[55] Ministry of Defence Low Flying Consultation Zones maps are available online at: https://restats.decc.gov.uk/cms/aviation-safeguarding-maps/ [accessed 19/03/2013
[56] http://www.glenswinton.co.uk/.

is limited to 28 days usage per year and as a result does not experience high volumes of flight traffic. The Preferred Noise Abatement Procedure[57] for the airfield is to join overhead or cross-wind and fly a tight circuit to avoid overflying dwellings other than Glenswinton Farm. On departure the procedure is to fly a climbing turn over uninhabited land.

13.9. Consultation with relevant aviation providers is a routine part of wind farm development and consultees will include:

- Civil Aviation Authority (CAA);
- Defence Estates, Ministry of Defence;
- NATS; and
- Glenswinton Airfield (Private Airfield).

13.10. Other additional information obtained from consultation aviation will be used to inform the future layout iterations.

Key Questions

13.11. A key question for the Council and Statutory Consultees is:

- Are there any additional consultees who should be contacted, including local airfields?

[57] http://www.glenswinton.co.uk/ .

EXISTING INFRASTRUCTURE

14.1. Wind farms have the potential to interfere with electro-magnetic signals passing above ground and physically with existing infrastructure below ground. This can therefore potentially affect television reception, fixed telecommunication links and other utilities. To identify any existing infrastructure constraints, a desk based study as well as consultation will be conducted. Consultation with relevant telecommunication and utilities providers is a routine part of wind farm development and consultees will include:

- Spectrum licensing / OFCOM;
- Television and telecommunications providers as appropriate; and
- Water, gas and electricity utilities providers.

14.2. Other additional information obtained from consultation will be used to inform the future layout iterations.

SOCIO-ECONOMICS AND TOURISM

15.1. A desktop socio-economic assessment will consider the potential direct and indirect effects of the Development. A range of existing surveys and assessments of socio-economic and visitor profiles, land use and ownership, and public attitudes will be collated to provide background information against which to assess the potential for significant effects.

15.2. In respect of recreation and access, consultations will take place to assess the effects to users of the public rights of way, cycle routes, and bridleways. This will include consultations with Dumfries and Galloway Council and organisations such as the British Horse Society, Ramblers Association, Scotways, Sustrans, and other relevant organisations.

15.3. In terms of tourism to the area, consultations will take place to assess effects on the economy in relation to tourism. This will include consultations with local businesses and other relevant consultees within the vicinity of the Development.

15.4. Effects will be considered based on the guidance from Guidelines for Environmental Impact Assessment[58] and a Handbook for EIA[59].

Key Questions

15.5. A key question for the Council and Statutory Consultees is:

- Are there any specific consultees who should be contacted?

[58] Institute of Environmental Management and Assessment (IEMA) (2004) Guidelines for Environmental Impact Assessment.
[59] Scottish Natural Heritage (SNH) (2003) A Handbook for Environmental Impact Assessment, Appendix 5: Guide to Outdoor Access Assessment.

SHADOW FLICKER AND REFLECTIVITY

16.1. Reflectivity is the potential for the sun to 'glint' off structures which, in the case of wind turbines, can be an intermittent glint when the turbines are rotating. This effect can be minimised by selecting a matt coating for the wind turbines, designed to reduce the potential for reflection.

16.2. Due to the lack of explicit guidance in Scotland, guidance within England is considered to be material for assessing shadow flicker effects. Guidance presented within the Companion Guide to PPS22[60] describes shadow flicker as an effect that:

> *"under certain combinations of geographical position and time of day, the sun may pass behind the rotors of a wind turbine and cast a shadow over neighbouring properties. When the blades rotate, the shadow flicks on and off. It only occurs inside buildings where the flicker appears through a narrow window opening."*

16.3. The Companion Guide provides further advice that the shadow flicker effect can only occur within 130 degrees either side of north relative to the turbine positions, as turbines do not cast long shadows on their southern side. It is also known that the effect is most likely to occur within 10 rotor diameters.

16.4. An assessment will be undertaken to identify any potential shadow flicker effects in line with government guidance. Effects will be quantified using a computer model during the EIA process and mitigation, if required, will be outlined.

[60] Department of Local Communities and Government (2004) Planning for Renewable Energy: A Companion Guide to PPS22, pp 177.

CO_2 DISPLACEMENT

17.1. The purpose of the Development will be to produce electricity from a renewable source, the wind, thereby displacing carbon dioxide (CO_2) and other greenhouse gas emissions that would occur through the production of the equivalent amount of electricity from fossil fuel sources. The EIA will consider the current electricity generation mix and assess the level of CO_2 savings that could potentially be made depending on the source of electricity generation the wind farm is displacing at any given time.

17.2. CO_2 emissions can also be generated from the degradation of peatland should a wind farm be constructed in peatland habitat, as peat based soils can act as carbon sinks or carbon sources depending on how they are managed. Should peat be present on the site in sufficient abundance and depth at the Development, the potential effects associated with construction on peatland would be considered as part of the EIA.

17.3. SNH guidance[61] on carbon savings associated with wind farms on areas of blanket bog and forests states that wind farms pay back any carbon loss through development on peat within 1-3 years. However, the payback period can be longer if the design of the wind farm on peatland allows wholesale degradation of the peat.

