Mark Hill Windfarm Extension

Request for a Scoping Opinion

August 2013

SCOTTISHPOWER RENEWABLES

Executive summary

1. Introduction 2
1.1 ScottishPower Renewables 2
1.2 Document purpose 2
1.3 Document structure 2
2. Policy and legislative context 3
2.1 Introduction 3
2.2 Policy context 3
2.3 Legislative context 6
3. Site selection and project description 9
3.1 Site selection 9
3.2 Description of proposed development 9
4. EIA methodology 14
4.1 Introduction 14
4.2 EIA guidance 14
4.3 Scoping 14
4.4 Approach to assessment 15
5. Landscape and visual 18
5.1 Introduction 18
5.2 Baseline conditions 18
5.3 Potential effects and EIA methodology 23
5.4 Consultation 30
6. Ornithology 31
6.1 Introduction 31
6.2 Baseline conditions 31
6.3 Potential effects 32
6.4 EIA methodology 32
6.5 Consultations 39
7. Ecology (non avian) 40
7.1 Introduction 40
7.2 Baseline conditions 40
7.3 Potential effects 40
7.4 EIA methodology 40

7.5 Consultation 56
8. Geology, soils and water resources 58
8.1 Introduction 58
8.2 Baseline conditions 58
8.3 Potential effects 58
8.4 EIA methodology 59
8.5 Consultation 65
9. Noise 66
9.1 Introduction 66
9.2 Baseline conditions 66
9.3 Potential effects 66
9.4 EIA methodology 67
9.5 Consultation 69
10. Archaeology and cultural heritage 70
10.1 Introduction 70
10.2 Baseline conditions 70
10.3 Potential effects 71
10.4 EIA methodology 71
10.5 Consultation 73
11. Access, traffic and transport 75
11.1 Introduction 75
11.2 Baseline conditions 75
11.3 Potential effects 75
11.4 EIA methodology 75
11.5 Consultation 78
12. Forestry 79
12.1 Introduction 79
12.2 Baseline conditions 79
12.3 Potential effects 79
12.4 EIA methodology 79
12.5 Consultation 80
13. Socio-economics, land use and recreation 81
13.1 Introduction 81
13.2 Baseline conditions 81

13.3 Potential effects 83
13.4 EIA methodology 83
13.5 Consultation 84
14. Other issues 86
14.1 Introduction 86
14.2 Aviation and defence 86
14.3 Local air quality 87
14.4 Carbon balance 87
14.5 Telecommunications and television 87
14.6 Shadow flicker 88
15. Draft outline of the environmental statement 89
16. Consultation strategy 90
17. Scoping questions 93

Figure 1 Site location
Figure 2 Indicative boundary
Figure 3 LVIA study area
Figure 4 Viewpoint location plan
Figure 5 Cumulative search area

Appendix 1 Wind energy developments within 60km

Executive summary

ScottishPower Renewables (UK) Limited (SPR) has identified an area of land to the north east of Barrhill within South Ayrshire, adjacent to the existing Mark Hill Windfarm, as being suitable for an extension. The proposed extension would be known as Mark Hill Windfarm Extension (referred to hereafter as the 'proposed Development'). The location of the proposed Development is shown in Figure 1.

The existing Mark Hill Windfarm has a total installed generation capacity in excess of 50 megawatts (MW) (56MW specifically) therefore the proposed Development will require consent from the Scottish Ministers under Section 36 of the Electricity Act 1989. The final number of turbines and layout will be defined as the design of the proposed Development progresses.

A Section 36 application will be submitted by SPR to the Energy Consents and Deployment Unit (ECDU) of the Scottish Government. In addition, the application will also request that the Scottish Ministers direct that planning permission for the proposed Development be deemed to be granted under Section 57 (2) of the Town and Country Planning (Scotland) Act 1997.

The proposed Development is a Schedule 2 development under The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 ('the EIA Regulations'). Due to the nature and scale of the proposed Development, an Environmental Impact Assessment (EIA) will be undertaken and an Environmental Statement (ES) will support the application for consent.

The purpose of this report is to request a Scoping Opinion, pursuant to Regulation 7 of the EIA Regulations, from the Scottish Government to advise SPR on the information which should be included in the ES.

This report describes the baseline environment and lists the potential environmental effects of the proposed Development. The report also outlines the proposed methodology for the assessment of each topic to be considered in the EIA; the approach to the consultation strategy and the list of consultees to be consulted. It aims to identify potential issues and minimise possible effects of the proposed Development as early as possible to influence overall project planning and design.

The findings of this report, in conjunction with the scoping response received from the Scottish Ministers and other consultees, will be used to inform the EIA process and the overall design of the proposed Development. This will be reflected in the ES and in a Design Report, required under the ECDU gate checking procedure.

1. Introduction

1.1 ScottishPower Renewables

SPR is part of Iberdrola, a world leader in wind power, with an operating portfolio of over 14,000 megawatts (MW). SPR is responsible for progressing Iberdrola's onshore wind and marine energy projects in the UK and Ireland, and offshore windfarms throughout the world, managing the development, construction and operation of all projects. Securing its position at the forefront of the renewable energy industry, SPR became the first UK developer to reach an installed generating capacity of 1,000MW in 2011, in addition to being award a second Queen's Award for Enterprise for Sustainable Development. With a pipeline including 10,000MW of offshore wind, and the world's first 10MW tidal energy array in the Sound of Islay, ScottishPower Renewables is firmly committed to the responsible development of renewable energy.

1.2 Document purpose

The proposed Development is a Schedule 2 development under the EIA Regulations.

This document informs the Scottish Ministers, under Regulation 8 of the EIA Regulations, that SPR intends to make an application for consent under Section 36 of the Electricity Act 1989 in relation to the proposed Development and that SPR intend to submit an ES with their Section 36 application. Deemed planning permission for the proposed Development under Section 57(2) of the Town and Country Planning (Scotland) Act 1997 will also be requested.

This document forms SPR's written request to the Scottish Ministers, under Regulation 7 of the EIA Regulations, for their opinion on the information to be provided in the ES.

1.3 Document structure

The structure of this Request for a Scoping Opinion is divided into the following sections:

- Chapter 2 identifies the regulatory context applicable to the content of this document;
- Chapter 3 provides a description of the proposed Development;
- Chapter 4 provides the general EIA methodology that is proposed to be followed;
- Chapters 5 to 14 describe the potential effects of the proposed Development, including baseline data sources and assessment approach. The structure of each chapter is as follows: Introduction; Baseline conditions; Potential effects; EIA methodology; and Consultation;
- Chapter 15 provides an outline of the proposed contents of the ES;
- Chapter 16 proposes an approach to consultation; and
- Chapter 17 provides contact details for further information.

2. Policy and legislative context

2.1 Introduction

This section aims to highlight the regulations applicable to the development of renewable energy generation projects, as well as those that shape the related planning and development control framework.

2.2 Policy context

This Development is proposed as part of SPR's response to targets set by the UK and the Scottish Government to increase the proportion of electricity generated from renewable sources and hence reduce Scotland's contribution to climate change.

The European Union Directive 2001/77/EC: Promotion of Electricity Produced from Renewable Sources and Directive 2003/87/EC: EU Emissions Trading Scheme set ambitious targets to tackle climate change. Directive 2001/77/EC was amended by the 2009 Renewable Energy Directive[1] which sets a target for the UK to achieve 15% of its total energy consumption, including transport, from renewable sources by 2020.

The Climate Change (Scotland) Act 2009 received Royal Assent on 4th August 2009. The Act sets an interim target for a 42% reduction of greenhouse gas emissions in Scotland by 2020 and an 80% reduction target for 2050. Delivering electricity from renewable sources has been identified as making a significant contribution to achieving this target, with further targets set in subsequent secondary legislation.

The 2020 Routemap for Renewable Energy in Scotland[2] was published by the Scottish Government in June 2011 (updated October 2012[3]), and updated the Renewable Action Plan 2009[4]. The 2020 Routemap recognised the revised target announced by the Scottish Government in May 2011[5] to meet an equivalent of 100% demand for electricity to be generated from renewable energy by 2020. The update published in October 2012 showed that the interim target of 31% of electricity demand to be generated from renewable sources established in the Renewable Action Plan 2009 had been met. The 2012 update has set a new interim target of 50% of electricity demand to be generated from renewable sources by 2015.

[1] Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.
[2] The Scottish Government (2011). *2020 Routemap for Renewable Energy in Scotland*. [online] Available at: http://www.scotland.gov.uk/Publications/2011/08/04110353/0 [Accessed 20 June 2013].
[3] The Scottish Government (2012). *2020 Renewable Routemap for Scotland – Update*. [online] Available at: http://www.scotland.gov.uk/Topics/Business-Industry/Energy/UpdateRenewableRoutemap [Accessed 20 June 2013].
[4] The Scottish Government (2009). *Renewables Action Plan.* [online] Available at: http://www.scotland.gov.uk/Publications/2009/07/06095830/0 [Accessed 20 June 2013].
[5] http://www.scotland.gov.uk/News/Releases/2011/05/18093247

The target set by the 2020 Routemap for Renewable Energy in Scotland is reiterated in the Draft Electricity Generation Policy Statement[6] published by the Scottish Government in March 2012. This document examined the way in which Scotland generates electricity, and considered the changes which would be necessary to meet the established targets.

Further, the Scottish Government Economy, Energy and Tourism Committee published a report in November 2012 discussing the 'Achievability of the Scottish Government's Renewable Energy Targets'[7]. This report found that the established target is achievable, but only if a number of issues are met. This report was followed in March 2013 by the Low Carbon Scotland: Meeting our Emissions Reductions Targets 2013-2027 - The Draft Second Report on Proposals and Policies[8], which further reiterated that the established targets could be met provided the issues identified previously were addressed.

National planning policy

The Scottish Government has published a series of national level planning policy documents. The National Planning Framework 2[9] was published in July 2009 and provides the overarching aims for planning in Scotland; a core aspect of this is the promotion of renewable energy. A replacement National Planning Framework 3[10] is currently being prepared with a draft being published in April 2013 prior to approval in 2014.

The Scottish Government has published on-line guidance[11] in relation to onshore wind turbine development (last updated October 2012). This guidance provides technical direction on the location and determination of wind turbine development.

Scottish Planning Policy (SPP) (February 2010)[12] gives guidance on the factors to be considered in the development and determination of renewable energy development proposals including windfarms. The SPP is currently being reviewed: a draft[13] was published in April 2013 for consultation with approval expected early in 2014.

[6] The Scottish Government (2012). *Electricity Generation Policy Statement* (Draft Electricity Generation Policy Statement for consultation). [online] Available at: http://scotland.gov.uk/Topics/Business-Industry/Energy/EGPS2012/DraftEPGS2012 [Accessed 20 June 2013].

[7] Scottish Government Economy, Energy and Tourism Committee (2012). *Report on the achievability of the Scottish Government's renewable energy targets*. SP Paper 220, 7th Report, 2012 (Session 4). Edinburg: The Scottish Government.

[8] The Scottish Government (2013). *Low Carbon Scotland: Meeting our Emissions Reductions Targets 2013-2027 - The Draft Second Report on Proposals and Policies.* Edinburg: The Scottish Government.

[9] The Scottish Government (2009).*Second National Planning Framework (NPF2).* Edinburg: The Scottish Government.

[10] The Scottish Government (2013). *Scotland's Third National Planning Framework - Main Issues Report and Draft Framework*. Edinburg: The Scottish Government.

[11] The Scottish Government. *Onshore wind turbines (Updated October 24, 2012).* [online] Available at: http://www.scotland.gov.uk/Topics/Built-Environment/planning/National-Planning-Policy/themes/renewables/Onshore [Accessed 20 June 2013].

[12] The Scottish Government (2010). *Scottish Planning Policy.* [online] Available at: http://www.scotland.gov.uk/Publications/2010/02/03132605/12 [Accessed 20 June 2013].

[13] The Scottish Government (2013). *Scottish Planning Policy. Consultation Draft.* Edinburgh: The Scottish Government.

Local planning policy

The proposed Development lies within the planning authority area of South Ayrshire.

The current structure plan covering the area is the Ayrshire Joint Structure Plan[14] which was approved in November 2007 by the Scottish Government. The Ayrshire Joint Structure Plan identifies 'Preferred Areas of Search for Large Scale Commercial Windfarms' in the Economic Investment Key Diagram. The proposed Development lies partly within one of these 'Preferred Areas of Search'. Proposals within the 'Preferred Areas of Search' will be supported by the Local Authority subject to other material considerations being satisfactorily addressed (Policy ECON 7 Wind Farms).

The adopted Local Plan is the South Ayrshire Local Plan[15] which was adopted in April 2007. Policy SERV 3 Renewable Energy is the key relevant policy in the Local Plan. Policy SERV 3 Renewable Energy states that:

'*The Council will presume in favour of proposals for renewable energy production developments where it can be demonstrated, through the provision of an environmental impact assessment, to be acceptable in terms of environmental, infrastructure and community impacts*.'

South Ayrshire Council is currently in the process of preparing the South Ayrshire Local Development Plan, which once adopted in 2014 will replace the Ayrshire Joint Structure Plan and the South Ayrshire Local Plan.

The South Ayrshire Proposed Local Development Plan was published in August 2012[16] and represents the latest stage in the preparation of the new Local Development Plan. The Proposed Plan '*LDP policy: wind energy'* states:

'*We will support proposals if:*

a. *the landscape is capable of accommodating the development;*
b. *they respect the main features and character of the landscape and keep their effect on the landscape and the wider area to a minimum (through a careful choice of site and high-quality design and materials);*
c. *they do not have a significant detrimental effect on the amenity of nearby residents;*
d. *the cumulative impact is acceptable; and*
e. *they do not affect aviation, defence interests and broadcasting installations.*

We will use conditions and supplementary guidance on wind farms when considering proposals for wind farms and turbines Proposals will be considered in relation to the criteria above and supplementary guidance on wind farm developments, which will identify preferred

[14] Ayrshire Joint Structure Plan Committee (2007). *Ayrshire Joint Structure Plan. Growing a Sustainable Ayrshire. The approved plan.* Prestwick: Ayrshire Joint Structure Plan Committee.
[15] South Ayrshire Council (2007). *South Ayrshire Local Plan.* Ayr: South Ayrshire Council.
[16] South Ayrshire Council (2012). *South Ayrshire Local Development Plan.* South Ayrshire Council.

areas of search for wind farms. We will use the Landscape Capacity Study to help us decide the effect of proposals on the landscape.

Developers must show us that their proposal will not result in adverse individual or cumulative impacts upon any Natura 2000 site.'

The Proposed Plan does not identify areas of search for windfarms. The Proposed Plan states that supplementary guidance will identify preferred areas of search for windfarms. It is understood that South Ayrshire Council will commence production of the supplementary guidance in 2014. The previous draft of the Local Development Plan, the Main Issues Report[17] which was published in 2010 identified a 'Preferred Areas of Search for Large Scale Windfarms'. The majority of the proposed Development area is located within this Preferred Area of Search.

The ES will include all relevant local development policies, however an exhaustive list has not been included for the purposes of requesting a Scoping Opinion.

2.3 Legislative context

The Electricity Act

Under Section 36 of the Electricity Act 1989 consent is required from the Scottish Ministers for the construction, extension and operation of a power generating station with a capacity of over 50MW. Although at present the capacity of the proposed Development is unknown, it is considered that, as it would form part of an extension to the existing Mark Hill Windfarm (56MW), the proposed Development will be applied for under this Act.

Schedule 9 of the Act places on the developer a duty to '*have regard to the desirability of preserving the natural beauty of the countryside, of conserving flora, fauna and geological and physiological features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest*'. The Applicant shall do what he reasonably can to mitigate any effect which the proposal would have on these matters.

The Applicant will have regard to national planning policy and guidance, energy policy and also policy and guidance published by the relevant planning authorities.

On granting consent under Section 36, the Scottish Ministers can also decide that planning permission be deemed to be granted, if requested to do so.

The Environmental Impact Assessment Regulations

The EIA Regulations implement European Union Council Directive 85/337/EEC as amended by Council Directive 97/11/EC on the assessment of the effects of certain public and private projects on the environment, insofar as it relates to applications for consent to construct, extend or operate a power station or install or keep installed overhead electricity lines under Sections 36 and 37 of the Electricity Act 1989.

[17] South Ayrshire Council (2010). *South Ayrshire Main Issues Report.*

Schedule 1 of the EIA Regulations lists those developments for which EIA is mandatory, whilst Schedule 2 describes projects for which the need for EIA is judged by the Scottish Ministers on a case-by-case basis through a screening process. Schedule 3 describes the criteria to be used by the Scottish Ministers to determine if a development is 'EIA development'.

Where EIA is required, environmental information must be provided by the developer in an ES. Schedule 4 specifies the information that must or may be provided in such a Statement.

The EIA Regulations prohibit the Scottish Ministers from granting consent for an EIA development without taking into account an ES, together with any associated environmental information.

The proposed Development is a Schedule 2 development: '*(1) a generating station, the construction of which (or the operation of which) will require a Section 36 consent but which is not Schedule 1 development'*. If it is likely to have significant environmental effects because of factors such as nature, size or location, it is 'EIA development', and a formal EIA is required. SPR independently offer that the proposed Development should be subject to EIA.

Obtaining a Scoping Opinion (Regulation 7)

Under Regulation 7 of the EIA Regulations, the developer of an EIA development may ask the Scottish Ministers, before submitting an application for a Section 36 consent under the Electricity Act 1989, to state in writing their opinion as to the information to be provided in the ES (i.e. to provide a 'Scoping Opinion').

The Guidance on the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000[18] ('the Guidance Note') states that this provision allows the developer to be clear about what the Scottish Ministers' consider to be the main effects of the development and therefore the topics on which the ES should focus.

The request for Scoping Opinion must be in writing and should include basic information on the development as set out below:

- A plan sufficient to identify the site which is the subject of the development;
- A brief description of the nature and purpose of the proposed development and its possible effects on the environment; and
- Such further information or representations as the person making the request may wish to provide or make.

The Guidance Note states that the developer should also submit a draft outline of the ES, giving an indication of what he considers to be the main issues, to provide a focus for the Scottish Ministers' considerations. The information on the development and draft outline of the ES is presented in the forthcoming sections of this request for a Scoping Opinion.

[18] The Scottish Government. *The Guidance on the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (Updated August 27, 2010).* [online] Available at: http://www.scotland.gov.uk/Topics/Business-Industry/Energy/Infrastructure/Energy-Consents/Guidance/EIA-Guidance [Accessed 20 June 2013].

Once the Scottish Ministers have received all the information they require, they will then obtain the views of the relevant Consultative Bodies.

When the Scottish Ministers issue a Scoping Opinion, they must state what information should be included in the ES, giving their reasons why. The EIA Regulations also require the Scottish Ministers to make available to the public, via the Planning Authorities, their Scoping Opinion.

The findings of this Request for a Scoping Opinion in conjunction with the Scoping Opinion received from Scottish Ministers and comments from other consultees will be used to inform the EIA. The list of consultees to be consulted is presented in Section 16.

Provision of Information by Consultative Bodies (Regulation 8)

Regulation 8 of the EIA Regulations provides for the developer to acquire from public bodies any environmental information they hold which will assist in the preparation of the ES.

When the developer notifies the Scottish Ministers that they intend to provide an ES with the application, the Scottish Ministers will notify the Consultative Bodies and other relevant environmental organisations and ask them to make the information available. The developer will be told who these organisations are, together with their addresses.

Scoping Question: Have all regulatory requirements, which should be taken into account, been identified?

3. Site selection and project description

3.1 Site selection

SPR's site selection policy is designed to identify windfarm sites that are economically and technically viable, environmentally acceptable and that will make meaningful contributions to Government targets for renewable energy generation.

In addition to these criteria, potential sites are screened against a series of technical, environmental and economic factors. These include wind speed and energy yields, site access, distance from communities, proximity to environmental designations and proximity to electricity grid among others.

The proposed Development site was considered an excellent potential site and was selected by SPR for a number of reasons, including the following:

- Opportunity to extend an existing SPR windfarm;
- Good wind resource;
- Good access to site and a proven turbine delivery route;
- Close to a potential grid connection point;
- Lack of statutory nature conservation designations within the proposed Development site;
- Located partly within the 'Preferred Area of Search for Large Scale Commercial Windfarms' in the Economic Investment Key Diagram of the Ayrshire Joint Structure Plan (November 2007); and
- Relatively sparsely populated area.

3.2 Description of proposed development

Site location

The proposed Development lies approximately 3 kilometres (km) north east of Barrhill, fully within the South Ayrshire Council boundary. The location is shown in **Figure 1**. The proposed Development area boundary is included within **Figure 2**. The proposed Development area is 1,151 hectares (ha) in size. The site has two access points from the A714 at grid references 228507, 581022 and 229517, 581036.

The proposed Development area is mostly covered with commercial plantation forestry between approximately 160m and 210m Above Ordnance Datum (AOD). It is characterised as an area of Plateau Moorland in the Scottish Natural Heritage (SNH) landscape assessment[19], but most of the area has since been planted with commercial coniferous woodland and is now largely defined as an area of Plateau Moorland with Forest. It is relatively low lying, crossed by several small burns and occasional small lochs. The A714 runs in a northwest – southeast direction to the south of the site.

[19] Land use Consultants (1998). *Ayrshire landscape assessment*. Scottish Natural Heritage review No. 111

As mentioned above, the main land use within the proposed Development area is commercial forestry. Some areas of forestry would need to be felled or restructured to accommodate the proposed Development. An area to the north west of the proposed Development area was previously felled as part of the construction of Mark Hill Windfarm.

Key components

The final choice of turbines and the most appropriate layout of the proposed Development will be subject to both environmental and technical constraints and will be optimised as the EIA, which includes consultation with all relevant parties[20], and conceptual design progress. SPR considers it is important to gather the initial views of consultees before progressing the layout. The design of the layout will be a relatively fluid process and will take into account key environmental constraints to produce a windfarm which is environmentally acceptable. The design of the proposed Development will be gradually formed through a series of design workshops, which will take account of survey data and consultation responses. The full range of environmental disciplines, included within this Request for a Scoping Opinion, will be considered within these design workshops. Ultimately the overall EIA process will strongly influence the final layout. The design process, and specifically the influence of consultation responses, will be presented in a Design Report as part of the ECDU Gate Check procedures.

A turbine layout is not presented in this report, although an indicative site boundary (as shown in **Figure 2**) represents the proposed Development area within which the turbines, access tracks and other windfarm associated infrastructure would be located.

The main elements of the proposed Development would comprise:

- Turbines and turbine foundations;
- Site access;
- Power cables linking the turbines laid in underground trenches;
- Substation compound and control building;
- Closed circuit television (CCTV) and associated masts;
- A communication mast;
- Onsite access tracks;
- Crane hardstandings;
- Permanent anemometry mast(s) and temporary mast(s) suitable for power curve verification;
- Forestry operations including tree felling and restocking;
- Borrow pits for sourcing local materials for tracks and hard standings; and
- Temporary site construction compounds and associated infrastructure.

Turbines

Although the wind turbine that would be erected at the site will be informed by the EIA process, which will include consultees' feedback, a turbine similar to the existing Mark Hill

[20] These include: landowners, the local community, statutory and non-statutory consultees and specialist consultants

Windfarm is expected for the proposed Development. The turbines considered for the initial conceptual design iterations will have an approximate blade tip height of up to the 122 metre (m).

The proposed turbines would be three bladed horizontal axis turbines. The turbine towers would be of tapering tubular steel construction, finished in a light grey semi-matt colour, similar to the surrounding windfarms.

Site access

The access route for construction vehicles and turbine transportation will be subject to survey and will be selected to minimise potential effects on the local area and transport infrastructure. Site access is expected to be taken directly from the A714 to the south of the proposed Development. The potential for site access and/or turbine delivery through the existing Mark Hill Windfarm will also be investigated.

Cabling, substation compound and control building

Electric cables would run buried in trenches along the sides of the access tracks from the wind turbines to the onsite substation.

A substation for electrical switchgear and transformer would be located onsite.

A control building that would contain store rooms, staff welfare facilities and additional rooms for other purposes such as telecommunications would also be required at the site.

The substation and control building would comply with requirements of the network operator and with health and safety legislation and guidance.

CCTV and communications masts

A communications mast would be used to support a broadband connection / radio network to the proposed Development. The mast would be approximately 15m in height to accommodate the apparatus required. CCTV masts may also be installed across the site to provide security.

Onsite access tracks

The need for new tracks providing access to the turbine bases and the control building and the substation compound will be minimised by upgrading and making use of existing forestry access tracks, where possible.

The network of new tracks that may also be required will be optimised through the EIA and conceptual design processes. Ground conditions such as peat and steep slopes will be taken into account and avoided where possible.

Crane hardstandings

A hardstanding area will be required adjacent to each turbine to allow operation of cranes during turbine erection and maintenance.

Meteorological masts

A permanent and/or temporary anemometry mast(s) would be erected at the site to monitor wind speeds and other meteorological data. Their heights and positions will be subject to the candidate turbine. Visual impact of the met mast(s) and other environmental topics will be assessed during the EIA.

Forestry operations

The siting of wind turbines, crane harstandings, access roads, substation and control building and any other ancillary infrastructure may require some felling of trees or clearance of the forested area. The EIA will consider impacts resulting from these works.

Borrow pits

Where possible, the stone required for tracks, foundations and crane pads would be predominantly sourced from onsite borrow pits. This would minimise transportation movements of stone to the proposed Development. However, depending on the quality of stone found, it may be necessary to import stone into the proposed Development.

The volume of material required will be dictated by the final layout. Work will be undertaken to assess the suitability of local geological conditions. The ES would consider the number, location and re-instatement of onsite borrow pits or if stone needs to be imported to the site, the effects resulting from the transportation of this stone.

Temporary construction compounds

Temporary construction compounds for temporary office accommodation, parking and for receipt and storage of plant, equipment and delivered materials will be required for the construction phase.

Connection to the grid

It is likely that the new substation would be connected to the existing substation at the existing Mark Hill Windfarm through an overhead power line. However, the impacts of the export cable will form part of a separate assessment and application under Section 37 of the Electricity Act 1989 undertaken by Scottish Power Energy Networks and/or the Grid operating company and as such will not be considered further in this report.

Existing land use

Some areas of commercial coniferous forestry are likely to be felled in order to accommodate the proposed Development. This would create an opportunity to diversify habitats and re-structure the forest according to contemporary standards and forestry best practice. The project team will work closely with the private landowners on these proposals, within the context of existing felling, restocking and Forest Design Plans (FDP)[21]. Any changes to the existing FDP will be agreed with the Forestry Commission Scotland (FCS) Conservator.

[21] The FDP is a document updated every five years, which outlines and explains how the forest is to be managed and why. It includes felling and planting proposals and other management strategies. FCS formally approves all FDPs

Project phases

Construction

The construction period would depend on the final number of turbines although for this scale of development the construction is likely to last a period of approximately 24 months. The construction phase would consist of the following principal activities:

- Removal of forestry as required;
- Construction of temporary construction compounds;
- Extraction/importation of material for access track, hard-standing and turbine foundation construction;
- Enhancement of existing road infrastructure and construction of onsite access tracks, passing places and watercourse crossings to inter-link the turbine locations and other infrastructure;
- Provision of culverts under tracks to facilitate drainage and maintain existing hydrology;
- Construction of turbine foundations, crane hard-standings and transformer plinths;
- Construction of control building and substation;
- Excavation of trenches and cable laying adjacent to site tracks;
- Connection of distribution cabling;
- Transport to site and erection of wind turbines;
- Commissioning of site equipment; and
- Site restoration.

Many of these operations would be carried out concurrently, although predominantly in the order identified reducing the overall length of the construction programme. Site restoration would be programmed to be undertaken at the earliest opportunity to minimise potential impacts.

Operation

It is considered that the proposed Development would have an operational life of 25 years. During this period onsite operations would be limited to servicing and maintenance activities.

Decommissioning

At the end of the operating period, the proposed Development would be decommissioned and the turbines removed as well as associated infrastructure, and the site restored. Alternatively, a new application may be made to extend the life of the proposed Development or replace the turbines.

4. EIA methodology

4.1 Introduction

The EIA process identifies the potential environmental effects of a development and then seeks to avoid, reduce or offset any adverse effects through mitigation measures where possible.

The EIA process is both iterative and cyclic and runs in tandem with project design. As potential effects are identified, the design of the project (for example, the layout of the turbines) will be adjusted and mitigation measures proposed. Consultation is a vital component of the EIA process that starts at an early stage and continues throughout each stage, contributing both to the identification of potential effects and mitigation measures.

An ES will be submitted with the application for consent gathering environmental information of the site, describing the proposed Development, predicting and describing its environmental effects, defining ways of avoiding, cancelling, reducing or compensating for the adverse effects, and taking into account the results of consultations with statutory and non-statutory consultees and the local community.

4.2 EIA guidance

There are numerous advisory documents that are relevant to the proposed Development, all of which will be given due regard in carrying out the EIA. The principal documents include the following:

- Scottish Government ECDU (2013). *Good Practice Guidance*;
- Scottish Government (2010). *Guidance on the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000*;
- Scottish Government (2011). *Guidance On The Electricity Works (Environmental Impact Assessment) (Scotland) Amendment Regulations 2008*;
- Scottish Government web based Guidance '*Onshore wind turbines'* (first published in February 2011 and last updated in October 2012);
- SNH (2012). *Guidance 'Assessing the cumulative impact of onshore wind energy developments' (version 3);*
- IEMA (2004). *Guidelines for Environmental Impact Assessment*; and
- SNH (2009). *A Handbook on Environmental Impact Assessment: Guidance for Competent Authorities, Consultees and other involved in the Environmental Impact Assessment Process in Scotland (3rd Edition).*

4.3 Scoping

Establishing which aspects of the environment and associated issues are relevant for a particular project is captured in the EIA scoping process. Scoping is the process of identifying those aspects of the environment and associated issues that need to be considered when assessing the potential effects of a particular development proposal. This recognises that there may be some environmental elements where there will be no

significant issues or likely effects resulting from the development and hence where there is no need for further investigation to be undertaken.

Following the identification of the scope of the EIA, individual environmental topics are subject to survey, investigation and assessment, and individual topic chapters are prepared for the ES.

4.4 Approach to assessment

Where appropriate, each technical assessment will be prepared in the ES to a standard format similar to as follows:

- An ***introduction*** describing the basic scope and approach of assessment;
- An outline of the ***consultation*** response to Scoping and any other consultations and how these are addressed;
- A description of the specific ***methodology*** applicable to the topic being assessed, both in terms of any surveys and also the criteria that would be used in the assessment of effects; any limitation to the assessment would also be described;
- A presentation of the ***baseline*** conditions of the environment applicable to the topic being assessed gathered through desk based assessments, consultation, site surveys, use of analytical models and/or the acquisition of data from third parties. Survey methodologies will be discussed and agreed with the relevant consultees;
- An ***assessment of effects*** describing the effects that are likely to arise from the proposed Development on the environmental topic being assessed relating to the construction, operational and decommissioning phases and cumulative effects which could occur. The assessment will take into account embedded mitigation, consisting of mitigation measures that are identified and adopted as part of the evolution of the project design;
- A description of ***mitigation measures*** additional to embedded mitigation consisting of mitigation measures that are identified during the EIA process to reduce or eliminate any effects that are predicted;
- A description of ***residual effects*** which would occur as a result of the proposed Development after additional mitigation measures have been implemented; and
- ***Conclusions***: overall summary and conclusions taken from the assessment process. Where relevant this will include monitoring recommendations.

General approach to the assessment of effects that will be followed wherever possible during the EIA is described below.

Assessment of effects

In assessing effects, it is important to distinguish between those that are significant and those that are non-significant. Whether or not an impact is significant depends principally on:

- The sensitivity and value or the resource or receptor that is affected; and
- The magnitude of the change to that resource or receptor that will result from the scheme.

This approach to assessing significance can be used for many types of environmental effect, although is not necessarily applicable in all cases. Wherever possible, this approach will be adopted in the EIA to help identify the significance of effects. In applying this approach or a simpler determination of significance, due regard will be given to professional judgement informed by reference to legal standards, Government policy, current good practice and the views of stakeholders.

It should be noted that there are certain environmental disciplines where predetermined thresholds for identifying the significance of effects already exist. Such predetermined thresholds are predominantly for effects that can be measured quantitatively and have generally been developed through the adoption of recognised industry standards, EIA best practice and professional judgement.

Value or sensitivity of receptors

The value or sensitivity of the resource or receptor depends on a range of factors including rarity, scale, value, robustness to change etc. In the case of ecological and landscape resources, this is often recognised in statutory designations and legal protections, or by reference to its importance to the local or wider community or its economic value. In the case of other resources and receptors, professional judgement has to be used.

Judging the sensitivity of receptors is a critical part of the assessment process, because even important or valuable resources may be relatively insensitive to impacts. This is therefore an important stage in assessing the significance of an impact on a particular resource or receptor. This judgement needs to take account of the likely response to the change and the ability of the resource to adapt to the impact. Some species of birds, for example, may be sensitive to disturbance during construction activities but may recover rapidly once the activities have ceased.

Magnitude of effect

The ES will describe the predicted effects and identify the predicted magnitude of the effect. The term 'magnitude' is used to encompass all the dimensions of the predicted effect including:

- The nature of the change (what is affected and how);
- It's size, scale or intensity;
- It's geographical extent and distribution;
- It's duration, frequency, reversibility, etc; and

- Where relevant, the probability of the impact occurring as a result of accidental or unplanned events.

Magnitude therefore describes the extent or degree of change that is predicted to occur in the resource or receptor.

Overall grading of the magnitude of effects may be defined differently according to the type of effect and a more or less detailed scale may be used for particular effects depending on the circumstances. For readily quantifiable effects such as noise, numerical values are used whilst for other topics a more qualitative classification is necessary.

Cumulative effects

Cumulative effects of the proposed Development in conjunction with other developments (existing, consented or subject of undetermined consent applications developments) will be considered.

The assessment of cumulative effects for a windfarm development is considered to be most important in terms of potential landscape and visual effects, but cumulative ornithological and noise effects are also often a key consideration. Due to the location of the proposed Development area adjacent to the existing Mark Hill Windfarm and in close proximity to other windfarms and proposed windfarms, cumulative effects will be particularly important for this EIA.

Scoping Question: Do the requirements outlined for assessment of effects look appropriate and complete?

Scoping Question: Are there any additional key sources of environmental information to be consulted?

5. Landscape and visual

5.1 Introduction

This section outlines the likely range of effects of the proposed Development on the landscape and visual resource and the proposed methodology for the identification, assessment and reporting of effects in the Landscape and Visual Impact Assessment (LVIA).

5.2 Baseline conditions

Overview – landscape and visual context

The location of the proposed Development is indicated in **Figure 1**, and consists of the area to the south east of the existing Mark Hill Windfarm, incorporating the areas around Balmalloch, Shentulloch Knowe, areas of land to the west and south of Black Clauchrie and to the north of the A714, around Loch Goosey. Within this proposed Development area the terrain ranges in heights from 210m AOD in the northern part of the site, to 160m AOD at the southern part of the site near the A714.

The existing Mark Hill Windfarm is located to the immediate north west of the proposed Development area, consisting of 28 turbines of 110m ground level to blade tip height wind turbines.

The wider landscape contains areas of considerable topographical diversity ranging from the highest point in the Galloway Uplands at Merrick (843m) in the east to the Stranraer peninsula and coastal flats around Luce Bay in the south and west. The south western part of Ayrshire forms a transition between the higher areas of Dumfries and Galloway and lowlands of the Ayrshire Basin. Underlain by Silurian greywacke, the dominant Southern Uplands Fault, and a series of lesser parallel fault lines, running from south west to north east, has determined the alignment of a series of valleys and ridgelines.

At the regional scale, the proposed Development is located in the Ayrshire Carrick Hills and Valleys Regional Character Area, in the Ayrshire Landscape Assessment (Land Use Consultants, 1998)[22]. Within this regional area, the proposed Development is located within the Plateau Moorlands Landscape Type, and a subset of this landscape type, the Plateau Moorlands with Forest, which occurs where significant afforestation has taken place. The proposed Development is covered by a mixture of commercial coniferous forestry and open moorland. It is crossed by several small burns and occasional small loch, including Loch Goosey and Loch Nevan.

The areas surrounding the proposed Development are not densely populated. The lowland and coastal and peninsula areas in the south and south western part of the study area are more settled. In general the majority of settlements are located on or near to the coast or within the valley landscapes, adjacent to important routes that follow these corridors. These

[22] Land use Consultants (1998). *Ayrshire landscape assessment*. Scottish Natural Heritage review No. 111

contain a pattern of small, scattered villages (such as Barrhill, Kirkcowan and New Luce) and farmsteads. The foothills give way to elevated and remote moorland with little habitation.

There are few major routes within the study area. The A714 follows the Duisk Valley corridor between moorland and uplands, while the remaining routes, including the A75, A77, A719, A747 and A716 follow more accessible coastal locations. The Stranraer to Glasgow railway line passes to the west of the proposed Development, passing Barrhill, at its closest point.