17.4. Good practice guidelines such as those presented within the recent research report for the Scottish Government[62] would be followed if peat is identified in sufficient abundance at the Development. Should this be the case, CO_2 emissions associated with peat will be calculated for the Development based on the methodology within the Scottish Government Report.

[61] Scottish Natural Heritage (2003) Windfarms and Carbon Savings Technical Guidance Note.
[62] University of Aberdeen & Macaulay Land Use Research Institute (2008) Calculating Carbon Savings from Wind Farms on Scottish Peat Lands – A New Approach, funded by the Scottish Government.

CUMULATIVE EFFECTS

18.1. At the time of writing it is known that there are other operational wind farms and a number of wind energy proposals in the region. The methodology adopted for assessing the cumulative effects of wind energy developments will be in accordance with advice from Scottish Natural Heritage (SNH)[63,64,65] and the Scottish Government[66]. Cumulative effects, which are the combined effects of two or more wind energy developments, will be considered for each technical area assessed within the ES.

18.2. The extent of any cumulative assessment relative to each technical assessment will be agreed during the consultation process and can include both existing and proposed wind farm developments and other forms of development. The potential landscape and visual effects, for example, which relate to the indivisibility of an individual wind farm development scheme, will be much more wide ranging than noise effects which will be limited to receptors in the more immediate vicinity of the Development.

18.3. In relation to some of the technical assessments, specific guidance and policy exists advising that effects associated with existing wind farm developments should be considered cumulatively.

18.4. An initial list of cumulative sites is located in Appendix C.

[63] Scottish Natural Heritage (SNH) (2003) A Handbook for Environmental Impact Assessment, Appendix 5: Guide to Outdoor Access Assessment.
[64] Scottish Natural Heritage (SNH) (2005) Cumulative effect of Windfarms, SNH.
[65] Scottish Natural heritage (SNH) (2012) Assessing the Cumulative Impact of Onshore Renewable Energy Developments.
[66] Scottish Government (2010) Scottish Planning Policy, Scottish Executive.

CONSULTATION

19.1. The process of identifying environmental effects is both iterative and cyclical, running in tandem with the iterative design process. Consultation forms an integral role throughout the EIA process.

Scoping Consultation

19.2. The Developer is fully committed to a thorough engagement process aiming to ensure that communities are consulted and informed of developments during, and beyond, the EIA process on all their projects. This is achieved by a variety of methods as appropriate including public exhibitions, meetings and circulars. Public consultation will be incorporated into the iterative design process and recorded in appropriate sections of the ES. Planning Advice Note (PAN) 81 on Community Engagement provides advice on how communities should be properly engaged in the planning process and forms a basis for potential activities.

19.3. Comments are specifically invited on:

- The proposed content of the ES;
- Assessment methods;
- Additional data sources; and
- Additional consultees.

19.4. In terms of the proposed content of the ES it should be emphasised that one of the aims of this scoping report is to scope out any issues which are known not to be significant from further consideration and to highlight and focus on the main issues which should be assessed within the ES.

19.5. All hard-copy responses should be addressed to:

Development Management
Dumfries and Galloway Council
Kirkbank
English Street
Dumfries
DG1 2HS

19.6. All electronic responses should be addressed to:
pe.nithsdale.planning@dumgal.gov.uk

19.7. Please also copy responses to Arcus Consultancy Services Ltd:

Andrew Mott – Project Manager
Arcus Consultancy Services Ltd
Suite 1c Swinegate Court East
3 Swinegate
York
YO1 8AJ
T. 01904 715 470

F. 01904 655 831
E. andrewm@arcusconsulting.co.uk

Public Consultation

19.8. At this point the reaction of the local community to the proposed wind farm cannot be predicted, but it is hoped that a positive relationship can be formed with local community members. It will be key to have input from Dumfries and Galloway Council regarding community consultation.

19.9. As part of the consultation process, the Applicant will engage with the local community in order to inform local people about the proposals, to explain the development and its likely effects and to take on board any concerns or issues.

19.10. The following pre-application community involvement strategy is proposed:

- Information, such as a development brief to be included on Infinergy's website (http://www.infinergy.co.uk) in relation to the project;
- Written consultation to Councillors and the Chair of the relevant committee to include information about the project along with a summary of public consultation to be carried out;
- Placement of an advert in local paper(s) announcing the project with reference to Infinergy's website for further information and including information on public exhibitions; and
- Public exhibitions – Infinergy will closely assess the consultation zone and will then decide on the location and timing of a public exhibition.

19.11. The ES will include a summary of all pre-application public consultation carried out.

APPENDIX A - FIGURES

INFINERGY

ARCUS

Site Boundary

1:50,000 Scale @ A3

0 1 2 km

N

Produced: SC
Reviewed: LHu
Approved: AM

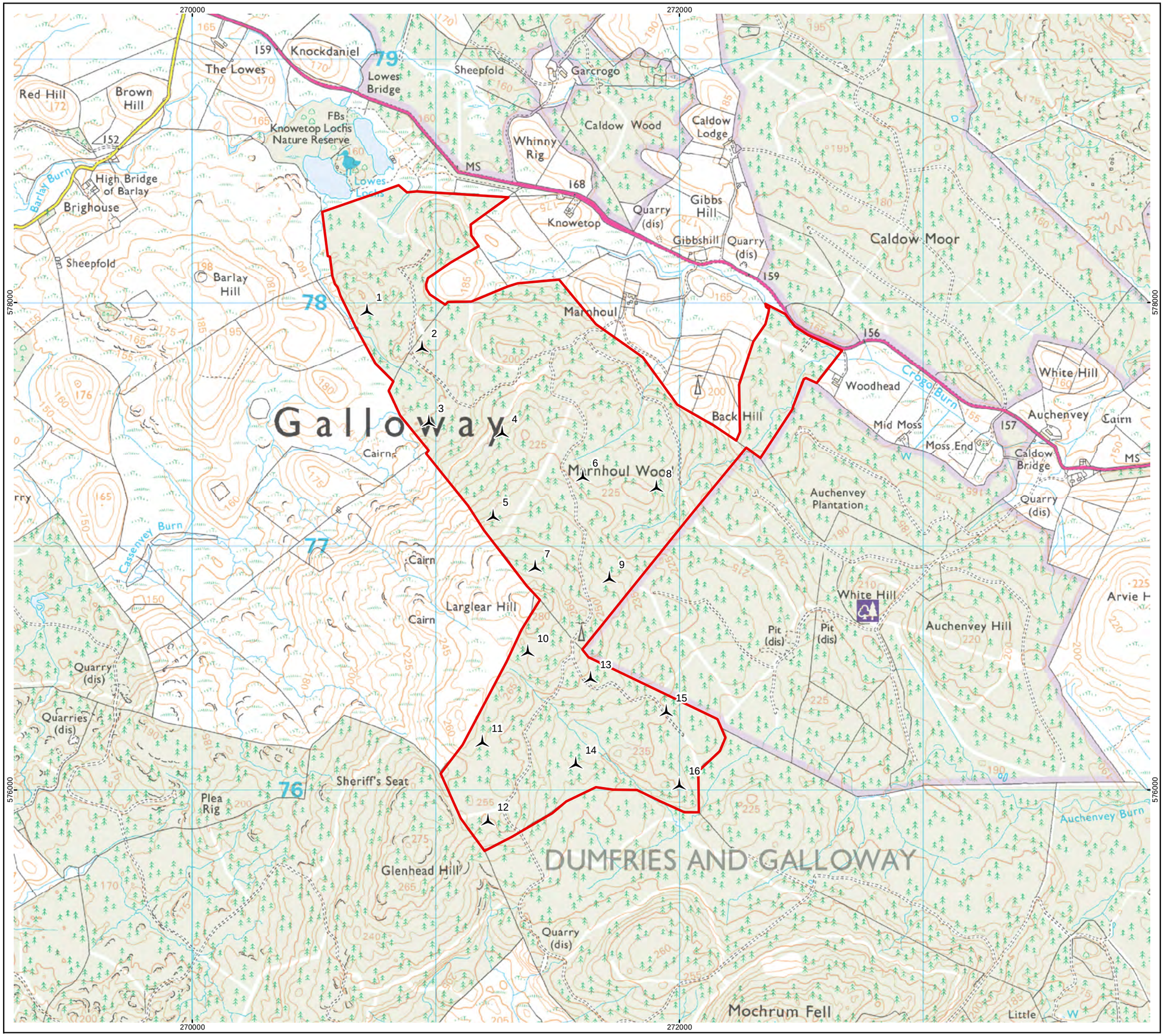
Ref: 1236/SR/001 | Revision: A

Date: 11/03/2013

Site Location
Figure 1

Marnhoul Wind Farm
Scoping Report

P:\Projects\1236 Infinergy DG Tenders\Marnhoul\MXDs CAD\Scoping\1236_Marnhoul_Fig01_Site_Location.mxd



INFINERGY

ARCUS

Proposed Turbine Location

Site Boundary

1:15,000 Scale @ A3

0 250 500 m

N

Produced: SC
Reviewed: LHu
Approved: AM

Ref: 1236/SR/002 | Revision: A

Date: 15/03/2013

Indicative Layout
Figure 2

Marnhoul Wind Farm
Scoping Report

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INFINERGY

ARCUS

- Site Boundary
- 35 km Landscape Study Area
- Garden and Designed Landscape
- National Scenic Area
- Local Landscape Designation

1:275,000 Scale @ A3

0 5 10 km

N

Produced: SC
Reviewed: LHu
Approved: AM

Ref: 1236/SR/003 | Revision: A

Date: 11/03/2013

Landscape Designations
Figure 3

Marnhoul Wind Farm
Scoping Report

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INFINERGY

ARCUS

- Proposed Turbine Location
- Site Boundary
- 35 km Landscape Study Area
- Viewpoint Location

Zone of Theoretical Visibility

- 1 - 4 Turbines may be visible
- 5 - 9 Turbines may be visible
- 10 - 15 Turbines may be visible
- All Turbines may be visible