The areas of forestry within and immediately surrounding the proposed Development are not considered tourist destinations. The Galloway Forest Park covers extensive areas of forestry to the east of the proposed Development, which includes numerous areas for outdoor recreation. Part of the Galloway Forest Park is the first Dark Sky Park in the UK. The Southern Upland Way passes to the south east of the proposed Development, an important long-distance coast-to-coast footpath. The Merrick, South Scotland's highest mountain can be climbed from Bruce's Stone, Glentrool.

The potential effects of the proposed Development on landscape character and visual amenity are considered further in the following section.

Landscape character

Landscape character types/areas

At the regional scale, the proposed Development is located in the Ayrshire Carrick Hills and Valleys Regional Character Area, in the Ayrshire Landscape Assessment (footnote no. 22). This comprises a variety of landscape types, encompassing upland, valley and coastal landscapes.

Within this regional area, the proposed Development is located within the Plateau Moorlands Landscape Type, and a subset of this landscape type, the Plateau Moorlands with Forest, which occurs where significant afforestation has taken place. There have been changes in the landscape since the Ayrshire Landscape Assessment was published in 1998. In particular, the site has been subject to further afforestation and part of this landscape type to the west of the site now includes the existing Mark Hill Windfarm. Consequently, the majority of the site is considered as being characterised as Plateau Moorland with Forestry, located adjacent to an area of Plateau Moorland with Windfarm – a further landscape sub-type defined around Mark Hill Windfarm.

Other landscape types located in the locality around (but not within) the site boundary are also relevant as part of the baseline landscape character. The Intimate Pastoral Valley Landscape Type is located to the west of the site (Duisk Valley) and to the north (Stinchar Valley). The Southern Uplands are located to the north east, formed by large scale, smooth domed or slightly conically shaped hills, with a strong relief that is dissected by steeply sided glens. The Southern Uplands with Forest are also located to the north east, a sub-type of the Southern Uplands, sharing the same characteristics with the addition of large scale coniferous forest plantations. The Rugged Granite Uplands of the Galloway Hills occupy a dramatic and prominent upland range to the east at the Merrick.

Landscape designations

The proposed Development is located adjacent to the **Ayrshire Scenic Area** (SA), designated within the South Ayrshire Proposed Local Development Plan (South Ayrshire Council, August 2012) (see footnote no.16) as 'notable areas of particular landscape quality'. This local plan designation applies to extensive areas of South Ayrshire and a broad variety of landscape character, encompassing the foothills, coastal landscapes and settled valleys of South Ayrshire. The proposed Development is located adjacent to the boundaries of the Ayrshire Scenic Area that cover the upper, southern parts of the Duisk Valley.

The proposed Development is located approximately 6km to the west of the **Galloway Hills Regional Scenic Area** (RSA), which is afforded protection in the Dumfries and Galloway Structure Plan (Dumfries & Galloway Council, 1999)[23]. The Galloway Hills RSA centres on the Rugged Granite Uplands and Coastal Granite Uplands of central Galloway, extending from the Ayrshire boundary south to where the hills meet the sea. The area under designation includes the principal foothills, lower ridges and side slopes of the eastern and western flanks of the Galloway Uplands, including the Merrick as well as the adjacent Cairnsmore and Carsphairn range of hills. The relationship between the hills and the adjacent lowlands gives rise to sweeping and dramatic views of the hills from the surrounding landscape.

Scotland's Third National Planning Framework (Main Issues Report and Draft Framework) (Scottish Government, 2013) (see footnote no. 10) confirms that **Core Areas of Wild Land** will not be designated under statute, but that SNH wild land mapping should 'inform future planning for windfarm development'. Plans should identify and safeguard areas of wild land character, based on SNH mapping of core wild land, published in 2013[24]. Wild land character is displayed in some of Scotland's remoter upland, mountain and coastal areas, which are sensitive to any form of intrusive human activity and have limited capacity to accept new development. The proposed Development area is located approximately 9km to the west of a Core Area of Wild Land covering the Rugged Granite Uplands of the Galloway Hills at the Merrick. SNH's wild land mapping assesses the land within the proposed Development area in terms of its wild land characteristics. The composite mapping of wildness factors indicates that the proposed Development area consists of varying shades of brown and yellow, which indicates lower (and therefore least sensitive) wildness characteristics. These findings are influenced by the commercial forestry land use with the proposed Development area, which is substantially human-influenced and does not have a high degree of naturalness or remoteness, and the landform, which is gently undulating and not rugged.

[23] Dumfries & Galloway Council (1999). *Structure Plan.* Dumfries & Galloway Council.

[24] SNH (2013). *Mapping Scotland's wilderness and wild land*. [online] Available at: http://www.snh.gov.uk/protecting-scotlands-nature/looking-after-landscapes/landscape-policy-and-guidance/wild-land/mapping/ [Accessed 20 June 2013].

Landscape capacity studies

The **Ayrshire and Clyde Valley Windfarm Landscape Capacity Study**[25] suggests that the heavily afforested landscapes of South Ayrshire are one of the areas where the character of the landscape was judged to be least sensitive to windfarm development. The landscape within the proposed Development is assessed in this study as having a low and medium sensitivity to windfarm development. The results of the study indicate that the proposed Development area is within a location with greater capacity for windfarm development, taking into account intervisibility and landscape sensitivity.

A key conclusion of the capacity study is that, irrespective of the level of windfarm development ultimately achieved within Ayrshire, a planned approach, based on the concentration of development into a smaller number of larger windfarms (as opposed to a large number of smaller windfarms) will help reduce the overall level of landscape and visual impact. This conclusion implies a degree of support for the siting of new windfarm development in areas considered to be of less sensitivity and potentially adjacent to existing windfarms, so as to concentrate development in these strategic windfarm areas.

The **Ayrshire Supplementary Planning Guidance: Windfarm Development**[26] provides a spatial framework for wind energy development in South Ayrshire, which identifies 'broad areas of search' for windfarm development. The proposed Development is partly located within an area identified as an 'area of potential constraint', and partly located within a 'broad area of search'. Areas of potential constraint include a number of potential constraints, not necessarily relating to landscape, and the existence of a constraint does not necessarily preclude development but requires a clear understanding of the nature of the constraint, factors that must be addressed and any mitigation required to produce an acceptable level of impact. In the case of landscape and visual impacts, this will require the potential impact on Sensitive Landscape Character Areas, such as the Duisk Valley, to be satisfactorily addressed. The proposed Development area is not located within an 'area afforded significant protection'.

The 'broad areas of search' identified in the Ayrshire Supplementary Planning Guidance appear to have been updated by those within the **South Ayrshire Main Issues Report**[27], which defines a wider 'Preferred Area of Search' for large scale windfarms (Map 6.1, Environment).

The South Ayrshire Local Development Plan Proposed Plan was published in August 2012 and represents the latest stage in the preparation of the new Local Development Plan. The Proposed Plan 'LDP policy wind energy' states:

[25] Land use Consultants (2004). *Ayrshire and Clyde Valley windfarm landscape capacity study.* Scottish Natural Heritage Commissioned report No. 065 (ROAME No. F01AA309c).
[26] Ayrshire Joint Planning Unit (2009). *Ayrshire Supplementary Planning Guidance: Windfarm Development*. Ayrshire Joint Planning Unit.
[27] South Ayrshire Council (2010). *South Ayrshire Main Issues Report.*

'We will support proposals if:

a. *the landscape is capable of accommodating the development;*
b. *they respect the main features and character of the landscape and keep their effects on the landscape and the wider area to a minimum (through a careful choice of site and high-quality design and materials);*
c. *they do not have a significant detrimental effect on the amenity of nearby residents;*
d. *the cumulative impact is acceptable; and*
e. *they do not affect aviation, defence interests and broadcasting installations.*

We will use conditions and supplementary guidance on wind farms when considering proposals for wind farms and turbines. Proposals will be considered in relation to the criteria above and supplementary guidance on wind farm developments, which will identify preferred areas of search for wind farms. We will use the Landscape Capacity Study to help us decide the effect of proposals on the landscape.

Developers must show us that their proposal will not result in adverse individual or cumulative impacts upon any Natura 2000 site.'

The Proposed Plan does not identify areas of search for windfarms. The Proposed Plan states that supplementary guidance will identify preferred areas of search for windfarms. It is understood that South Ayrshire Council will commence production of the supplementary guidance in 2014. The previous draft of the Local Development Plan, the Main Issues Report which was published in 2010 identified 'Preferred Areas of Search' for large scale windfarms. The majority of the proposed Development area is located within the 'Preferred Area of Search for Large Scale Windfarms' defined in the South Ayrshire Main Issues Report. A small area of Plateau Moorland with Forest near the Duisk Valley is outside the preferred area of search.

Visual receptors

The areas surrounding the proposed Development are not densely populated. The lowland and coastal and peninsula areas in the south and south western part of the study area are more settled. The largest towns are Stranraer, located on the coast of the western peninsula, and Ayr, located to the north. Other, smaller towns near the proposed Development include Newton Stewart, Wigtown, Girvan and Maybole. In general the majority of settlements are located on or near to the coast or within the valley landscapes, adjacent to important routes that follow these corridors. In addition to the main settlements, low coastal areas and small neighbouring valleys contain a pattern of small, scattered villages (such as Barrhill, Kirkcowan and New Luce) and farmsteads, particularly in the fertile coastal areas of the south. The foothills give way to elevated and remote moorland with little habitation.

There are few major routes within the study area. The A714 follows the Duisk Valley corridor between moorland and uplands, while the remaining routes, including the A75, A77, A719, A747 and A716 follow more accessible coastal locations. The Stranraer to Glasgow railway line passes to the west of the proposed Development, passing Barrhill, at its closest point.

The areas of forestry within and immediately surrounding the proposed Development are not considered tourist destinations. The Galloway Forest Park covers extensive areas of forestry to the east of the proposed Development, which includes numerous areas for outdoor recreation including walking and mountain biking. Part of Galloway Forest Park is the first Dark Sky Park in the UK and there are a number of dark sky viewing sites. The Southern Upland Way passes to the south east of the proposed Development, an important long-distance coast-to-coast footpath. National Cycle Network Route 7 passes to the east of the proposed Development, through the Southern Uplands and along the Water of Minnoch to Glentrool. Glentrool is located to the south west and the main gateway to the Galloway Hills, with a visitor centre and trail centre for the '7 Stanes' cycle routes. The Merrick, South Scotland's highest mountain can be climbed from Bruce's Stone. A number of coastal areas, located at longer distances from the proposed Development, around Luce Bay and the west coast of Ayrshire are important tourist destinations. A 'new style' Biosphere is proposed for Southern Ayrshire and Galloway, with a key role in promoting the area in terms of nature based tourism and sustainable economic development.

5.3 Potential effects and EIA methodology

Legislation and guidance

The methodology that will be used to carry out the LVIA draws on the following good practice guidance:

- Landscape Institute and IEMA (2013). *Guidelines for the Assessment of Landscape and Visual Impacts. Third Edition*;
- SNH (2012). *Guidance 'Assessing the cumulative impact of onshore wind energy developments' (version 3);*
- SNH (2006). *Visual Representation of Windfarms Good Practice Guidance* and *Consultation Draft 2nd Edition* (May 2013);
- SNH commissioned report (2006). *Visual Analysis of Windfarms Good Practice Guidance*;
- SNH (2009). *Siting and Designing Windfarms in the Landscape*; and
- Landscape Institute (2011). *Use of Photography and Photomontage in Landscape and Visual Impact Assessment, Note 01/11*.

Detailed LVIA methodology

A full LVIA of the proposed Development will be undertaken including ancillary infrastructure (such as site roads and borrow pits). The assessment process will be used to revise the layout and design of the proposed Development to minimise effects and will be based on relevant and accepted guidance, advice and best practice including national policy guidance, and other information provided by consultees.

Study area

The LVIA study area is defined as a 35km radius area from the outer edge of the proposed Development (**Figure 3**), to include all those areas within which potentially significant visual effects of the proposed Development may occur. The proposed viewpoints to be used during

the assessment are included within **Figure 4**.The reasons for establishing the study area for use in the LVIA will be clearly documented in the LVIA.

Potential effects

Landscape character types/areas

During the EIA, a full Landscape Character Assessment will be carried out as part of the Landscape and Visual Assessment chapter to update the existing landscape character assessments for the area.

The effects of the proposed Development on the Plateau Moorlands and Plateau Moorlands with forest landscape types will be assessed in full in the LVIA. The landscape character assessment included in the LVIA will also consider the effects of the proposed Development on the landscape character types that cover the wider study area. The effects identified on landscape character types will be assessed to determine their significance, through the evaluation of the sensitivity of the landscape receptors to change and the magnitude of effect resulting from the proposed Development. Effects on the landscape character of the site and surrounding landscape character types will also be carefully considered in the layout design of the proposed Development.

Landscape designations

Effects of the proposed windfarm on statutory landscape designations in the study area will be assessed in the LVIA, along with effects on other local designations within the study area. The effects identified on landscape designations will be assessed to determine their significance, through the evaluation of the sensitivity of the landscape designation to change and the magnitude of effect resulting from the proposed Development.

Landscape capacity studies

The landscape capacity of the proposed Development will be considered in the LVIA in relation to published landscape capacity studies.

Visual amenity

The LVIA will assess the potential visual receptors that may be affected by the proposed Development, as identified in **Table 5.1**.

Table 5.1: Visual receptors included in LVIA

Type of visual receptor	Visual receptor
Settlements	Barrhill
	Bargrennan
	Newton Stewart
	Wigtown
	Creetown
Roads	A714
	A75
	B734
	B7027
	Minor Road, Glenluce to Barrhill
Railways	Glasgow-Stranraer
Long distance walking routes	Southern Upland Way (SUW)
Cycle paths	National Cycle Network Route 7
	Glentrool Big Country Route
Hill walks	Merrick
	Cairnsmore of Fleet
Specific viewpoints	Byrne Hill

The susceptibility of different visual receptors to changes in views and visual amenity varies and is mainly a function of the activity of the people experiencing the view, the extent to which their attention or interest may be focused on the view, and the visual amenity they experience at particular locations. The effects identified on visual receptors will be assessed to determine their significance, through the evaluation of the sensitivity of the visual receptors to change and the magnitude of effect resulting from the proposed Development.

Viewpoints

A range of viewpoints from which the proposed Development will be seen by different groups of people are identified for assessment in the LVIA (**Table 5.2**). They include a range of public viewpoints, including from within settlements, footpaths, hill summits, transport routes and visitor locations. The viewpoints which are proposed for the assessment of visual effects have been informed by field work, and by desk research. Viewpoints selected for inclusion in the assessment include representative viewpoints, selected to represent the experience of different types of visual receptor; and specific viewpoints, chosen because they are promoted viewpoints in the landscape or within landscapes with value recognised by designation. The selection of viewpoints identified in **Table 5.2** proposed for the assessment takes account of a range of factors, including:

- The extent of visibility of the proposed Development;
- The accessibility to the public;
- The viewing direction, elevation and distance (i.e. short, medium and long distance);
- The nature of the viewing experience (e.g. static views from settlements or sequential views along routes);
- The view type (e.g. panoramas, vistas, framed or glimpsed views); and

- The potential for cumulative views in conjunction with other developments.

A Residential Visual Amenity Study for properties surrounding the site out to 2km will also be undertaken as part of the assessment.

Table 5.2: Proposed viewpoints for LVIA

	Viewpoint	Easting	Northing	Distance (km)	Rationale
1	A714 Creeside	229554	581022	1.6	Closest section of A714 with visibility and also representative of views from Creeside/Eldrick. Closest point of Ayrshire Scenic Area.
2	A714 Feoch Burn	224989	581417	1.8	Glimped section of A714 with potential view of Development along Feoch Burn. Within Ayrshire Scenic Area.
3	Barrhill, Gowlands Terrace	223187	582183	2.7	Representative of views experienced by residents in Barrhill, the closest main settlement, however visibility is very limited.
4	A714, near Cairnderry Cairn	231508	579916	3.0	Representative of sequential views from A714 northbound, arrival into Ayrshire. Also near Chambered Cairn.
5	Barrhill Station	222576	581676	3.4	Closest section of railway line with visibility. Within Ayrshire Scenic Area
6	B7027 Knockycoid	226210	579104	4.0	Closest section of B7027 with visibility. Also representative of views for residents in Knockycoid area.
7	Barrhill-New Luce Road (C72)	221980	579927	4.9	View across Duisk Valley to plateau moorland and Mark Hill Windfarm beyond. Distinctive profile of Galloway Hills to the south.
8	Core Path, Duisk Valley near Pinwherry	220060	585045	6.0	Closest section of core path network with visibility and within the Intimate Pastoral Valley landscape type (Duisk Valley) and Scenic Area.
9	Footpath, Pinmore-Muck	222633	589326	6.2	Footpath to the north west of the development between Pinmore

	Viewpoint	Easting	Northing	Distance (km)	Rationale
	Water				and Muck-Water.
10	B7027 Loch Maberry	228402	576217	6.3	Scenic section of B7027 with first main visibility heading north on B7027.
11	Kirriereoch	235818	586417	6.8	Closest point of NCN route/Core Path in Water of Minnoch. Closest point of Galloway Hills RSA.
12	Chirmorrie	220752	576522	8.2	Specific view of the Galloway Hills arriving into Ayrshire from Galloway on minor road. Distinctive profile of Galloway Hills.
13	B734 Poundland, Stinchar Valley	218058	587228	8.5	Section of B734 with visibility of Mark Hill. Within Ayrshire Scenic Area. Minimal visibility of Development behind operational Mark Hill.
14	Glenvernoch Fell (SUW)	232712	574104	8.8	Local high point on closest section of SUW (between Bargrennan and New Luce).
15	Auchensoul Hill	226361	594526	9.1	Within Ayrshire Scenic Area. Minimal visibility of Development, but higher tip height could become more visible above ridgeline.
16	Craig Airie Fell (SUW)	223617	573674	9.6	Local high point on section of SUW between Bargrennan and New Luce. First visibility eastbound on SUW.
17	A714, Cree Valley	237014	571966	12.6	View from A714 in Cree Valley. Within valley landscape type and Galloway Hills RSA.
18	Merrick	242721	585513	12.9	Specific view from high point of Southern Uplands and within Galloway Hills RSA/Core Area of Wild Land. Popular hill walk with panoramic views.
19	Byrne Hill	217846	594543	13.3	Specific view from marked OS Viewpoint on Byrne Hill near Girvan. Principal view is to the sea. Within Ayrshire Scenic Area.

	Viewpoint	Easting	Northing	Distance (km)	Rationale
20	Knockdolian	211350	584800	14.4	Specific view from prominent frequently walked hill between Colmonell and Ballantrae, and within Ayrshire Scenic Area.
21	Newton Stewart, Blair Monument	240400	565400	20.0	Representative of views experience by residents of elevated western side of Newton Stewart.
22	A75 near Kirkcowan	235600	563240	20.1	Glimpsed view from closest section of visibility on A75 near Kirkcowan/Newton Stewart.
23	Cairnsmore of Fleet	250116	567096	25.2	Highest of the Solway Hills and most southerly of 'Graham's. Popular hill walk with panoramic views.
24	Knock Fell	225500	555800	26.9	Elevated hill fort, illustrates potential maximum effect on the Machars landscape to the south.