Viewpoint

1 Bardennoch Hill
2 Dunveoch Hill
3 A762 south of New Galloway
4 Airlie Hill
5 Bridge of Dee
6 Haugh of Urr
7 NE of Parton, nr Diamonds Lodge
8 A712 NW of Corsock
9 Junction of minor roads at Glaisters
10 The Mull
11 Walton Park
12 Southern Upland Way nr Benbrack
13 A712 nr Bread & Beer Cottage
14 Southern Upland Way NE of St John's Town

1:275,000 Scale @ A3

0 5 10 km

N

Produced: SC
Reviewed: LHu
Approved: AM

Ref: 1236/SR/004 | Revision: A

Date: 04/04/2013

Zone of Theoretical Visibility with Viewpoints
Figure 4

Marnhoul Wind Farm
Scoping Report

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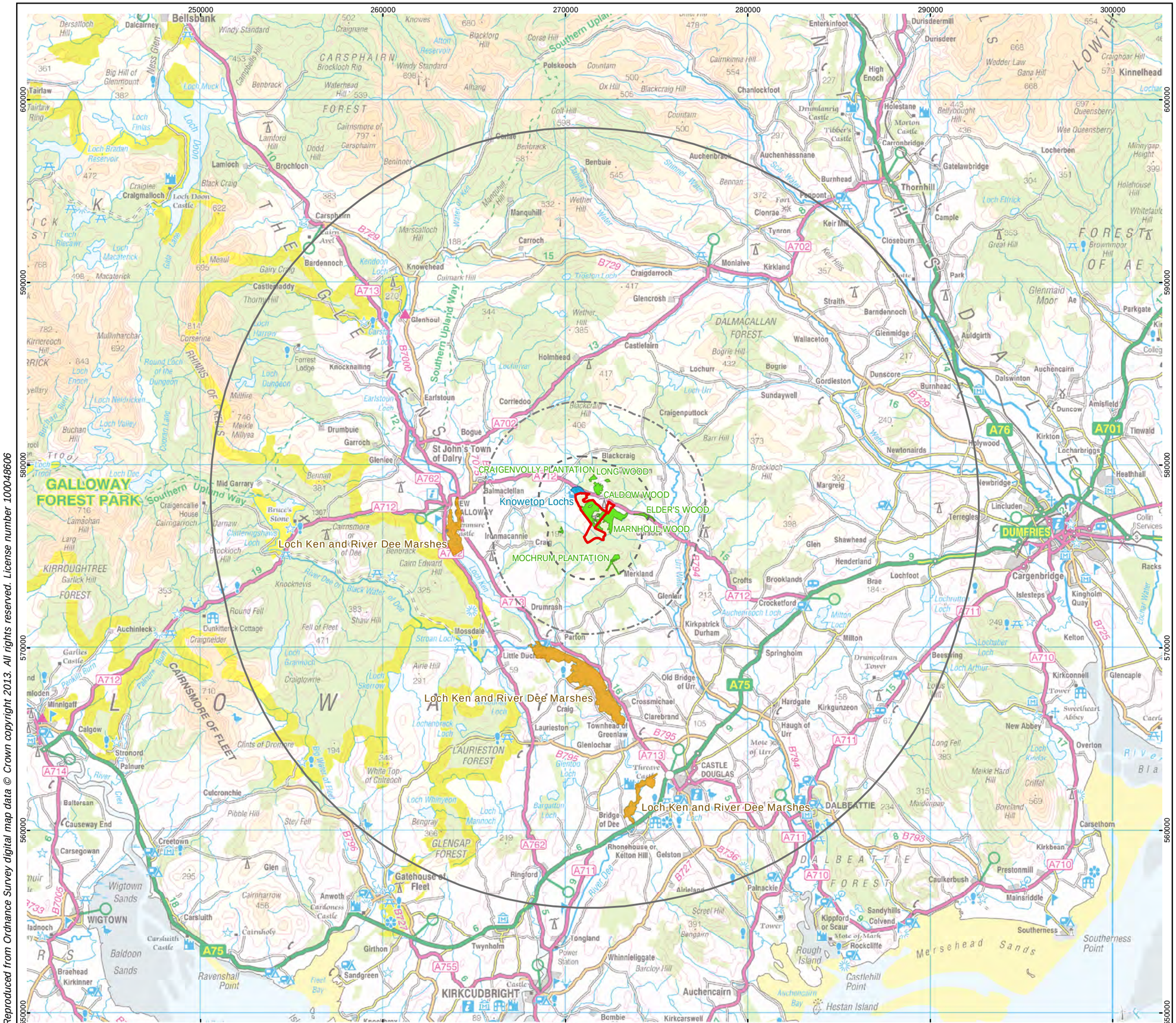

INFINERGY

ARCUS

- Site Boundary
- 2 km Study Area
- 5 km Study Area
- 20 km Study Area
- Special Protection Area
- Scottish Wildlife Trust Reserve
- Ancient Woodland Inventory

1:200,000 Scale @ A3

N

0 5 10 km

Produced: SC
Reviewed: LHu
Approved: AM

Ref: 1236/SR/005 | Revision: A

Date: 11/03/2013

Ecological Designations Figure 5

Marnhoul Wind Farm Scoping Report

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INFINERGY

ARCUS

- Proposed Turbine Location
- Site Boundary
- Vantage Point
- 500 m Survey Area
- VP 1 Viewshed
- VP 2 Viewshed

1:15,000 Scale @ A3

0 250 500 m

N

Produced: SC
Reviewed: LHu
Approved: AM

Ref: 1236/SR/019 | Revision: A

Date: 25/03/2013

Vantage Points and Viewsheds
Figure 6

Marnhoul Wind Farm
Scoping Report

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270000

580000

TROQUHAIN SUNDIAL

GLAISTERS BRIDGE

IRONMACANNIE MILL

Little Merkland, fort

CORSOCK, CHAPEL

HOLMHEAD

CORSOCK BRIDGE

CORSOCK, OLD TEMPERANCE INN

CORSOCK, SIGNPOST AT JUNCTION OF A712 AND B794

CORSOCK HOUSE, STABLES

CORSOCK HOUSE

CORSOCK HOUSE, GATES

INFINERGY

ARCUS

- Site Boundary
- 5 km Cultural Heritage Study Area
- Category A Listed Building
- Category B Listed Building
- Scheduled Monument

1:50,000 Scale @ A3

0 1 2 km

N

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Reviewed: LHu
Approved: AM

Ref: 1236/SR/005 | Revision: A

Date: 25/03/2013

Cultural Heritage Designations Figure 7

Marnhoul Wind Farm Scoping Report

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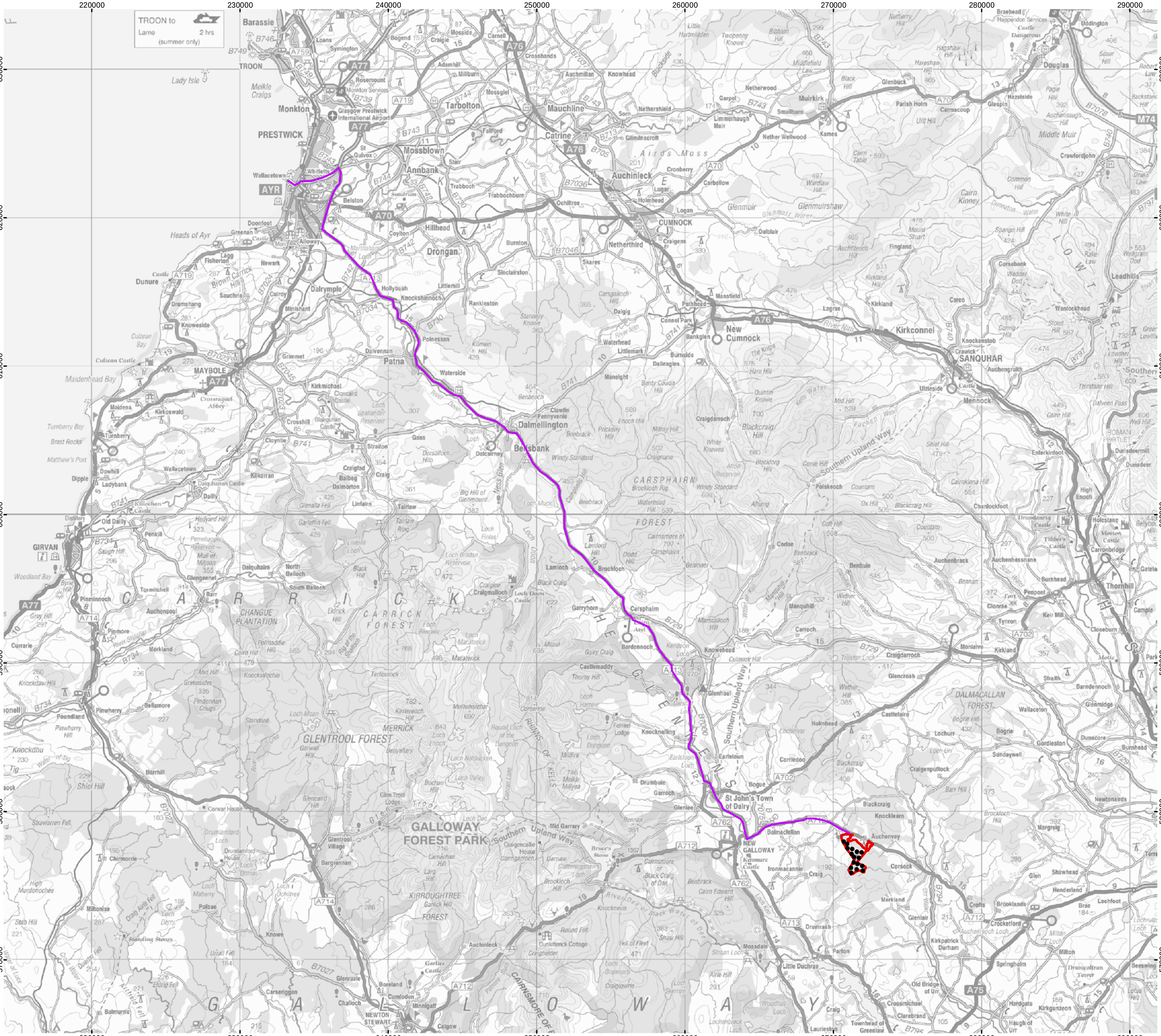