The effects identified on these viewpoints will be assessed in the LVIA to determine their significance, through the evaluation of the sensitivity of the viewpoints to change and the magnitude of effect resulting from the proposed Development.

Cumulative effects

A Cumulative Landscape and Visual Impact Assessment (CLVIA) will be undertaken as part of the LVIA.

The CLVIA will distinguish between predicted effects in relation to operational, consented and application stage wind energy development 'scenarios'.

A search area base plan showing other wind energy developments within a 60km area radius from the site is shown in **Figure 5**. Wind energy developments identified in this plan are listed in Appendix 1. The search plan includes wind energy developments within different typologies up to specific distances, based on an approximate limit of visual significance for each typology, as follows:

- Within 15km: small/medium typology (20-50m to blade tip), medium (50-80m to blade tip) and large (80-150m to blade tip) turbines;
- Between 15 - 25km: medium (50-80m to blade tip) and large (80-150m to blade tip) typologies; and
- Between 25 - 60km: large (80-150m to blade tip) turbines only.

These distances are informed by recommendations for appropriate zones of theoretical visibility for different wind turbine heights in relevant guidance (SNH, 2013) and verified through field survey. Domestic scale wind turbines, with a height less than 20m to blade tip, will not be included in the assessment as it is considered that the proposed Development will not have significant effects in addition to these turbines.

Within the 60km search area, a 35km study area is proposed as the basis for a detailed assessment of the cumulative effects of the proposed Development. The key principle will be to focus on the likely significant effects of the proposed Development in addition to wind energy developments within this study area, and in particular those effects that may influence the outcome of the consenting process.

The existing Mark Hill Windfarm is located to the immediate west of the development area, consisting of 28 turbines at 110m ground level to blade tip height. Other operational windfarms are present in the landscape beyond this to the north at Hadyard Hill (52 x 110m), to the west at Arecleoch (60 x 135m) and to the south west at Artfield Fell (15 x 74m and 7 x 80m under construction) (**Figure 5**). Kilgallioch Windfarm was consented by the Scottish Government in February 2013 and consists of 96 turbines up to a maximum of 146.5m to blade tip, located within Plateau Moorland and forestry 5km south of Barrhill. Glenchamber (11 x 126.5m) and Carscreugh (18 x 70m) windfarms are also consented, to the south of Artfield Fell.

In addition to these operational and consented windfarms, there are numerous proposals for windfarms with submitted planning applications and further pre-application stage windfarms.

The operational and consented windfarms form a pattern of development within the elevated Plateau Moorland with forest and southern uplands with forest landscapes, ensuring that windfarm development is associated with the large-scale, simple uplands rather than the surrounding more complex, smaller scale valley and coastal landscapes. The integration of the proposed Development with this development pattern and potential cumulative effects with other windfarms will be a key design matter of the scheme, and will be considered throughout the design and assessment process.

Cumulative Zone of Theoretical Visibility (ZTV) will be produced for key projects in the 35km study area with which the proposed Development is likely to interact. Wirelines and photomontages will also be produced in the LVIA to predict and illustrate the nature and degree of cumulative visual effects.

The CLVIA will assess both combined/simultaneous visibility and sequential visual effects along routes. The cumulative effects identified on landscape and visual receptors will be assessed in the CLVIA to determine their significance, through the evaluation of the sensitivity of the viewpoints to change and the cumulative magnitude of effect resulting from the proposed Development.

5.4 Consultation

The detailed methodology for landscape and visual assessment, including viewpoints, and the scope of the cumulative assessment will be agreed in further consultation with consultees including Dumfries & Galloway Council, South Ayrshire Council and SNH.

Scoping Question: Have the most likely and significant effects been identified at this stage?

Scoping Question: Are there any likely or significant effects that should be considered for inclusion in the full assessment process and if so why?

Scoping Question: Do the requirements outlined for assessment of effects look appropriate and complete?

Scoping Question: Are there any additional key sources of environmental information to be consulted?

6. Ornithology

6.1 Introduction

This section details the proposed approach to the evaluation of bird interest on the proposed Development site and surrounding area, and the assessment of potential effects. The ornithology surveys, site evaluation and assessment of potential effects will be undertaken by Natural Research (Projects) Ltd (NRP).

6.2 Baseline conditions

There are no statutory designations at international or national level for ornithology on the proposed Development site.

However, the Glen App and Galloway Moors Special Protection Area (SPA) and Site of Special Scientific Interest (SSSI) is located approximately 12km south west of the proposed Development and will be considered within the EIA. Glen App and Galloway Moors SPA qualifies under Article 4.1 of EC Directive 79/409 by regularly supporting a breeding population of European importance of the Annex 1 species hen harrier (*Circus cyaneus*) (SNH, 2003)[28].

Merrick Kells SSSI lies approximately 8.5km cited for breeding bird assemblages.

Galloway Forest Park is designated as an Important Bird Area[29] and is located adjacent to the Development area. The designation as an Important Bird Area is due to populations of black grouse (*Tetrao tetrix*), peregrine (*Falco peregrinus*) and short-eared owl (*Asio flammeus*).

NRP have been undertaking surveys of the proposed Development and surrounding area since 2010 with surveys continuing through spring and summer 2013; hen harrier, goshawk (*Accipiter gentilis*), merlin (*Falco columbarius*), peregrine, barn owl (*Tyto alba*) and osprey (*Pandion haliaetus*) were all noted in the course of the Generic Vantage Point (GVP) watches and Migration Watch Period (MWP) surveys. None of the raptors were confirmed to be breeding within the survey area and only one barn owl breeding location was found within the survey boundary.

Flights of whooper swan (*Cygnus Cygnus*), greylag goose (*Anser anser*), pink-footed goose (*Anser brachyrhynchus*) and pale-bellied brent goose (*Branta bernicla hrota*) along with golden plover (*Pluvialis apricaria*) were noted during GVP and MWP observations.

One two male black grouse were located displaying at two locations within the survey boundary. One female was also recorded.

[28] SNH (2003). *Citation for Special Protection Area (SPA) – Glen App and Galloway Moors – South Ayrshire and Dumfries and Galloway (UK9003351)*

[29] BirdLife international (2013) *Important bird Areas factsheet: Galloway Forest Park* [online]. Available at: http://www.birdlife.org/datazone/sitefactsheet.php?id=2661 [Accessed 20 June 2013]

6.3 Potential effects

Windfarm developments have the potential to affect birds through direct loss of habitat, displacement of birds to less suitable habitats and collision with turbines. It is SPR's policy to avoid designated areas where development could have an unacceptable impact on the designated interest.

Evaluation of the bird survey results will be required to make judgements on the likely potential effects that these proposals would have on birds through direct loss of habitat, displacement of birds to less suitable habitats and collision with turbines.

6.4 EIA methodology

Legislation and guidance

The following legislation, guidance and policy will be considered as part of the assessment:

- EU Council Directive 2009/147/EC on the Conservation of Wild Birds (Birds Directive);
- Environmental Impact Assessment Directive 85/337/EEC (as amended);
- The Wildlife and Countryside Act 1981 (as amended);
- Nature Conservation (Scotland) Act 2004 (as amended);
- The Wildlife and Natural Environment (Scotland) Act 2011;
- JNCC (2012). *The UK Biodiversity Action Plan (UKBAP);*
- Scottish Biodiversity Forum (2013). *Scottish Biodiversity List*,
- South Ayrshire Council (2008). *Ayrshire Local Biodiversity Action Plan (LBAP) 2007 – 2010*;
- South Ayrshire Council (2012). *South Ayrshire Local Development Plan*;
- SNH (2005a). *Guidance 'Survey methods for use in assessing the impacts of onshore windfarms on bird communities' (version 6.7);*
- SNH (2005b). *Guidance 'Cumulative Effects of Windfarms' (version 2);*
- SNH (2006). *Guidance 'Assessing Significance of Impacts from Onshore Windfarms on Birds outwith Designated Areas';*
- SNH (2010). *Guidance 'Use of Avoidance Rates in the SNH Wind Farm Collision Risk Model';*
- SNH (2012). *Guidance 'Regional population estimates of selected Scottish breeding birds';*
- SNH (2013). Guidance 'Avoidance Rates for Wintering Species of Geese in Scotland at Onshore Wind Farms';
- Pendlebury et al. (2011). SNH Commissioned Report: *Literature review to assess bird species connectivity to Special Protection Areas*[30];
- SNH (2012). *Assessing the Cumulative Impact of Onshore Wind Energy Developments*; and
- Eaton et al. (2009). *The Birds of Conservation Concern (BoCC) 'Red List'*[31].

[30] Pendlebury, C., Zisman, S., Walls, R., Sweeney, J., McLoughlin, E., Robinson, C., Turner, L. & Loughrey, J. (2011). *Literature review to assess bird species connectivity to Special Protection Areas*. Scottish Natural Heritage Commissioned Report No. 390. SNH, Battleby

All wild birds are protected under the Wildlife and Countryside Act 1981 (as amended). It is an offence to kill, injure or take a wild bird; take damage or interfere with a nest of any wild bird whilst it is in use or being built (or at any time for a nest habitually used by any bird listed on Schedule A1); obstruct or prevent any wild bird from using its nest; take or destroy an egg of any wild bird; disturb any wild bird listed on Schedule 1 whilst it is building a nest or is in, on, or near a nest containing eggs or young, or whilst lekking; disturb the dependent young of any wild bird listed on Schedule 1; harass any wild bird listed on Schedule 1A.

Certain birds are afforded extra protection under the Wildlife and Countryside Act 1981 (as amended). The birds are listed on Schedules under the Wildlife and Countryside Act.

Survey methods

This section outlines the methods used to gather the data on birds which will be used in the assessment of the potential effects of the proposed Development.

As mentioned above (NRP) has been undertaking ornithology surveys since 2010 and this will be complete in summer 2013. NRP has extensive experience of windfarm surveys and the surveys were designed and completed using the current SNH Guidance (SNH 2005).

The survey areas used for the production of the ES chapter encompass the proposed Development plus a buffer appropriate to the species under consideration. The following surveys have been undertaken between 2010 and 2012:

- Reconnaissance and habitat mapping;
- Breeding bird survey in areas of open ground;
- Inventory of woodland/forest breeding birds;
- Generic flight activity (vantage point watches).
- Migratory flight activity;
- Autumn / winter walkover surveys;
- Breeding scarce raptor and owl survey;
- Black grouse survey;
- Nightjar survey; and
- Assessment of vole abundance.

In the spring and early summer of 2013 surveys for black grouse, checks of the barn owl nesting locations and further checks for nightjar will be completed, to complement the surveys from previous years. Further surveys will be undertaken by experienced field ornithologists under licence from SNH (where required).

The details of the methodologies for each species are outlined below.

[31] 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 Isle of Man*. British Birds 102: 296-341

Reconnaissance and habitat mapping

A map of the key bird habitats within a 2km survey boundary of the proposed Development will be produced to inform survey effort.

Breeding bird survey in areas of open ground

The distribution of territories of selected species of conservation concern breeding in open ground, were mapped within 500m of the proposed Development. Surveys were completed using the Brown and Shepherd (1993)[32] methodology for upland wader surveys modified to provide reliable breeding estimates for open ground passerines also.

Fieldwork was not 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. All suitable areas within the survey boundary were surveyed on four occasions in spring / early summer 2011.

The survey aimed to cover the ground systematically with a constant search effort. The positions of birds where they were first detected were mapped and at the end of each visit a summary map was compiled showing the location of each identified territory or breeding pair. Population estimates were derived by comparing the summary maps for the four survey visits.

Inventory of woodland/forest breeding birds

Selected species of woodland / forest breeding birds of conservation concern were surveyed in spring 2011 at a sample of 62 woodland count points stratified spatially within the 500m survey boundary of the proposed Development. The objectives were to describe the species composition of the woodland bird community.

Each count point was visited twice in spring 2011. Fieldwork was undertaken between sunrise and sunrise + 6 hours. Meteorological constraints were the same as those for breeding bird surveys of open ground (see above).

On arrival at each count point, surveyors paused to allow birds to acclimatise to the presence of the observer. Thereafter, all birds seen and heard during a 5-minute recording period were recorded. The dominant woodland/forest type at each count point was classified as (1) coniferous plantation, (2) native coniferous, (3) broadleaf, (4) mixed coniferous / broadleaf. In coniferous plantations the forest growth stage was classified as (1) establishment, (2) developing pre-thicket, (3) thicket, pole and high forest, (4) clearfell, (5) pre-thicket.

Flight activity survey

Flight activity within the vicinity of the proposed Development was quantified in order to (1) identify areas of greatest importance to birds and (2) generate quantitative data on activity

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

levels to inform assessment of collision risk. The methods given in Band, Madders & Whitfield (2007)[33] were used.

Five Generic Vantage Points (GVPs) were established with the aim of maximising ground visibility within the 500m survey boundary using the minimum number of points. GVPs were selected through a mix of Geographical Information System (GIS) analysis and field trials. A total of at least 75 hours observation was completed from each GVP for each season (between April to August and September to March) between 2010 and 2012, starting in November 2010 and running through until October 2012 (Table 6.1). Overall 770 hours of observation were undertaken from GVPs.

Observers positioned themselves to minimise their effects on bird behaviour. A viewing arc not exceeding 180 degrees was scanned. Watches were undertaken during daylight hours by a single observer in a wide range of weather conditions, excepting poor ground visibility (< 2km), and were spread temporally to include a representative number of hours early and late in the day.

During each watch three hierarchical recording methods were used, as follows:

Focal bird sampling

The viewing arc was scanned constantly until a *Target A* [34] species was detected in flight. Once detected the bird was followed until it ceased flying or was lost to view. The time the bird was initially detected and the time it spent within the flight activity survey area (to the nearest second) were recorded. The route followed by the bird was plotted regardless of whether or not the bird was within the survey boundary. The bird's flying elevation above the ground was estimated at the point of detection and at 15 second intervals thereafter. Flying elevation was classified as10 to 30m, 30 to 50m, 50 to 100m, 100 to 150m, or greater than 150m.

Focal bird sampling – untimed

The same scanning procedure as described above was used. However flights of *Target B* species[35] were not timed, instead the flight path was mapped and flying elevation recorded at the start and when it changed during the recorded bout. Where a flock was observed a central flight line representative of the route was estimated.

Activity summaries

At the end of each five-minute period flight activity within the survey area by species of lesser conservation importance (*Target C* species) was summarised. The number of birds recorded in any one period was the minimum number of individuals that could account for the activity observed. The height, direction and number of individuals involved in notable bird movements were recorded.

---

[33] 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. and Ferrer, M. (eds) "Birds and Wind Power". Lynx Edicions, Barcelona.

[34] *Target A* species were drawn from those listed in Annex 1 of the Birds Directive and Schedule 1 of the WCA. Other species considered important in a regional or local context were also included.

[35] Mainly migratory wildfowl and wader species of conservation concern

Table 6.1, below, shows the GVP watch hours between 2010 and 2012.

Table 6.1: GVP Watch Hours 2010 to 2012

GVP	April to August (hours)	September to March (hours)	Total hours
1	76.5	76.5	153.0
2	75.0	76.0	151.0
3	75.5	80.0	155.5
4	83.0	75.5	158.5
5	77.5	75.0	152.5

Migratory flight activity

Watches were undertaken from two Migration Watch Points (MWPs) A and B with the aim of recording movements of geese, swans and waders at a landscape scale. These points gave good broad spatial coverage of the site in respect of birds moving on a predominantly North-South axis. Observations totalling 36 hours were undertaken in spring 2011 and 18 hours in autumn 2010 and 2011. A range of meteorological conditions were sampled.

Autumn/winter walkover surveys

Walk-over surveys were undertaken during November 2010 to March 2011, September 2011 to March 2012 and September and October 2012. These surveys were designed to counter-balance surveys of breeding birds undertaken during the spring and summer and occurred within the 500m survey boundary. As for the breeding bird surveys, selected bird species were surveyed,

Walk routes meandered to closely examine as much ground as practical. Where practicable, observers used a different route on each visit to maximise the eventual spatial coverage of the site. Observers paused frequently to scan for birds. For *Target A* and *B* species the time each individual was first detected was recorded along with details of age, sex and behaviour. The location and flight route (if applicable) were mapped. For other species the number of individuals was recorded and locations were plotted on the map. Between 2010 and 2012 49.50 hours of walkovers completed during the non-breeding seasons in a range of meteorological conditions.

Breeding scarce raptor and owl survey

Surveys were carried out during both breeding seasons in 2011 and 2012. Extreme care was taken to avoid unnecessary disturbance to breeding birds. Methods follow those described in Hardey et al (2009)[36].

Searches for scarce breeding raptors and owls were completed during both breeding seasons in 2011 and 2012. Priority was given to the species considered most likely to occur: goshawk, hen harrier, merlin, peregrine and barn owl. Habitat mapping, consultations and local knowledge identified a number of potentially suitable areas for breeding by these species and this information was used to prioritise searches. In 2011 61 hours of searches were completed and 37.75 hours in 2012.

Goshawk

For this species a 1km survey boundary of the proposed Development was used. Survey methods given in Hardey et al. (2009)[36] were followed. Suitable woodland was searched for evidence of occupation (e.g. nests, plucked prey, moulted feathers, pellets and faeces) during late March to May of 2011 and 2012.

Hen harrier

For this species a 2km survey boundary was used. Survey methods given in Hardey et al. (2009)[36] were followed. Emphasis was given to areas of suitable habitat (mostly stands of heather > 0.4m tall). Potential nesting areas were watched for three to four hours if necessary.

Merlin

For this species a 2km survey boundary of the proposed Development was used. Survey methods given in Hardey et al. (2009)[36] were followed. Emphasis was given to the following habitat types: heath bog habitats with stands of heather greater than 0.4m tall; edges of closed canopy forestry plantations; old crows nests (which could be reused by merlin); and, boulders, fence lines, stone dykes, hummocks, bushes, posts and trees were checked for signs of occupation (e.g. plucked prey, moulted feathers, pellets and faeces).

Areas where merlins were observed or signs were found were visited at least twice to verify occupation of the site. Potential nest areas were watched for four to six hours if necessary.

Peregrine

For this species a 2km survey boundary of the proposed Development was used. Survey methods given in Hardey et al. (2009)[36] were followed. Potential and known nest sites were visited and checked for evidence of occupation in April and May. Surveyors looked for birds or signs of occupation (e.g. faecal splash, fresh plucks). Possible sites were watched from a suitable vantage point for 3 to 4 hours or until a nest was located.