- Proposed Turbine Location
- Site Boundary
- Potential Turbine Delivery Route to Site

1:250,000 Scale @ A3

0 5 10 km

N

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Approved: AM

Ref: 1236/SR/020	Revision: A
Date: 25/03/2013	

Turbine Delivery Route
Figure 8

Marnhoul Wind Farm
Scoping Report

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APPENDIX B – ORNITHOLOGY SURVEY METHODS

Details of Survey Methodology at the proposed Marnhoul Wind Farm Site

AB1.1 Below is a detailed summary of the timing and methods to be employed by Natural Research (Projects) Ltd. (NRP) during the course of ornithological surveys. They are an elaboration of the methods described, more generally, in the main Scoping document.

Moorland Breeding Bird Survey

AB1.2 Open land (to include scrub, isolated trees and copses) will be surveyed using a modified version of the Brown and Shepherd (1993)67 method for upland bird survey during April – June 2013.

AB1.3 Timing: The site will be surveyed four times, during the period mid-April to end June 2013. Fieldwork will not be undertaken in conditions considered likely to affect bird detection, for example strong winds (greater than Beaufort Scale Force 4), persistent precipitation, poor visibility (less than 300m), or in unusually hot or cold weather.

AB1.4 Field methods: Survey walk-routes will attempt to optimise ground visibility. Surveyors pause at appropriate vantage and listening points. Isolated trees, copses and patches of scrub will be approached and examined. Streams and ditches will be walked. All other areas will be approached to within 100m. Registrations will be mapped at the first location that behaviour indicative of breeding is observed. Care will be taken to avoid recording individuals exhibiting breeding behaviour more than once.

Woodland Breeding Bird Survey

AB1.5 Timing: Each count point will be visited twice, once during the period mid-April to mid-May and once during the period 1-21 June. The aim will be to undertake fieldwork between sunrise and sunrise + 6 hrs, when activity by most woodland birds peaks. Fieldwork will not be undertaken in conditions considered likely to affect bird detection, for example strong winds (greater than Beaufort Scale Force 4), persistent precipitation, or in unusually hot weather.

AB1.6 Field methods: On arrival at each count point surveyors will pause to allow birds to acclimatise to the observer's presence. Thereafter, all birds seen or heard during a 5-minute recording period will be noted, together with details of any breeding behaviour. The dominant woodland / forest type at each count point will be classified as:

- Coniferous plantation;
- Native coniferous;

[67] Brown, A.F. and Shepherd, K.B. (1993) A method for censusing upland breeding waders. Bird Study 40: 3 pp189-195.

- Broadleaf; and
- Mixed coniferous / broadleaf.

AB1.7 In coniferous plantations the forest growth stage will be classified as:

- Establishment;
- Developing pre-thicket;
- Thicket, pole and high forest;
- Clearfell; and
- Pre-thicket.

Flight Activity Survey

AB1.8 The aims are (1) to record flight activity within the vicinity of the Development site in order to identify areas of greatest importance to birds and (2) to quantify flight activity in the vicinity of the likely turbine locations in order to estimate collision risk. The methods given in Band, Madders & Whitfield (2007)[68] are being used.

AB1.9 Timing: Watches are being undertaken in each month of the year. A total of at least 79 hours from each of 2 Vantage Points (VPs) will be completed during the 12 months of survey. Watches are being undertaken in a range of weather conditions excepting poor visibility (< 300 m) and are being spread temporally to include a representative number of hours early and late in the day.

AB1.10 Field methods: Information is being collected during timed watches from VPs. During the reconnaissance survey period, trial observations were conducted from potential VP locations and visible areas were ascertained using GIS analysis. These were then used to determine the final VP locations so as to maximize the area visible. A map of the VPs used and visible areas has been provided (see Figure 6 of the Scoping Report). Care is taken to minimise possible disturbance to birds. Normally, all points within the survey area will be within 2 km of a VP. For species of high nature conservation importance the following data are being recorded:

- The flight lines used by individual birds;
- The time spent flying over a defined survey area; and
- The proportion of flying time spent at a range of flying heights (< 10 m, 10 – 30 m, 30 – 50 m, 50 – 100 m, 100 – 150 m or > 150 m).

AB1.11 For other selected bird species (secondary species) an index of activity will be calculated based on the number of 5-minute periods that birds are observed. The location of activity indicative of breeding by raptors is being recorded.

[68] Band, W., Madders, M. & Whitfield, D.P. (2007). Developing field and analytical methods to assess avian collision risk at wind farms. In: de Lucas, M, Janss, G. & Ferrer, M. (eds). Birds and Wind Power. Lynx Edicions, Barcelona.

Autumn and Winter Walked Transects / Scans

AB1.12 The aim is to formally record bird activity over large areas relatively quickly. The method involves a series of shortened (~1 hour) vantage point watches linked by a walk route designed to maximise coverage of the survey area. Surveys have been conducted October 2012- March 2013 inclusive.