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

Barn owl

For this species a 1km survey boundary of the proposed Development was used. Survey methods given in Hardey et al. (2009)[36] were followed. During surveyors' visits to the site potential nesting and roosting locations were identified, including buildings and old trees. Suitable sites were checked for signs of occupancy (adult birds, eggs, young, pellets, feathers, faecal splash) during the winter and in summer.

In the spring and early summer of 2013 checks of barn owl nesting locations have been undertaken to complement the surveys from previous years.

Black Grouse Survey

Suitable habitat within the 1.5km survey boundary of the proposed Development was surveyed for displaying ('lekking') males during the spring of both 2011 and 2012. Care was taken to avoid disturbing lekking birds.

In all areas with habitat identified as potentially suitable for holding displaying black grouse two visits were undertaken in each spring of 2011 and 2012. Visits were undertaken on calm dry days with good visibility, within two hours of dawn. Observers listened carefully for lekking birds from suitable locations. If a lek was located, each lek was then carefully watched from a suitable vantage point and total numbers of males and females present counted.

Further surveys for black grouse have been undertaken in spring 2013.

Nightjar

A small number of nightjar (*Caprimulgus europaeus*) occur in Dumfries and Galloway, perhaps in suitable habitat within 10km of the proposed Development. Therefore suitable habitat within the survey boundary was surveyed during three visits made in summer 2011 on dry, calm, warm evenings. Surveys commenced one hour before dark and continued until at least one hour after dark. Singing birds were listened for from suitable vantage points. Another visit was made during 2012, and further visits have been undertaken in summer 2013.

Assessment of vole abundance

Field voles (*Microtus agrestis*) are also important prey for some raptors and owls and their abundance varies spatially and temporally and these changes can influence raptor and owl distribution and breeding success.

Field voles were surveyed during the 2011 and 2012 breeding seasons as follows. Twenty-five quadrats (each 25 x 25 centimetres (cm)) were randomly located within a representative area of suitable habitat and searched for evidence of field vole activity. The presence/absence of the following signs was recorded: runways in the vegetation, old and fresh vegetation clippings indicative of voles feeding, and old and fresh vole faeces.

Assessment of effects

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

- evaluate the relative 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.

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, 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.

Cumulative effects

As there are other existing and proposed windfarm developments in the area it is considered that cumulative effects with neighbouring windfarm developments will be relevant. Cumulative impacts may arise from other projects. The proximity, nature and timing of work would need to be considered as would the ecology of the species in the assessment of cumulative impacts.

6.5 Consultations

Statutory and non-statutory consultees such as Scottish Natural Heritage (SNH) and the Royal Society for the Protection of Birds (RSPB) will be consulted during this process as the EIA progresses.

An initial meeting with the SNH Case Officer, regarding the findings of the completed ornithological surveys (amongst other issues), has already taken place on 18th July 2013.

Scoping Question: Have the most likely and significant effects been identified at this stage?

Scoping Question: Are there any likely or significant effects that should be considered for inclusion in the full assessment process and if so why?

Scoping Question: Do the requirements outlined for assessment of effects look appropriate and complete?

Scoping Question: Are there any additional key sources of environmental information to be consulted?

7. Ecology (non avian)

7.1 Introduction

This section covers all aspects of ecology (habitats, protected species, fisheries, etc.) with the exception of ornithology, which has been dealt with separately.

7.2 Baseline conditions

The baseline conditions in and around the proposed Development area will be assessed via a combination of a desk based study and field surveys. No ecology baseline conditions of the proposed Development area are known so far.

7.3 Potential effects

The potential effects of the proposed Development are likely to be as follows:

- Direct and indirect habitat loss;
- Disturbance to protected fauna as follows:
    - Disturbance to / loss of breeding sites, resting places, etc.;
    - Direct / indirect loss of foraging resource;
    - Displacement / disruption to movement of animals within / through the proposed Development area; and
    - Direct effects upon protected fauna, .i.e. road traffic accidents, etc.
- Environmental effects, .i.e. pollution of watercourses, etc.; and
- Changes to habitat composition through land-use change, increased human presence, etc.

7.4 EIA methodology

Legislation and guidance

The following legislation and guidance will be considered as part of the assessment:

- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna ('Habitats Directive');
- Council Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy ('Water Framework Directive');
- Environmental Impact Assessment Directive 85/337/EEC (as amended);
- The Conservation (Natural Habitats &c.) Regulations 1994 (as amended) (the Habitats Regulations);
- The Wildlife and Countryside Act 1981 (as amended);
- Nature Conservation (Scotland) Act 2004 (as amended);
- The Wildlife and Natural Environment (Scotland) Act 2011;
- The Protection of Badgers Act 1992;
- IEEM (2006). *Guidelines for Ecological Impact Assessment in the United Kingdom*;

- Scottish Renewables and SEPA (2012). *Developments on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste*;
- SEPA (2010). *SEPA Regulatory Position Statement - Developments on Peat*;
- SNH, SEPA, Scottish Government and The James Hutton Institute (2011). *Developments on Peatland – Site Surveys and Best Practice*;
- Scottish Renewables, SNH, SEPA and FCS (2010). *Good Practice during Windfarm Construction (version 1);*
- SEPA (2012). *Land Use Planning System* – SEPA Guidance Note 6;
- JNCC (2012). *The UK Biodiversity Action Plan (UKBAP);*
- Scottish Biodiversity Forum (2013). *Scottish Biodiversity List*,
- South Ayrshire Council (2008). *Ayrshire Local Biodiversity Action Plan (LBAP) 2007 – 2010*; and
- South Ayrshire Council (2012). *South Ayrshire Local Development Plan*;

A summary of the relevant legislative context for protected species is provided below.

Habitats

Habitats and species listed under Annex IV of the Habitats Directive and Schedule 4 of the Habitats Regulations are protected. Under section 43 it is an offensive to deliberately pick, collect, cut, uproot or destroy a wild plant of a European protected species and to keep, transport, sell or exchange, or offer for sale or exchange, any live or dead wild plant of a European protected species, or any part of, or anything derived from, such a plant.

Otter

Otters (*Lutra lutra*) are protected through inclusion in Annex IV of the Habitats Directive as translated into UK law by the Habitats Regulations as a European Protected Species (EPS). This makes it an offence to deliberately capture, disturb, injure or kill an otter or to damage or destroy a breeding site or resting place. As such any development works, which could affect an EPS, such as otters, may require a licence to legally proceed. Otters are also included within Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). This species is further highlighted as a priority species within the UKBAP and a key species within the Ayrshire LBAP.

Bat species

All UK bat species are European Protected Species under the Habitats Directive, and are the subject of a UK-wide Biodiversity Action Plan (BAP). They are protected under Section 9 of the Wildlife and Countryside Act 1981 as amended by the Nature Conservation (Scotland) Act 2004. The Habitats Regulations add further protection to all bats and their roosts.

The Conservation (Natural Habitats etc.) Amendment (Scotland) Regulations 2007 and the Conservation (Natural Habitats etc.) Amendment (No.2) (Scotland) Regulations 2009 amended the offences in regard of disturbance to an European Protected Species, including bats, introducing tighter control on disturbance, obstruction of a roost, or disturbance likely to significantly affect distribution or abundance and the addition of specific protection for hibernating and migrating bats.

The Scottish Biodiversity List which identifies priority species within Scotland includes all Scottish bat species. Whiskered bat (*Myotis mystacinus*), noctule (*Nyctalus noctula*), common pipistrelle (*Pipistrellus pipistrellus*) and soprano pipistrelle (*Pipistrellus pygmaeus*) are also highlighted as a key species in the Ayrshire LBAP.

Water vole

Water voles (*Arvicola terrestris*) are protected through Schedule 5 of the Wildlife & Countryside Act 1981 (as amended), in respect of Section 9(4) only. Although the animals themselves are currently not protected in Scotland, it is illegal to intentionally or recklessly damage, destroy or obstruct access to any structure or place that water voles use for shelter or protection. It is also an offence to disturb water voles while they are using such a place. Water voles are listed as a priority species in the UKBAP and a key species in the Ayrshire LBAP.

Great crested newt

Great crested newts (GCN) (*Triturus cristatus*) are fully protected under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). This makes it an offence to recklessly take, injure or kill a GCN; destroy or cause disturbance to places they use for shelter or protection (e.g. breeding pond or hibernation site); or obstruct access or deny use of a breeding site or resting place.

Red squirrel and pine marten

Red squirrels (*Sciurus vulgaris*) and pine martens (*Martes martes*) are both listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). This makes it an offence to recklessly take, injure or kill a red squirrel or pine marten, or destroy or cause disturbance to places they use for shelter or protection (a drey, nest or den). Red squirrels and pine martens are listed as a priority species in the UKBAP and red squirrels are a key species in the Ayrshire LBAP.

Badger

The Protection of Badgers Act 1992 provides full legal protection to badgers (*Meles meles*). In Scotland, this legislation was updated by the Nature Conservation (Scotland) Act 2004. It is an offence to recklessly take, injure or kill a badger, or destroy or cause disturbance to their setts. SNH interprets the legislation in such a way that any sett within an active badger territory is afforded legal protection, whether it shows signs of recent use or not. In addition, badgers are afforded protection from ill treatment. This has been defined to include preventing badgers access to their setts as well as causing the loss of significant foraging resources within a badger territory.

A licence is required for the disturbance or destruction of setts. SNH must be consulted prior to any works which could cause disturbance to badgers.

Fish

Atlantic salmon (*Salmo salar*) and river lamprey (*Lampetra fluviatilis*) are listed on Appendix III of the Bern Convention and Annex II and V of the Habitats Directive. Sea Lamprey (*Petromyzon marinus*) and brook lamprey (*Lampetra planeri*) are listed on Appendix III of the

Bern Convention and Annex II of the Habitats Directive. The following species are listed in the UK BAP Priority Species List:

- Atlantic salmon;
- River lamprey;
- Sea lamprey; and
- Sea trout (*Salmo trutta*).

Atlantic salmon and river lamprey are also listed on Schedule 3 of the Habitats Regulations making it an offence to use certain methods of killing.

Desk based study

The potential effects from the proposed Development on ecology will be assessed by completing an initial desk study followed by field surveys. The desk based study will gather information such as designated sites from a variety of online sources and consultation with government and non-government organisations, such as those listed below. The following list is not exhaustive:

- National Biodiversity Network (NBN) Gateway (http://data.nbn.org.uk/);
- SNH Sitelink (http://gateway.snh.gov.uk/sitelink/index.jsp);
- International Union for Conservation of Nature (IUCN) Red list of threatened Species (http://www.iucnredlist.org/);
- South Ayrshire Council;
- Scottish Natural Heritage;
- Scottish Wildlife Trust;
- Scottish Badgers;
- Botanical Society of the British Isles (BSBI);
- Amphibian and Reptile Group (ARG) UK;
- Ayrshire Bat Group;
- Ayrshire Rivers Trust / Ayr District Salmon Fishery Board; and
- Galloway Fisheries Trust / Cree District Salmon Fishery Board.

Field surveys – survey methods

The results of the desk based study will help refine the specific requirements of the field surveys.

The field surveys will cover the proposed Development area and appropriate buffers outwith the area where access allows, as described in the individual survey methodologies below.

The following ecology surveys will be conducted:

- Extended Phase 1 habitat surveys;
- National Vegetation Classification (NVC) surveys;
- Otter surveys;
- Bat surveys;
- Water vole surveys;
- Pine marten surveys;
- Great crested newt habitat suitability surveys;
- Badger surveys;
- Fisheries surveys; and
- Peat depth, coring and mire condition surveys.

Details of these methods are provided below.

Extended phase 1 habitat survey

An extended phase 1 habitat survey (Ex. P1) will be undertaken across the proposed Development area plus a 250m buffer, with the findings serving to inform further species specific surveys as appropriate. Surveys will be carried out in line with Joint Nature Conservation Commitees (JNCC) (2010)[37] and involve surveyors completing a walkover of the survey area and recording the habitats present onto a 1:10,000 map. Linear and point features (such as fence lines and single trees) will also be mapped. Ex. P1 is a standard technique for classifying and mapping British habitats, with the aim of providing an inventory of those areas of greatest ecological importance. In addition to the recording of habitats, all other features of ecological interest, especially those pertaining to the presence or likely presence of protected species will also be noted via the inclusion of 'Target Notes' (TN). Each TN includes a brief description of the feature together with a grid reference – additional information such as a diagram and/or photograph may also be appropriate depending on the feature.

Higher plant identification and nomenclature will follow Stace (2010[38]). Evidence of invasive plant species subject to legal control, e.g. Japanese knotweed (*Fallopia japonica*) or Himalayan balsam (*Impatiens glandulifera*), will be noted.

National vegetation classification surveys

National Vegetation Classification (NVC) surveys will be undertaken across the proposed Development area plus a 250m buffer, in order to identify more specific habitats of interests, such as those which are listed on Annex I of the EU Habitats Directive, UK Biodiversity Action Plan (UKBAP) or those which correspond with Scottish Environment Protection Agency (SEPA) guidance on Groundwater Dependent Terrestrial Ecosystems (GWDTE). Surveys will follow standard NVC guidelines (Rodwell, 2006)[39]. The NVC scheme provides a

[37] JNCC (2010). *Handbook for phase 1 habitat survey – a technique for environmental audit*
[38] Stace, C. (2010). *New Flora of the British Isles* (3rd Edition). Cambrigde: Cambridge University Press.
[39] Rodwell, J.S. (2006). *NVC Users' Handbook*.

standardised system for classifying and mapping semi-natural habitats, and ensures that surveys are carried out to a consistent level of detail and accuracy.

Homogenous stands and mosaics of vegetation will be identified and mapped by eye, drawn as polygons on field maps; these polygons will be surveyed qualitatively to record dominant and constant species, sub-dominant species and others species present; where possible, aerial photographs will be used to aid accurate mapping of vegetation boundaries. NVC communities will be attributed to the mapped polygons using surveyor experience and matching field data against published floristic tables (Rodwell 1991 – 2000, 5 volumes)[40]. Stands will be classified to sub-community where possible.

Otter surveys

Otter surveys shall be undertaken along all watercourses across the proposed Development area and will extend 250m up and downstream of the proposed Development area boundary in line with SNH guidance[41]. The survey will record the presence of otter signs as described in Sargent & Morris (2003)[42] and Chanin (2003)[43], including:

- Holts: Underground features where otters live. They can be tunnels within bank sides, underneath root-plates or boulder piles, and even man-made structures such as disused drains. Holts are used by otters to rest up during the day, and are the usual site of natal or breeding sites. Otters may use holts permanently or temporarily;
- Couches: These are above ground resting-up sites. They may be partially sheltered, or fully exposed. Couches may be regularly used, especially in reed beds and on in-stream islands. They have been known to be used as natal and breeding sites. Couches can be very difficult to identify, and may consist of an area of flattened grass or earth;
- Prints: Otters have characteristic footprints that can be found in soft ground and muddy areas;
- Spraints: Otter faeces may be used to mark territories, often on in-stream boulders. They can be present within or outside the entrances of holts and couches. Spraints have a characteristic smell and often contain fish remains;
- Feeding signs: The remains of prey items may be found at preferred feeding stations. Remains of fish, crabs or skinned amphibians can indicate the presence of otter;
- Paths: These are terrestrial routes that otters take when moving between resting-up sites and watercourses, or at high flow conditions when they will travel along bank sides in preference to swimming; and
- Slides and play areas: Slides are typically worn areas on steep slopes where otters slide on their bellies, often found between holts/couches and watercourses. Play areas are used by juvenile otters in play, and are often evident by trampled vegetation and the presence of slides. These are often positioned in sheltered areas adjacent to the natal holt.

[40] Rodwell, J.S. (Ed), et al. (1991–2000). *British Plant Communities* (5 volumes). Cambridge: Cambridge University Press.
[41] Otters and Development. SNH. Accessed via http://www.snh.org.uk/publications/on-line/wildlife/otters/.
[42] Sargent, G. and Morris, P. (2003). *How to Find and Identify Mammals*. London: The Mammal Society.
[43] Chanin, P. (2003). *Monitoring the Otter (Lutra lutra) Conserving Natura 2000 Rivers Monitoring Series No.10.* Peterborough: English Nature.

Any of the above signs are diagnostic of the presence of otter. However, it is often not possible to identify couches with confidence unless other field signs are also present. Sprainting is the most reliably identifiable evidence of the presence of this species.

Bat surveys

Bat survey work will take two forms: roost assessment, and collision risk assessment.

Roost assessment

Surveys will be required to ascertain the presence and nature of any roosts. This will be done in the first instance via a preliminary site reconnaissance and habitat assessment, in line with standard methods described by Hundt (2012) within the proposed Development area plus a 250m buffer. This will involve a survey of all buildings, structures and mature trees to qualify the suitability of these features for roosting bats. Following this and dependent on these initial findings, it may be necessary for activity surveys to be undertaken in order that bat presence can be confirmed, and this presence qualified. Again, standard methods will be followed, with surveyors positioned at appropriate points in close proximity to the feature, and hand-held bat detectors used to pick-up the calls of any bats using these features. Should further information be required (e.g. in the event that a licence is needed to disturb the roost), then a licensed bat worker will examine the roost at an appropriate time of year (i.e. when the roost is in use) and gather data on bat species, numbers and the type of roost present (e.g. maternity roost, transitional roost etc.).

Collision risk assessment

The second form of survey shall be bat activity surveys across the proposed Development area in order that the potential collision risk/direct turbine effect upon bats can be included within the assessment. Surveys shall follow current guidance (Natural England, 2012[44]; Rodrigues et al, 2008[45]; Hundt, 2012[46]) which describe the processes involved in determining levels of survey effort required in order to sufficiently assess the proposed Development area's importance to bats.

The survey work will involve the use of transects and static detectors in order to qualify usage by flying bats, and identify areas of particular importance in this regard, which will then serve to inform the design process. Surveys shall follow recent guidance[44, 45, 46] which describes the processes involved in determining levels of survey effort. Static detectors of the same type and model (Anabat SD2) will be left onsite to continually record from dusk to dawn. These detectors are left out onsite for a minimum of five nights and allow temporal variation of bat activity to be quantified. Five separate static detector points will be sampled – including the at height sampling point. In addition to the static detector surveys, walked or driven transects or a combination of both shall also be undertaken in order to gain a more complete picture of bat activity across the proposed Development area. This shall be done

[44] Natural England Technical (2012). *Information Note TIN 051. Bats and Onshore Wind Turbines – Interim Guidance*; 2nd Edition.

[45] Rodrigues L., Bach L., Dubourg-Savage M.J., Goodwin J. & Harbusch C. (2008). *Guidelines for consideration of bats in wind farm projects*. EUROBATS Publication Series No. 3.