AB1.13 Timing: Surveys have been undertaken each month, September to March. Surveys were undertaken in conditions of good ground visibility (at least 3 km) when the cloud base was higher than the most elevated ground being observed.

AB1.14 Field methods: Walk routes meandered in order to closely examine as much ground as practicable. Routes and VPs varied between visits in order that spatial coverage of the site was maximised over time. All water bodies were scanned thoroughly. Other features of potential ornithological importance (e.g. areas of bog, scrub, woodland edge, etc.) were closely approached. Emphasis was given to recording birds of high nature conservation importance. During vantage point watches, data were collected using the standard method (see Flight Activity Survey, above). During the walk route, observers paused frequently to scan skylines for raptors and other birds. In the case of Target Species the location and flight route (if applicable) of each individual is mapped. For other species, an inventory of the numbers encountered during the walkover is recorded together with observations of any notable concentrations or behaviour.

Breeding Diurnal Raptor Survey

AB1.15 The aim is to determine the distribution of breeding attempts of diurnal raptors within and adjacent to the Development site during the period March – June 2013.

AB1.16 Site visit information and the habitat map suggest that for a 2 km radius of this Proposal the habitat is potentially suitable for breeding goshawk, hen harrier, merlin, peregrine and short-eared owl. However, evidence of breeding by any other raptor species listed in Schedule 1 of the Wildlife & Countryside Act (1981) will be investigated thoroughly. Breeding success will also be recorded wherever possible, since it is an important determinant of flight activity levels. Surveys will be undertaken under licence from SNH by experienced field ornithologists. Extreme care will be taken to avoid unnecessary disturbance to breeding birds.

AB1.17 Methods follow those described in Hardey et al (2009)[69].

[69] Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B., and Thompson, D. (2009) Raptors: a field guide to survey and monitoring. The Stationary Office, Edinburgh.

Goshawk

AB1.17 Suitable woodland habitat within 1 km of the site will be searched for evidence of occupation by breeding goshawk (e.g. nests, plucked prey, moulted feathers, pellets and faeces) during late March to early April. Potential nesting areas will be re-visited during the period May to August to confirm breeding outcome. Note that surveyors received intensive training on the detection of goshawk signs from Dr M Marquiss during courses organised by Natural Research in March 2004 and 2012.

Hen harrier

AB1.18 Areas of suitable habitat will be observed during the period 20 March – 30 April and behaviour indicative of breeding recorded. Unsuitable areas include land above 600 m; improved pasture and arable land; extensive areas of degraded land with no heather cover and low vegetation; the vicinity of cliffs, rocky outcrops, boulder fields and scree; areas within 100 m of hill farms and occupied dwellings. At sites where breeding is suspected, further observations will be undertaken during the period 1 May - 10 June to locate nests. Potential nest areas will be watched for 3 – 4 hours if necessary. Occupied nests will be visited at least twice during the period 15 May to 31 July to determine breeding success. Any roosting birds found to be present during the non-breeding period will be surveyed.

Merlin

AB1.19 Areas of suitable nesting habitat (including forest edge where trees > 5 m high) will be closely observed during the period 20 March - 30 April. Boulders, fence lines, isolated posts, stone dykes, grouse butts, hummocks, stream banks, crags, trees and recently burnt areas of heather will be checked for signs of occupation (e.g. plucked prey, moulted feathers, pellets and faeces). Any corvid nests detected will be mapped. Areas where merlins are observed or signs found will be visited at least twice (including once in May and once in early July) to verify occupation of the site. Potential nest areas will be watched for 4 – 6 hrs if necessary. All located corvid nests will be visited during the period May-July.

Peregrine

AB1.20 Potential nest sites will be visited and checked for evidence of occupation in March and April. Sites to be checked will include nest sites found in previous years by raptor study group workers and crags and steep banks identified from OS maps and searches of the survey area. Surveyors will look for birds or signs of occupation (e.g. faecal splash, fresh plucked prey). Occupied sites will be re-visited between 20 March and 10 May to verify incubation. Searches will be made for eyries. Where this is not possible sites will be watched from a suitable vantage point for 3 – 4 hours or until a nest is located. Further visits will be made during the period 20 May to 10 July to monitor breeding success.

Short-eared owl

AB1.21 At least two visits will be carried out between early April and the end of May. Suitable habitat will be visited and checked for evidence of hunting males, territorial activity and other signs of presence. If birds are present but breeding is not confirmed, a further visit will be made in June. Any roosting birds found to be present during the non-breeding period will be surveyed as per hen harrier (see above).

Barn owl

AB1.22 The aims of the survey are to determine the distribution and occupancy of potential barn owl breeding sites within 1 km of the Development site. Timing and field methods: Each area where barn owls are potentially present will be surveyed twice, once during the period May- June 2013. Fieldwork will not be undertaken in persistent precipitation. The survey area will be searched systematically to locate potential nest sites, including buildings, nest-boxes, trees along woodland edges, and hay-bale stacks. Visits will be undertaken during late afternoon. Where examination of potential nest sites is inconclusive, the site will be watched at least once from one hour before, until one hour after, sunset.