[46] Hundt, L. (2012). *Bat Surveys: Good Practice Guidelines*, 2nd edition. Bat Conservation Trust.

using calibrated Anabat SD2 detectors, with surveyors covering pre-defined routes and stopping at pre-defined point-count locations for five minutes.

The number of survey visits will be dictated by this guidance and will vary from bi-monthly surveys through the spring/summer, to monthly visits, dependent on the likely presence of certain key 'at risk' species.

Depending on the value of the site and the habitats present, at height surveys would be required to quantify bat activity at height. It is likely that key-holing will be required for turbine placement. If key-holing is proposed an Anabat will be positioned at canopy height by suitably qualified tree climbers.

On completion of these surveys, recorded bat echolocation data shall undergo analysis (using Analook computer software) in order to identify those species presence and quantify this presence through the relative abundance of bat passes recorded.

Water vole surveys

Water vole surveys shall be undertaken along all proposed Development area watercourses, concurrently with otter surveys described above. Surveys shall extend for 250m up and downstream of the Development area and will follow methodology prescribed in Strachan, Moorhouse and Gelling (2011[47]). This will involve a search for the following field signs:

- Faeces: Recognisable by their size, shape and content. If not too dried-out these are also distinguishable from rat droppings by their smell;
- Latrines: Faeces often deposited at discrete locations known as latrines;
- Feeding stations: Food items are often brought to feeding stations along pathways and hauled onto platforms. Recognisable as neat piles of chewed vegetation up to 10cm long;
- Burrows: Appear as a series of holes along the water's edge distinguishable from rat burrows by size and position;
- Lawns: May appear as grazed areas around land holes;
- Nests: Where the water table is high above ground woven nests may be found;
- Footprints: Tracks may occur at the water's edge and lead into bank side vegetation. May be distinguishable from rat footprints by size; and
- Runways in vegetation: Low tunnels pushed through vegetation near the water's edge; these are less obvious than rat runs.

Pine marten

In most cases, pine marten surveys shall be undertaken in combination with other protected species surveys, such as badger or red squirrel. Furthermore, the need for such surveys shall depend on the nature of the planned works, together with findings from the Ex. P1 surveys. Signs of pine marten will be systematically searched for within the proposed Development area plus a 250m buffer. Signs of pine marten include scats and dens (which

[47] Strachan, R., Moorhouse, T. and Gelling. M. (2011). *The Water Vole Conservation Handbook*. Third Edition. Oxford: Wildlife Conservation Research Unit, Department of Zoology, University of Oxford.

can include the utilisation of upturned trees, tree cavities, rocks or manmade structures such as log piles or large bird boxes[48]). General survey methods shall follow O'Mahony et al. (2006)[49]. Pine martens are known to be present in the nearby Galloway Forest Park (approximately 6km away).

Great crested newt – habitat suitability index assessment

An initial site visit was conducted on 13th May 2013 specifically to assess the suitability of water bodies within the proposed Development area plus a 500m buffer. A Habitat Suitability Index (HSI) assessment following standard guidance (Oldham et al, 2000)[50] was conducted. The HSI allows for an evaluation to be made of the potential for water bodies to support GCN. It takes into account the following ten habitat criteria, which influence the likely presence or likely absence of GCN, and scores them according to their suitability:

- Geographic location;
- Pond size / area;
- Pond permanence;
- Water quality;
- Pond shading;
- Presence of fish;
- Presence of waterfowl;
- Presence of other ponds within a 500m radius;
- Availability of suitable terrestrial habitat; and,
- Availability of suitable aquatic vegetation on which newts can lay their eggs.

HSI scores are calculated as the geometric mean of the ten individual habitat suitability scores. HSI scores, which range between 0 and 1, can provide an indication of the likelihood of their potential to support GCN. Ponds with high scores are more likely to support GCN than those with low scores. The following HSI score bands have been developed to provide a rough guide as to likelihood of ponds supporting GCN based on their HSI scores (Oldham et al, 2000) (**Table 7.1**).

[48] Birks, J., Messenger, J. and Halliwell, E. (2005). *Diversity of den sites usd by pine martens Martes martes: a response to the scarcity of arboreal cavieites?* Mammal Rev. Vol. 35. No. 3&4: 313-320.

[49] O'Mahony D., O'Reilly, C. & Turner, P. (2006). *National Pine Marten Survey of Ireland 2005*.

[50] Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). *Evaluating the suitability of habitat for the Great Crested Newt (Triturus cristatus)*. Herpetological Journal 10 (4), 143-155.

Table 7.1: GCN Habitat Suitability Index

HSI score	Pond suitability
<0.5	Poor
0.5 – 0.59	Below average
0.7 – 0.79	Good
>0.8	Excellent

All waterbodies estimated to be over 2,000 square metres (m^2) were scoped out of the assessment, as were loch and lochans that are known to be actively stocked with fish (for fishing purposes). The remainder of the waterbodies all scored as 'poor' (below 0.5). It is therefore concluded that the water bodies were not suitable for supporting GCN and no further survey work is required for this species.

Badger surveys

Badger surveys will be carried out in line with standard methods (e.g. as described within Reynolds & Harris 2003)[51] and will extend across the proposed Development area plus a 100m buffer including a systematic search of field boundaries, scrub and woodland within the proposed Development area, in order to record any of the following signs of badger presence:

- Faeces: usually deposited within excavated pits ('latrines'). These sites are generally situated along territory boundaries, which in turn often follow topographical linear features such as hedgerows and fence lines;
- Setts: comprising either single isolated holes or a series of holes, often associated with other signs of badger presence such as paths and faeces;
- Paths: often connecting setts or foraging areas;
- Hairs;
- Feeding signs (snuffle holes): Small scrapes where badgers have searched for insects and plant tubers; and
- Footprints.

Any of these field signs, with the exception of foraging signs, are diagnostic of the presence of badgers.

Fisheries surveys

As the site falls within the River Cree and River Stinchar catchments, the Ayrshire Rivers Trust will be requested to undertake fisheries surveys (for salmonids and lamprey sp.), as

[51] Reynolds, P. and Harris, M. (2005). *Inverness Badger Survey 2003.* SNH Commissioned Report No. 096 (ROAME No. F02LE01).

required. Full electrofishing survey and habitat suitability assessment will be undertaken as necessary, and as informed through this scoping/consultation exercise.

Other protected species

Depending on the exact nature of works and following feedback and findings from this scoping/consultation exercise, it may be necessary to undertake surveys for additional faunal species. The main such examples are summarised below:

- *Red squirrel*: During the initial habitat assessment , it was noted that the forest within the proposed Development area is currently at thicket stage and is therefore not likely to be suitable habitat for red squirrel. No targeted surveys are recommended for this species; however, red squirrels are known to be present in the surrounding area and therefore they will be considered in the Environmental Management Plan to ensure there are no adverse effects on this species.
- *Reptiles*: An assessment shall be made of the proposed Development area's importance to reptiles based on surveyor expertise and local knowledge. It is likely, given the prevailing habitats that both adder and common lizard will be present across the proposed Development area, and whilst specific survey in this regard is not considered necessary, features of particular importance (i.e. potential hibernacula) shall be recorded and considered as part of the assessment.
- *Invertebrates*: As with reptiles, it is not considered necessary to undertake specific surveys for terrestrial invertebrates; however those habitats of particular importance to the group (e.g. dead wood, wild flower assemblages etc.) shall be recorded and considered as part of the assessment.

Peat depth and coring surveys and blanket mire condition assessment

Sampling frequency will take due consideration of good practice and published guidance. Methods will be based on the following key guidance documents:

- SNH, SEPA, Scottish Government and The James Hutton Institute (2011). *Developments on Peatland – Site Surveys and Best Practice*;
- Scottish Renewables, SNH, SEPA and FCS (2010). *Good Practice during Windfarm Construction (version 1);*
- Scottish Renewables and SEPA (2012). *Developments on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste*;
- SEPA (2012). *Land Use Planning System SEPA Guidance Note 4 – Planning guidance on windfarm developments* (version 6).
- SEPA Internal Guidance (2010). *Development on Peatland Guidance*; and
- SEPA (2010). SEPA Regulatory Position Statement - *Developments on Peat*.

The following methods will be employed:

Phase 1 peat survey – 100m^2 systematic grid

- The proposed Development area will be sampled using a 100m^2 systematic grid. A random point will be selected within the area and the grid established around the random point.
- GIS will be used to generate the systematic grid and related sampling locations.
- Approximately 1000 samples will be generated in total (with 100 probes per 1 square kilometre (km²)).
- Sampling locations will be downloaded on to hand held Global Positioning System (GPS) units which will be used to locate sampling locations in the field. Where GPS operation fail due to dense canopy cover, standard navigation techniques will be employed to locate the sample point.
- A custom made collapsible solid steel peat depth probe will be used at each sample point to establish peat depth. Full depth will be taken. (N.B. As this is a peat assessment only peat depths will be recorded; where the sample point falls on mineral soil the probe depth will be recorded as zero).
- Peat depth data will be modelled using 'Inverse Distance Weighted' interpolation in ArcMap 9.2©. This interpolation method is best suited to situations where the density of samples is great enough to capture the local surface variation needed for the analysis (Childs, July-September 2004).
- A depth model will be generated using the following categories of peat depth:
  - 0;1-20; 21-50; 51-100; 101-150, and; 50cm intervals thereafter.

Blanket mire condition

The Ecological Impact Assessment will establish the condition of blanket mire habitats within the proposed Development area. The information collected as part of this survey will inform that assessment. The following methods will be employed.

At each sampling point a 2m^2 quadrat will be sampled. The following variables will be recorded:

- % cover of key plant groups within the foliar and basal vegetation layers (assessed by eye) as detailed in **Table 7.2**.

Table 7.2: Key plant groups within the foliar and basal vegetation layers

Foliar layer	Basal layer
Calluna vulgaris	*Sphagnum mosses* (*Spp*. present recorded)
	Non-*sphagnum* mosses
Other dwarf shrubs	Bare Ground/needles
Eriophorum vaginatum	
Molinia	
Other Grasses and Sedges	

- Presence or absence of peat erosion. Peat erosion is defined as bare peat which shows signs of erosion (principally as a consequence of water movement);
- Presence or absence of herbivore (sheep, deer) impacts (dung, trampling, browsing);
- Presence or absence of drain. Drains include: plough furrows; main forest drains; and subsidiary drains.
- Presence or absence of peat hagging. Evidence of erosion of blanket peat into blocks of varying size, applied to the general vicinity.
- At each sampling point where a drain dissects the quadrat, a 2m section of 'drain' will be surveyed to establish its activity. The following categories of activity will be recorded:
  - Active: <30% occluded (visibly active);
  - Semi-Active: 30-90% occluded (some signs of running water current or recent); and
  - Inactive: 90-100% occluded (no sign of running water current or recent).

The data collected above will be used to undertake a blanket mire condition assessment using the following variables:

- Planted and Unplanted areas will be treated as different strata in the analysis. This will be recorded at each sample location;
- Non blanket mire habitats (e.g. improved and semi-improved grassland, acid grassland) will be removed from the condition assessment;
- The mean % cover of Sphagnum in each strata;
- The presence of broad branched sphagnum species (*comprising Sphagnum magellanicum* and *Sphagnum papillosum*) in each strata;
- The mean % cover of *Eriophorum vaginatum* in each strata;
- The mean % cover of Non-sphagnum mosses in each strata;
- Presence or absence of peat erosion in each strata;

- Presence or absence of herbivore impacts in each strata;
- Drain activity and distribution; and
- Presence or absence of peat hagging.

Phase 2 peat survey – 50m and 10m probing and coring

Phase 2 involves undertaking high resolution probing as follows:

- A depth probe will be taken every 50m along the centre line of the proposed access route;
- Where a track already exists and is proposed for widening, peat depth probes will be recorded at 7.5m from the centre line of the existing track;
- One probe will be taken every 50m along the planned infrastructure; and
- 20 peat depth probes will be taken around each turbine, permanent anemometer, substation location and borrow pits. These will be configured in a North, South, East, West orientation around the infrastructure at 10m intervals.

Phase 2 also involves undertaking coring of the proposed Development area according to the method discussed below:

Peat analysis methods will follow those detailed within Hobbs (1986[52]) (see Hobbs Appendix A p.78-79 and Hodgson (1974[53])). It is important to note that the Von Post scale cannot be reliably used in compressed or friable peats and close examination of the peat properties should be undertaken instead (Hobbs, 1986. P26) in afforested areas (this does not apply to samples in un-afforested ground).

- A core will be taken at each turbine location, the construction compound, the borrow pit location, and associated storage area. A peat depth probe will be taken adjacent to the core sample;
- A 'Russian Corer' will be used to take peat cores of known volume (0.5l);
- A trial pit will be excavated where peat depths were shallow and conditions too firm;
- At each core sample location, the full peat depth profile will be sampled. This will involve taking 50cm cores from the surface layer through to the basal layer (where peat meets the underlying mineral substrata);
- Peat from 5 cores will be sent for bulk density, dry matter, carbon content analysis and pH determination. Samples will be transferred into water and air tight containers in the field. The samples will be sent to the laboratory by courier the following morning for analysis; and
- At each sample core, the following information will be collected in the field:
  - A photograph will be taken of each 50cm core;
  - Depth of acrotelm;
  - Degree of humification (Soil Survey 1974 ed. J M Hodgson):

[52] Hobbs, N.B. (1986). *Mire morphology and the properties and behaviour of some British and foreign peats*. Quarterly Journal of Engineering Geology 19, 7-80.
[53] Hodgson, J.M. (1974). *Soil Survey Field Handbook. Describing and Sampling Soil Profiles*. Harpenden.

- Amorphous Peats - peats with fibre <1/3rd volume when unrubbed - reduces to <1/10 by rubbing, (optional - yields soluble dark humidified matter).
- Fibrous Peats - peats with fibre >2/3rds volume when unrubbed - reduces to no less than >4/10 by rubbing, (optional - yields little soluble dark humidified matter).
- 'Intermediate' if assessment falls between amorphous and fibrous.

- Degree of humification using the Von Post Scale;
- Fine Fibre Content: F0 (none), F1, F2, F3 (very high);
- Course Fibre Content: R0 (none), R1, R2, R3 (very high); and
- Water Content: B1 (dry) to B5 (very high).

Assessment of effects

The assessment process will involve the following:

- Identification of the potential effects of the proposed Development;
- Incorporating potential effects into the design process as appropriate;
- Consideration of the likelihood of occurrence of potential effects where appropriate;
- Defining the Nature Conservation Value of the ecological receptors present;
- Establishing the receptor's Conservation Status where appropriate;
- Establishing the Magnitude of the likely effect (both spatial and temporal);
- Based on the above information, a professional judgement as to whether or not the identified effect is significant with respect to the EIA Regulations;
- If a potential effect is determined to be significant, measures to mitigate or compensate for the effect will be suggested where required;
- If required, opportunities for enhancement may be considered; and
- Residual effects after mitigation, compensation or enhancement.

Determining nature conservation value

Value is defined on the basis of the geographic scale. Attributing a value to a receptor is generally straightforward in the case of designated sites, as the designations themselves are normally indicative of a value level. For example, an SAC designated under the Habitats Directive is implicitly of European (International) importance. In the case of species, assigning value is less straightforward as it is necessary to consider its distribution and status, including a consideration of trends based on available historical records. This means that even though a species may be protected through legislation at a national or international level, the relative value of the population onsite may be quite different (e.g. the site population may consist of a single transitory animal, which within the context of a thriving local/regional/national population of a species, is clearly of local or regional value rather than national or international).

Where possible, the valuation of habitat/populations within this assessment will make use of any relevant published evaluation criteria (e.g. Nature Conservancy Council guidance on selection of biological Site of Special Scientific Interest (SSSIs)). Furthermore, JNCC/NBN

guidance (2008)[54] will be consulted where relevant in order that cross-referencing of classifications within different systems can be standardised (e.g. correctly matching NVC types with Annex I habitats where relevant etc.).

The term which will be used for the ecological receptors affected at the proposed Development is 'Valued Ecological Receptors' (VERs).

Where relevant, information regarding the particular receptor's conservation status shall also be considered in order to fully define its value. This will enable an appreciation of current population or habitat trends to be incorporated into the assessment.

Magnitude of effects

Effect magnitude refers to changes in the extent and integrity of an ecological receptor. The only definition of ecological 'integrity' within Scottish planning policy is found within circular 6/1995[55] which states that:

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

Although this definition is used specifically regarding SACs and SPAs, it will be applied here to wider countryside habitats and species.

Determining the magnitude of any likely effects requires an understanding of how the ecological receptors are likely to respond as a result of the proposed Development. This change can occur during construction and/or operation of the proposed Development.

Effects can be adverse, neutral or beneficial.

Effects will be judged in terms of 'magnitude' in space and time, with relevant criteria used to define this, as standard.

Significance of effects

The significance of potential effects will be determined by integrating the assessments of Nature Conservation Value, Conservation Status and Magnitude in a reasoned way.

A set of pre-defined significance criteria will be used in assessing the effects of the proposed Development. It requires to be established whether there will be any effects which will be sufficient to adversely affect the VER to the extent that its Conservation Status deteriorates above and beyond that which would be expected should baseline conditions remain (i.e. the 'do nothing' scenario). Furthermore, these predictions will be given with a level of confidence relative to the effect being assessed (in line with IEEM 2006)[56].

---

[54] NVC & Other Classification. Available at: http://jncc.defra.gov.uk/page-4266 JNCC/NBN. 2008.

[55] Scottish Executive Circular 6/1995 as amended (2000). *Nature Conservation: Implementation in Scotland of the Habitats and Birds Directives*

[56] IEEM (2006). *Guidelines for Ecological Impact Assessment in the United Kingdom*.

Cumulative effects

The context in which cumulative effects may be considered is heavily dependent on the ecology of the receptor assessed but in all cases will involve consideration of the cumulative effects upon the receptor extents/populations relevant to that receptor. For example, for water voles it may be appropriate to consider effects specific to individual catchments, should the distance between neighbouring catchments be sufficient to assume no movement of animals between them.

Mitigation

SPR is committed to implementing measures within the conceptual design process where possible avoid or reduce potential effects on ecology. Good practice during construction and operation of the proposed Development will also be implemented by way of mitigation.

It is recognised that peat is a key constraint within the proposed Development area and as such it will be recommended that a Peat Management Plan be completed in accordance with best practice guidance.

Where likely significant effects on ecology are identified, measures to prevent, reduce and where possible offset these adverse effects will be proposed. Measures likely to be utilised include:

- Appointment of an Ecological Clerk of Works (ECoW) during construction of the proposed Development;
- Adherence to Pollution Prevention Guidance;
- Implementation of water quality protection measures;
- Reinstatement of habitats to pre-construction conditions where possible; and
- Careful timing of activities and other construction measures such as ramping of trenches and installation of dry culverts to avoid effects on protected species.

7.5 Consultation

Consultation will be undertaken with statutory and non-statutory organisations, such as those listed below. The following list is not exhaustive:

- South Ayrshire Council;
- Scottish Natural Heritage;
- Scottish Wildlife Trust;
- Scottish Badgers;
- Botanical Society of the British Isles (BSBI);
- Amphibian and Reptile Group (ARG) UK;
- Ayrshire Bat Group;
- Ayrshire Rivers Trust / Ayr District Salmon Fishery Board; and
- Galloway Fisheries Trust / Cree District Salmon Fishery Board.

Scoping Question: Have the most likely and significant effects been identified at this stage?

Scoping Question: Are there any likely or significant effects that should be considered for inclusion in the full assessment process and if so why?

Scoping Question: Do the requirements outlined for assessment of effects look appropriate and complete?

Scoping Question: Are there any additional key sources of environmental information to be consulted?

8. Geology, soils and water resources

8.1 Introduction

This section sets out the proposed approach to the assessment of the potential effects of the proposed Development on the water environment (which includes hydrology and hydrogeology) and soils and geology (which includes an assessment of the distribution and thickness of peat at site) during the construction, operation and decommissioning of the windfarm.

The geological and water environment assessment will be prepared by MacArthur Green and SLR Consulting Limited.

8.2 Baseline conditions

Geology and soils

Peat is recorded by published British Geological Survey mapping to potentially cover a large proportion of the site. It is likely that the peat is underlain by low permeability Glacial Till; the presence of which will be confirmed as part of the assessment.

The bedrock is shown by published mapping to comprise Ordovician rocks with a low bulk permeability.

Hydrogeology

The Ordovician rocks will not store or allow the movement of large quantities of groundwater. Groundwater movement will be restricted to fracture flow. Any groundwater abstraction is likely to sustain only a limited yield. Near to surface water features, limited groundwater in drift deposits is likely to be in hydraulic with surface water.

Hydrology

The majority of the proposed Development lies within the catchment of the Duisk Water, a tributary of the River Stinchar, which is widely regarded for its fisheries interests.

8.3 Potential effects

A summary of the potential effects on ground conditions and the water environment resulting from construction, operation and decommissioning of a windfarm is provided below. These will be considered in the EIA.

Construction

- Effects on surface water and groundwater quality from pollution from fuel, oil, concrete or other hazardous substances;
- Discharge of sediment-laden run-off to drainage system and watercourses;
- Increased flood risk to areas downstream of the site during construction through increased surface run-off;

- Disturbance of any residual ground contamination which might be associated with historic land use (such as mining or forestry);
- Changes in groundwater levels from dewatering excavations;
- Potential change of groundwater flow paths and contribution to areas of peat and groundwater dependent terrestrial ecosystems (GWDTEs);
- Disturbance of watercourse bed and banks from the construction of culverts;
- Ground instability (including peat slide risk);
- Potential pollution effects to public and private water supplies; and
- Potential blockage of existing forestry drainage channels or culverts during forestry clearance or construction activities.

Operation

- Increased runoff rates and flood risks, resulting from increases in areas of tracks and hardstanding at turbines;
- Changes in natural surface water drainage patterns (which may effect water contribution to areas of peat and GWDTEs);
- Changes to groundwater levels and groundwater movement;
- Longer term effects on abstraction for water supplies, particularly any supplies dependent on groundwater; and
- Pollution effects on surface water quality from maintenance work.

Decommissioning

- Effects on surface water and groundwater quality from pollution from fuel, oil or other hazardous substances;
- Discharge of sediment-laden run-off to drainage system and watercourses;
- Ground stability and peat slide risk; and
- Potential pollution effects to public and private water supplies.

8.4 EIA methodology

Legislation and guidance

The soils, geology and water environment chapter of the ES will be prepared with reference to best practice guidance and legislation, including:

Geology and soils

- Scottish Renewables and SEPA (2012). *Developments on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste*;
- SEPA Internal Guidance (2010). *Development on Peatland Guidance*; and
- SEPA (2010). SEPA Regulatory Position Statement - *Developments on Peat*;
- SNH, SEPA, Scottish Government and The James Hutton Institute (2011). *Developments on Peatland – Site Surveys and Best Practice*;
- SNH and FCS (2010). *Floating Roads on Peat*;
- Institution of Civil Engineers (2001). *Managing Geotechnical Risk: Improving Productivity in UK Building and Construction*;

- CIRIA (1997). *Ground Engineering Spoil: Good Management Practice*. CIRIA Report 179, 1997;
- Scottish Executive (2005). *Scottish Roads Network Landslides Study Summary Report*;
- Forestry Commission (2006). *Guidelines for the Risk Management of Peat Slips on the Construction of Low Volume/Low Cost Roads on Peat*; and
- Scottish Government (2007). *Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments*.

Water environment

- Scottish Executive (2010). *Scottish Planning Policy (SPP)*;
- EC Water Framework Directive (2000/60/EC), Water Environment and Water Services (Scotland) Act 2003, and Water Environment (Controlled Activities) Regulations 2011;
- Forestry Commission (2012). *Forests and Water Guidelines*;
- SEPA (2012). *Land Use Planning System – SEPA Guidance Note 6*;
- Scottish Renewables, SNH, SEPA and FCS (2010). *Good Practice during Windfarm Construction (version 1);*
- CIRIA (2006). *Control of Water Pollution from Linear Construction Projects* – Technical Guidance, C648, CIRIA;
- CIRIA (2007). *The SUDS Manual* C697, CIRIA; and
- CIRIA (2005). *Environmental Good Practice on Site* C650, CIRIA.

Study area

The study area will include all proposed site infrastructure. In addition details of local water use and quality within a buffer of at least 3km from the proposed infrastructure will be considered.

Desk study

An initial desk study will be undertaken to determine and confirm the baseline characteristics by reviewing available information pertaining to soils, geology, hydrology, and hydrogeology such as groundwater resources, licensed and unlicensed groundwater and surface water abstractions, public and private water supplies, surface water flows, flooding, rainfall data, water quality and soil data. This will include review of published geological maps, Ordnance Survey (OS) maps, aerial photographs and site specific data such as site investigation data, geological and hydrogeological reports, digital terrain models (slope plans) and geological literature.

The desk study will identify sensitive features which may potentially be affected by the proposed Development and will confirm the geological, hydrogeological and hydrological environment.

Field surveys

The hydrological assessment specialists will liaise closely with the project ecology and geology / geotechnical specialists to ensure that appropriate information is gathered to allow a comprehensive impact assessment to be completed.

A detailed site visit and walkover survey will be undertaken, in order to:

- Verify the information collected during the desk and baseline study;
- Undertake a visual assessment of the main surface waters and identify private water supplies;
- Identify drainage patterns, areas vulnerable to erosion or sediment deposition, and any pollution risks;
- Visit any identified GWDTEs (in consultation with the project ecologists);
- Prepare a schedule of potential watercourse crossings;
- Inspect rock exposures, establish by probing an estimate overburden thicknesses (a probe is pushed vertically into the ground to refusal and the depth is recorded);
- Confirm underlying substrate, based on the type of refusal of the probe (solid and abrupt refusal-rock, solid but less abrupt refusal with grinding or crunching sound-sand or gravel, rapid and firm refusal-clay, gradual refusal-dense peat or soft clay);
- Allow appreciation of the site, determining gradients, possible borrow pits, access routes, ground conditions, etc., and to assess the relative location of all the components of the proposed Development;
- Complete a probing exercise that will identify areas of thick peat that may constrain the proposed Development (by inserting a probe into the ground and pushing into the peat to refusal then the depth is recorded); and
- Confirm the distribution and depth of peat across the site using a 100m grid.

The desk study and field surveys will be used to identify potential development constraints and will be used as part of the site design process.

The peat probing completed as part of the initial field surveys (see above) will be developed further as part of the assessment of effects of the proposed Development. The following works would be completed:

- Geomorphological mapping to inspect those parts of the site identified as being of risk of peat slide (this may include areas outside the proposed site boundary, where potential peat slides could impact on to site);
- A limited (in terms of aerial extent) geomorphological mapping exercise will be undertaken to link the topographic features with the underlying geology and to visit those areas of the site that may be identified as potentially ‘at risk from peat slide’;
- The thickness of the peat will be established by probing and the underlying sub-strata confirmed by inspection of watercourses;
- The investigation will look at turbine locations, access routes and borrow pits for signs of existing or potential peat instability; and
- Output from the field survey will comprise a record of investigation locations and summary of peat depths recorded.

In conjunction with the project ecologists and hydrologists, an assessment of the condition of any peat will be assessed. The peat condition assessment will include (but not be limited to) details related to the characteristics of the soils, classification of vegetation cover, assessment of current land use impacts, assessment of drainage paths and channels, evidence of peat erosion and coring to further characterise the peat.

Assessment of effects

Once the desk study is completed and sensitive soil, geological and water features identified an assessment of effects will be undertaken to assess the potential for significant effects on soils, geology and the water environment as a result of the construction, operation and decommissioning of the proposed Development.

The purpose of this assessment will be to:

- Identify any areas susceptible to peat slide, using peat thickness and Digital Terrain Model (DTM) data to analyse slopes;
- Assist in the micrositing of turbines, tracks and other infrastructure;
- Assess potential effects on soils, peat and geology;
- Determine what the likely effects of the proposed Development are on the hydrological regime, including water quality, flow and drainage;
- Allow an assessment of potential effects on identified licensed and private water supplies;
- Assess potential effects on water (including groundwater) dependent habitats;
- Determine the presence of any sensitive hydrogeological features and habitats;
- Determine suitable mitigation measures to prevent significant hydrological and hydrogeological effects;and
- Develop an acceptable code for working on the site that will adopt best practice procedures, effective management and control of onsite activities to reduce or offset any detrimental effects on the geological, hydrogeological and hydrological environment.

A qualitative risk assessment methodology will be used to assess the significance of the potential effects. Two factors will be considered: the sensitivity of the receiving environment and the potential magnitude should that potential impact occur.

This approach provides a mechanism for identifying the areas where mitigation measures are required, and for identifying mitigation measures appropriate to the risk presented by the proposed Development. This approach also allows effort to be focused on reducing risk where the greatest benefit may result.

The sensitivity of the receiving environment (i.e. the baseline quality of the receiving environment as well as its ability to absorb the effect without perceptible change) and the magnitude of effects will each be considered through a set of pre-defined criteria.

The sensitivity of the receiving environment together with the magnitude of the effect defines the significance of the effect, which will be categorised into a level of significance.

Given the location of the site, it is considered that a basic Flood Risk Assessment (FRA) would need to be prepared to satisfy Scottish Planning Policy. This would be incorporated into the text of the impact assessment, and is likely to include recommendations for the control and management of the rate of runoff from parts of the proposed development and recommended minimum capacities for any watercourse crossings.

We have assumed that it will not be necessary to undertaken any hydraulic modelling of the proposed watercourse crossings, but propose to present indicative designs for the crossings. Details would be developed that are proportionate to the location and size of water features that would be crossed. Sufficient detail would be provided to satisfy SEPA that the crossings can be consented in accordance with the requirements of the Controlled Activity Regulations (CAR).

If significant peat deposits are confirmed, a Peat Landslide Hazard and Risk Assessment will be completed using the site survey data and slope analysis (using DTM data), highlighting areas that may be impacted by a peat slide so that appropriate mitigation measures can be identified (see below).

A draft peat management plan will be prepared as a supporting technical appendix in line with the SEPA Regulatory Position Statement: Developments on Peat (2010) and based on guidance in Developments on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste (Scottish Renewables and SEPA, 2012).

Mitigation

Given both SPR's commitment to, and prior experience of, implementing accepted good practice during construction and operation, and the current regulatory context, any potential effects on soils, geology and the water environment identified by the assessment will be addressed and mitigated by the conceptual design process and the application of best practice guidance to prevent, reduce or offset effects.

As a consequence, a number of measures are not considered to be mitigation as such, but rather an integral part of the design/construction process; and it is proposed that these will be taken into account prior to assessing the likely effects of the proposed Development. However, where appropriate, more tailored mitigation measures will be identified prior to determining the likely significance of residual effects.

Specific measures will also be detailed within the Draft Construction Environmental Management Plan (CEMP) and will include as a minimum:

- Adoption of best practice pollution prevention, drainage control and waste management procedures;
- Control of drainage and sediment runoff from excavation areas and access tracks;
- Control of drainage and sediment runoff during the construction of watercourse crossings;
- Control of concrete pouring; and

- Appropriate design of foundation installation, taking into account the presence of peat across the site, the management of soil water levels and the potential to generate excessive quantities of groundwater contaminated sediments.

Drainage control will involve treatment and discharge of water into surrounding vegetation so that no increase in runoff to surrounding watercourses is experienced. These measures will reflect current best practice in the industry and will serve to prevent an increase in flood risk or decrease in downstream water quality. Consideration will also be given to discharges to areas of peat so as not to increase peat slide risk or change peat hydrology. Standard construction practices adopted on windfarm developments will be assessed, and modified where necessary, to ensure that predicted effects are able to be controlled. Guidance on the protection of the water environment including relevant SEPA and CIRIA guidance will also be used to assist with the proposed Development mitigation.

A statement of residual effects, following consideration of mitigation measures will be given.

Cumulative effects

The assessment will consider potential cumulative effects associated with other windfarm developments within 10km of the site and within the same surface water catchments.

8.5 Consultation

As part of the consultation phase of the project environmental data and views of the proposed Development will be sought from SEPA, SNH, Ayrshire Rivers Trust (ART) and South Ayrshire Council.

Scoping Question: Have the most likely and significant effects been identified at this stage?

Scoping Question: Are there any likely or significant effects that should be considered for inclusion in the full assessment process and if so why?

Scoping Question: Do the requirements outlined for assessment of effects look appropriate and complete?

Scoping Question: Are there any additional key sources of environmental information to be consulted?

9. Noise

9.1 Introduction

A noise assessment will be undertaken to identify and address potential noise impacts that may arise during the construction and operation phases of the proposed Development.

9.2 Baseline conditions

The proposed Development area is located in an area of low population density. The noise environment in the surrounding area is expected to be characterised by mainly 'natural' sources, such as, wind disturbed vegetation, birds and farm animals, with a varying influence of noise from local roads.

9.3 Potential effects

The assessment will consider the noise and vibration impacts associated with construction, operation and decommissioning stages of the proposed Development on neighbouring dwellings.

During construction, noise could arise from both onsite activities, such as, the construction of onsite access tracks, turbine foundations, the control building (substation) etc., and also from the movement of construction related traffic both onsite and travelling on public roads to and from the proposed Development area.

It is noted that, given the nature of works involved in the construction of a windfarm and distances to neighbouring dwellings, the risk of significant effects relating to ground borne vibration is generally very low. Similarly it is recognised that vibration resulting from the operation of windfarms is imperceptible at typical separation distances. The assessment will therefore focus on impacts associated with construction noise.

During their operation, windfarms have the potential to create noise effects through both aerodynamic noise and mechanical noise. Aerodynamic noise is caused by the interaction of the turbine blades with the air. Mechanically generated noise is caused by the operation of internal components, such as, the gearbox and generator, which are housed within the nacelle of the turbine. However, the level of mechanical noise radiated from current technology wind turbines is generally engineered to a low level.

Traffic volumes associated with operation of the proposed Development are expected to be relatively low and, as such, assessment of the noise impact associated with operational traffic can be scoped out.

9.4 EIA methodology

Legislation and guidance

The following policies are of relevance to the noise assessment:

- Scottish Executive (2010). *Scottish Planning Policy (SPP)*;
- Planning Advice Note PAN 1/2011;
- Onshore Wind Turbines (web-based planning advice note)[57]; and
- South Ayrshire Council (2012). *South Ayrshire Local Development Plan*.

SPP requires consideration of potential noise impacts for developments such as this, but provides no specific advice on noise. Planning Advice Note PAN1/2011 provides general advice on preventing and limiting the adverse effects of noise without prejudicing economic development. It makes reference to noise associated with both construction activities and operational windfarms.

The web-based planning advice note on 'Onshore Wind Turbines' provides further advice on noise, and confirms that the recommendations of ETSU-R-97 'The Assessment and Rating of Noise from Wind Farms', '*should be followed by applicants and consultees, and used by planning authorities to asses and rate noise from wind energy developments*'.

PAN1/2011 and the Technical Advice Note accompanying PAN1/2011 provide further advice on construction noise and make reference in particular to British Standard BS 5228 'Noise control on construction and open sites'.

Good practice in the application of the ETSU-R-97 methodology will be referenced, as set out in a 2009 UK Institute of Acoustics Bulletin article (Bowdler et al., Acoustics Bulletin, Vol 34, No 2 March/April 2009) as well as the recently issued Institute of Acoustics Good Practice Guide to the Application of ETSU-R-97 (2013).

Assessment of effects

The baseline environment will be assessed by measuring background noise levels as a function of site wind speed at the nearest neighbours (or, at a representative sample of the nearest neighbours).

Reference will also be made to the baseline measurements previously made as part of the application for the Mark Hill Windfarm. This will therefore likely avoid the need for baseline measurement at locations which could be significantly influenced by the turbines of the existing Mark Hill Windfarm when operating.

Noise monitoring equipment will be deployed at all relevant properties to capture back ground noise levels in line with ETSU-R-97.

[57] The Scottish Government. *Onshore wind turbines (Updated October 24, 2012).* [online] Available at: http://www.scotland.gov.uk/Topics/Built-Environment/planning/National-Planning-Policy/themes/renewables/Onshore [Accessed 20 June 2013].

In assessing the impact of **construction** noise and vibration, it is usual to accept that the associated works are of a temporary nature. The assessment of potential effects due to noise emissions during construction will be undertaken in accordance with the BS 5228 British Standard guidance. Predictions of construction noise will be made referencing typical activity emission levels and likely variations in noise levels at surrounding receiver locations, using the methodology set out in BS 5228-1:2009 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise'. This assessment will identify if and when predicted noise levels may be above standard guideline limits, taking into account the rural character of the area and the different construction activities used throughout the construction programme. Construction noise management procedures will also be determined.

Consideration will also be given to the potential effect of construction traffic on sensitive receptors in the area. Depending upon the outcome of the Traffic Assessment, the impact of traffic along the site access route will be assessed on the basis of the methodology within BS 5228-1:2009, as well as the Department of Transport publication 'Calculation of Road Traffic Noise' (1988), where appropriate.