Assessment of Field Vole Abundance:

AB1.23 Field methods: Initial site visits and habitat identified areas of habitat suitable for voles. Twenty-five quadrats (each 25 x 25 cm) will be randomly located within a representative area of rank grassland and searched for evidence of field vole activity. The presence / absence of the following signs will be recorded: runways in the vegetation, fresh vegetation clippings indicative of voles feeding, and fresh vole faeces. Assessments will be carried out monthly, April to September 2013.

APPENDIX C – CUMULATIVE SITES

Name	*Easting and Northing (approx)*	*No. Turbines*	*Hub height*	*Rotor diameter*	*Height to Tip*	*Approximate distance between nearest turbines*	*Info.* Source
Operational							
Wether Hill	270200 594100	14				14.5km	Scottish Power Renewables
Hare Hill	265000 609000	20				31.7km	RES EAC
Dalswinton	294500 589300	15				25.2km	Infinis
Minsca	322800 581400	16	80m	98m	129m	50.3km	Infinis
Hagshaw Hill	278000 630000	26	35m	44m	55m	52.5km	SLC / The Wind Power website
Hagshaw Hill Ext.	280000 630000	20	49m	62m	80m	53.6km	SLC
Hadyard Hill	225700 596400	52		80m		48.5km	SSE
Artfield Fell	223000 567000	15	43m	62m	74m	48.9km	DP Energy / SSE wibsites
Robin Rigg	290582 540875	60				38.0km	
Nutberry	277000 632000	6			125m	55.2km	Slc / Falck Renewables
Windy Standard	261849 601965	36	35m	43m	56.5m	25.2km	
Hellrigg	313900, 551670	4				48.5km	RWE, BWEA
Siddick	300194, 531705	7	40m	42m	61m	52.5km	Eon, BWEA
Eastman	300850, 530744	2	69m	82	110m	53.6km	BWEA
Oldside	299400, 530294	9			61m	53.6km	Eon, BWEA
Winscales Moor	303610, 529064	7			81m	56.6km	BWEA
Approved or Under Construction							
Torrs Hill	252920 589240	2			100m max.	20.9km	
Windy Standard Ext.	260219 602115	30			12@100m max. 18@120m max.	25.9km	SG S.36
Blackcraig	270700 582250	23				4.0km	SG
Whiteside Hill	271000 505000	13	80m	82.4m	121.2m	27.4km	D&G
Mark Hill	225200 584650	28			110m	46.3km	BWEA & Force 9 Energy

Name	Easting and Northing (approx)	No. Turbines	Hub height	Rotor diameter	Height to Tip	Approximate distance between nearest turbines	Info. Source
Arecleoch	217225 579681	60	90m	90m	135m	52.9km	BWEA SG
Bankend Rig	265000 633000	11			76m	55.8km	SLC
Dungavel	268607 635860	13	60m	80m	102m	57.2km	SLC
Birkhill Commercial Park	283859 635603	1				59.0km	SLC
Clyde Windfarm	298234 626749	152			125m	50.4km	SLC
Harestanes / Forest of Ae	301516 598743	71 max.	70@80m 1@70m	70@90m 1@90m	125m 115m	33.1km	BWEA
Tallentire	311900, 535994	6				56.5km	BWEA
Flimby	303650, 533594	3				52.9km	BWEA
Westnewton	313636, 542338	3				53.5km	BWEA
Wythegill	301300, 531950	1				53.0km	BWEA
Submitted but not yet determined							
Afton	262300 603980	27	5@60m 22@80m	5@100m 22@120m	5@110m 22@140m	27.1km	E.on
Margree	268981 586834	17			120m	8.5km	
Hare Hill Ext. 2	266682 608875	39				31.0km	
Blackhill / Sanquhar Community WF	271200 608300	18			126.5m	30.3km	Community Wind Power website
Ulzieside	275400 606600	20	80m		125m	28.7km	Community Wind Power website
Burnhead	247800 608550	13			127m	39.0km	Burnhead Wind Farm website
Dersalloch	241950 604450	23			7@115m 16@125m	39.3km	Dersalloch Wind Farm website
Breaker Hill	218020 588360	15	69m	60m	99m	54.0km	Wind Prospect ES
Carscreugh	222350 560000	18			70m	51.8km	Renewables Map
Barlockhart	222300 556450	4	60m	84m	102m	52.2km	Renewables Map
Newfield	316590 586705	21	80m	90m	125m	44.3km	s.36 DPEA
Earlshaugh	309250 615150	24				51.0km	SBC
Clyde Ext.	302450 622050					54.9km	

Name	***Easting and Northing (approx)***	***No. Turbines***	***Hub height***	***Rotor diameter***	***Height to Tip***	***Approximate distance between nearest turbines***	***Info.* Source**
Andershaw	284320 625400	14			125m	49.3km	SLC
Middlemuir	285336 626157		84m	104m	136m	50.4km	SLC
Glentaggart	283286 626637	5	80m	104m	132m	51.1km	SLC / Infinis
Spireslack / Galawhistle	276000 629000	42			125m	51.4km	SLC
Refused, Subject to Appeal							
Southmains	278600 607900`	3			84m	30.9km	DPEA
Mayfield	272900 556200	6	80m	100m	130m	19.8km	

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