The methodology for the assessment of **operational** noise from windfarms in Scotland recommended by PAN1/2011 is that documented in ETSU-R-97: 'The Assessment and Rating of Noise from Wind Farms' (ETSU, 1996). In summary, the assessment shall:

- Identify the nearest noise sensitive receptors;
- Assess the baseline environment by examining existing noise data and by measuring background noise levels as a function of site wind speed at a representative sample of the nearest neighbours;
- Determine the quiet day time and night time noise limits from the measured background noise levels at the nearest neighbours;
- Specify the type and noise emission characteristics of the wind turbines proposed for the site;
- Calculate noise emission levels due to the operation of the wind turbines as a function of site wind speed at the nearest neighbours, including the cumulative effect of all turbines; and
- Compare the calculated windfarm noise emission levels with the derived noise limits and assess in the light of relevant planning requirements.

The above-referenced good practice guidance will be considered, including advice on baseline survey, wind shear assessment and noise prediction methodology.

Cumulative effects

The assessment of operational noise will include the cumulative effects of other turbines in the area, in particular the existing Mark Hill Windfarm.

The noise limits derived according to ETSU-R-97 guidance, for each noise-sensitive receptor, apply to the total noise produced by all windfarms. Therefore, potential cumulative

operational noise levels, including existing, consented and application wind turbines in the area, must be assessed relative to these limits.

9.5 Consultation

The exact measurement locations and survey methodology are to be discussed and agreed in consultation with the Environmental Health Department at South Ayrshire Council.

Scoping Question: Have the most likely and significant effects been identified at this stage?

Scoping Question: Are there any likely or significant effects that should be considered for inclusion in the full assessment process and if so why?

Scoping Question: Do the requirements outlined for assessment of effects look appropriate and complete?

Scoping Question: Are there any additional key sources of environmental information to be consulted?

10. Archaeology and cultural heritage

10.1 Introduction

The assessment of the effects of the proposed Development on the archaeology and cultural heritage resources will consider the potential for direct effects within the proposed Development area, and the potential for effects upon the setting of key assets in the wider landscape.

10.2 Baseline conditions

Twenty-two cultural heritage sites have been identified within the proposed Development area by the preliminary desk-based assessment carried out for the Request for a Scoping Opinion.

Ballmalloch Chambered Cairn is designated as a Scheduled Monument (Index No. 2503) and there are two further cairns located at Darnaconnar (West of Scotland Archaeology Service (WoSAS) Pin 11522) and at Half Merk (WoSAS Pin 13058). A possible dwelling or castle is located on an island in Loch Goosey (WoSAS Pin 11532).

The other known cultural heritage sites within the proposed Development area relate to the pre-improvement agricultural landscape and include a number of pre-improvement farmsteads or settlements and associated field systems at:

- Darnaconnor (WoSAS Pin 11522);
- Half Merk (WoSAS Pins 11501, 13054 and 17206 / 42449);
- Nevan (WoSAS Pin 13073);
- Clauchrie Burn (WoSAS Pin 13092);
- Brough Hill (WoSAS Pin 13099); and
- Darnaconnar / Black Clauchrie (WoSAS Pin 13060).

Other associated remains which have been recorded include:

- Two probable shieling huts (WoSAS Pin 13072);
- A kiln (WoSAS Pin 13093);
- A hay ree attached to a field wall (WoSAS Pin 42452);
- Three hay rees (WoSAS Pins 42446, 42447 & 42450);
- A bridge (WoSAS Pin 13074);
- Two further buildings at the southern end of the site; and
- A former farmstead and associated field system at Balmalloch / Dillan Knowe identified from the First Edition Ordnance Survey map.

In addition to the Scheduled Monument within the proposed Development area, there are four others within 5km of the redline boundary. Within 5km there are also seven Listed Buildings.

10.3 Potential effects

- The proposed Development will be designed to develop the best possible layout within the context of all environmental and technical constraints. The aim will be to avoid any significant direct impacts upon cultural heritage sites within the proposed Development area;
- Any ground breaking activities associated with the construction of the proposed Development have the potential to disturb or destroy previously unknown buried archaeological remains; and
- The presence of the proposed Development in this area could have indirect impacts on the setting of historic environment sites in the wider landscape, in particular there is a potential for the turbines to be present in important views to or from Scheduled Monuments, Listed Buildings and other historic environment sites and areas.

10.4 EIA methodology

Legislation and guidance

Cultural heritage resources include:

- World Heritage Sites;
- Scheduled Monuments and other archaeological features;
- Listed Buildings and other buildings of historic or architectural importance;
- Conservation Areas and other important historic townscapes;
- Inventory Gardens and Designed Landscapes (GDLs), and
- Historic Battlefields and other important historic landscapes.

The study will be conducted with reference to the relevant statutory and planning frameworks for cultural heritage. Legislation includes the Ancient Monuments and Archaeological Areas Act 1979, the Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997. The primary planning guidance comprises the Scottish Historic Environment Policy (SHEP), Scottish Planning Policy SPP and Planning Advice Note (PAN 2/2011) at national level, and the Structure Plan and Local Plan at regional and local levels respectively.

The collation of baseline information will comply with the Institute for Archaeologists' Standard and Guidance for an Archaeological Desk-Based Assessment (2012).

Desk based study

A desk-based assessment will be conducted to identify all known cultural heritage features, designated or otherwise, and to inform an assessment of the archaeological potential of the land.

Field surveys

The results of the desk-based assessment will be augmented by a RCAHMS Level 1 reconnaissance field survey (Royal Commission on the Ancient and Historical Monuments of

Scotland Corporate Plan 2004-9, Survey and Recording) of the proposed Development area, carried out in order to:

- Locate all visible cultural heritage sites, monuments and landscape features, both identified during the desk-based assessment and previously unrecognised, and record their character, extent and current condition;
- Identify areas with the potential to contain unrecorded, buried archaeological remains, taking into account factors such as topography, geomorphology and ground conditions; and
- Inform the assessment of the possible effects of the proposed Development on those features.

Intrusive field evaluations will not be undertaken as part of the baseline survey.

External receptors

Details will be obtained for previously recorded cultural heritage sites, monuments and landscape features with statutory and non-statutory designations and undesignated archaeological sites of likely national importance within and in the landscape surrounding the proposed Development. A ZTV map generated for the proposed Development will be used to identify those cultural heritage receptors within 10km of the proposed Development from which there is theoretical intervisibility with one or more development components.

Key sensitivities

Within the proposed Development area, the Scheduled Monument of Balmalloch Chambered Cairn (Index No. 2503) as well as two other recorded cairns (WoSAS Pins 11522 & 13058) will be key considerations in the EIA process. It will also be important to consider those sites which are designated in the West of Scotland Sites and Monuments Record as non-statutory register (NSR) codes C (almost certainly of national importance) and V (probably of national importance). However, as the site has been in use for commercial forestry since the 1990s, it is likely that many of these sites have been damaged or destroyed by pre-afforestation ploughing and other forestry operations. Field survey to reassess the quality of preservation of these sites will be undertaken, where access permits.

The following sites are considered to be the key external cultural heritage receptors to be considered within the EIA.

Scheduled Monuments:

- Corrafeckloch, hut circle and field system 1150m SE of (Index No. 4815);
- Cairnderry, chambered cairn (Index No. 1007);
- Cairn Kinna, two cairns 900m ESE of Corrafeckloch (Index No. 1008);
- King's Cairn, chambered cairn 450m NE of Kirriemore (Index No. 1030);
- Sheuchan's Cairn, chambered cairn, Highlandman's Rig (Index No. 1041);
- White Cairn, cairn 910m NNE of Bargrennan Cottage (Index No. 1048);
- White Cairn, chambered cairn 630m W of Glentrool School (Index No. 1049);
- Ballmalloch, chambered cairn (Index No. 2503);

- Dinvin Motte (Index No. 2202); and
- Bencallen Hill, chambered cairn (Index No. 3890).

Category A Listed Buildings:

- Kildonan House (Barrhill, Kildonan House) (Index No. 1052)

Assessment of effects

The effects of the proposed Development on cultural heritage resources will be assessed on the basis of their type (direct physical effects, effects on setting, and cumulative effects), their nature (beneficial, neutral or adverse), and the longevity of the predicted effect (reversible, short-term or long-term; irreversible, permanent). The assessment will take into account the importance of the receptor and the magnitude of the effect. The assessment of importance of archaeological and heritage assets reflects the relative weight which statute and policy attach to them, principally as published in SPP and SHEP.

It will be necessary to consider the effect of the Development upon the setting of cultural heritage assets within the wider landscape, particularly those that are considered to have broad settings that may be affected by the proposed Development. Assessment of effects on setting will take account of the baseline context, which includes other consented and exisiting windfarm developments. The potential for cumulative effects in combination with other proposed, and currently unconsented windfarms will be assessed. The assessment of effects on the setting of cultural heritage resources in the wider landscape will take account of the Historic Scotland guidance document ‘Managing Change in the Historic Environment: Setting’

Mitigation

Mitigation measures designed to prevent, reduce or offset significant adverse effects will be proposed, and residual effects will be assessed taking into account the likely effectiveness of the mitigation proposed.

Cumulative effects

There is a potential for cumulative indirect impacts upon the setting of cultural heritage assets with statutory and non-statutory designation within the wider landscape as a result of the construction of the proposed Development in combination with other operational, consented and proposed windfarms in the wider area.

10.5 Consultation

Historic Scotland and WoSAS, who act as archaeological advisors to South Ayrshire Council, will be consulted to agree the approach to assessment and assessment methodology, to obtain professional opinion on the likely effects of the proposed Development upon cultural heritage interests, and to discuss approaches to mitigation. Consultation will also be undertaken with these organisations and the Dumfries & Galloway Council Archaeologist, to agree the locations of proposed cultural heritage visualisation viewpoints, for photomontages and/or wirelines to inform the assessment.

The following information will be sought from the Council's archaeological advisors and Historic Scotland:

- Details of any current or recent archaeological work or projects being undertaken within or in the vicinity of the Development site, the results of which may not yet be recorded in the West of Scotland Sites and Monuments Records or RCAHMS database;
- Details of those sites with statutory protection in the wider landscape whose settings it is considered may be affected by the Development; and,
- Details of any other cultural heritage sites in the vicinity of the Development which it is considered may raise significant issues within the EIA process for this Development.

Scoping Question: Have the most likely and significant effects been identified at this stage?

Scoping Question: Are there any likely or significant effects that should be considered for inclusion in the full assessment process and if so why?

Scoping Question: Do the requirements outlined for assessment of effects look appropriate and complete?

Scoping Question: Are there any additional key sources of environmental information to be consulted?

11. Access, traffic and transport

11.1 Introduction

This chapter considers the potentially significant issues associated with Traffic and Transport during the construction and operational phases of the proposed Development, which will require further consideration within the ES.

11.2 Baseline conditions

An initial appraisal has indicated that the turbine components will likely be brought in from the Port of Ayr and transported to site via the A77 trunk road, the A75 and then onto the A714, bypassing the town of Newton Stewart. There is a constraint on this route in the shape of the narrow bridge structure over the River Cree to the east of the site, and further investigation will be required to confirm the most appropriate route to site.

Site access would be taken either directly from the A714 or via the existing access track through Mark Hill Windfarm.

11.3 Potential effects

The main transport effects relating to the proposed Development surround the transportation of abnormal loads and the impact of general construction traffic on the settlement of Barrhill and potentially the roads surrounding Newton Stewart.

An abnormal loads assessment will be undertaken to identify the preferred route to site for abnormal loads and to assess what mitigating measures may be required on the public road network.

The ES will identify the potential traffic and associated environmental effects on sensitive receptors which would include the local settlements and mitigation will be proposed where necessary.

11.4 EIA methodology

Legislation and guidance

The ES chapter will be prepared in accordance with the following policy and guidance documents:

- Scottish Executive (2010). *Scottish Planning Policy (SPP)*;
- Institution of Highways and Transportation (1994). *Guidelines for Traffic Impact Assessment*;
- Institute of Environmental Assessment (1993). *Guidelines for the Environmental Assessment of Road Traffic;*
- Scottish Government (2005). *Transport Assessment & Implementation*; and
- PAN 75: Planning for Transport, Scottish Government.

Further baseline studies

Baseline traffic flows data will be obtained for the selected delivery routes to site and from relevant sources including Transport Scotland, Dumfries & Galloway Council and South Ayrshire Council (where available) for the A77 and A714. Furthermore two-way traffic counts will also be undertaken on the local road network at affected road links close to the site such as Forest Road.

The collated data is expected to confirm traffic levels including light goods vehicles (LGV) and heavy goods vehicles (HGV) using the available access routes. These figures will be combined with the forecast levels of construction traffic in order to identify the likely development effects along the delivery route.

Background traffic flows are predicted to increase on the local road network regardless of the proposed Development. This assumption is based on the forecast growth in the volume of traffic as described in the Department of Environment DETR publication National Road Traffic Forecasts (Great Britain) (NRTF).

Assessment of effects

Construction

Further analysis of the abnormal loads access route and the potential impacts of general construction traffic on the road network is required. This would include:

- Swept path analysis of identified pinch points on the route, to ensure that vehicles can navigate the route;
- A review of the height and weight restrictions on any bridges / structures to be crossed;
- Details of the site access arrangements and interface with the existing road network;
- Provision of an estimate of numbers of construction vehicle movements and construction staff movements for the construction duration and for a typical day in the construction period; and
- Proposals for mitigation measures, which could potentially include temporary bridge reinforcement, carriageway widening and traffic management procedures.

It is noted that construction traffic flows can only be calculated once turbine numbers are known and once an outline programme has been established for the construction works. Other factors such as ground conditions also need to be established to identify whether suitable borrow pits can be found. This in turn will inform the estimate of material quantities required for onsite construction works.

In accordance with the Guidelines for the Environmental Assessment of Road Traffic (Institute for Environmental Assessment, 1993), the method used for assessing environmental effects of increased traffic will be based on a comparison between predicted traffic flows on potentially affected roads with and without construction traffic, in percentage terms.

Criteria are applied to the percentage increases to establish whether significant environmental effects are likely. These criteria take into account the sensitivity of the receptors or the resources likely to be affected and any changes in the composition of traffic, specifically if more HGVs are anticipated. The criteria are a 30% or more increase in total movements or of HGVs, or a 10% increase where sensitive locations are present such as schools, hospitals or residential areas.

The significance of each effect is considered against the criteria within the Institute of Environmental Assessment (IEA) guidelines, where possible. However, the IEA Guidelines for the Environmental Assessment of Road Traffic (IEA, 1993) state that:

> *'for many effects there are no simple rules or formulae which define the thresholds of significance and there is, therefore, a need for interpretation and judgement on the part of the assessor, backed-up by data or quantified information wherever possible. Such judgements will include the assessment of the numbers of people experiencing a change in environmental impact as well as the assessment of the damage to various natural resources.'*

The significance of the effects on receptors will therefore be evaluated against the IEA guidelines and, where possible, in line with the criteria used for the other environmental topic areas covered in the ES. These criteria are subjective but take into account the numbers of receptors affected, their sensitivity and the length of the period for which they will be affected. Mitigation, where appropriate, will be identified and incorporated into the windfarm design.

A review of published transport plans and planning policies for the area will be undertaken. Other more specific records will also be sourced, such as data on traffic levels, accident records and details of any weight restrictions.

Operation and cumulative effects

The proposed Development is unlikely to generate any significant long–term increase in volume of traffic accessing the site and will have a negligible cumulative impact, in terms of capacity, on the local road network. Once operational there will be little traffic associated with the development apart from occasional maintenance vehicles which will not affect the area. It is therefore not proposed to undertake any detailed assessment of the operational phase of the windfarm within the ES.

11.5 Consultation

Transport Scotland, Dumfries & Galloway Council and South Ayrshire Council will be consulted to obtain traffic data, where relevant.

Scoping Question: Have the most likely and significant effects been identified at this stage?

Scoping Question: Are there any likely or significant effects that should be considered for inclusion in the full assessment process and if so why?

Scoping Question: Do the requirements outlined for assessment of effects look appropriate and complete?

Scoping Question: Are there any additional key sources of environmental information to be consulted?

12. Forestry

12.1 Introduction

This chapter presents the approach to dealing with effects on forestry caused through design and construction of the proposed Development. Integration of the proposed Development with the existing woodland structure is a key part of the consenting process. Ultimately a Windfarm Forest Design Plan (FDP) will be produced which will detail felling and replanting proposals. This will be produced by DGA Forestry.

12.2 Baseline conditions

The site is largely forested apart from open ground for management boundaries, roads, unplantable land and margins. It is located in an area with extensive commercial woodlands both private and publicly owned. The woodlands within the site are all privately owned.

12.3 Potential effects

Areas of woodland will need to be cleared for the construction and operation of the windfarm 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 a loss of woodland area. This will be addressed through the redesign of the existing forest including, for example, the use of designed open space; alternative woodland types; or changing the management intensity.

12.4 EIA methodology

Legislation and guidance

In the UK there is a strong 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 windfarm. The integration of the windfarm into the forest design plan will be a key part of the development process.

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* 3rd Edition;
- Forestry Commission Scotland (2006). *The Scottish Forestry Strategy;*
- UKWAS (2012). *The UK Woodland Assurance Standard* 3rd Edition;
- Forestry Commission Scotland (2009). *The Scottish Government's Policy on Control of Woodland Removal*;
- Forestry Commission (2003). *Forests and Water Guidelines* 4th Edition; and

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

Baseline determination

The forestry baseline will describe the crops existing at time of preparation of the ES. This will include species composition; age class structure; yield class; other relevant crop information; baseline felling and restocking plans, as available. The baseline will be prepared from existing records, site surveys and aerial photographs.

Assessment of effects

Forestry does not fit well into the standard EIA assessment process. As commercial forests are dynamic and constantly changing through landowner activities this will not be a formal EIA assessment, but instead it will describe the changes to the forest structure resulting from the incorporation of the windfarm into the forest. This will include the changes to, for example, the woodland composition and work programmes.

The principal output will be the preparation of the Windfarm FDP. This will include a felling plan showing which woodlands are to be felled and when they are to be felled during the life of the windfarm. It will further include a restocking plan showing which woodlands are to be replanted and when during the life of the windfarm. 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.

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.

12.5 Consultation

The main forestry consultee is 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 the Control of Woodland Removal Policy.

Scoping Question: Have the most likely and significant effects been identified at this stage?

Scoping Question: Are there any likely or significant effects that should be considered for inclusion in the full assessment process and if so why?

Scoping Question: Do the requirements outlined for assessment of effects look appropriate and complete?

Scoping Question: Are there any additional key sources of environmental information to be consulted?

13. Socio-economics, land use and recreation

13.1 Introduction

The Socio-Economics, Land Use and Recreation chapter will assess the potential for effects both positive and negative on the local economy, tourism and recreation and land use.

The assessment will cover the potential for effects both in the locality of the proposed Development (the South Ayrshire Council area) and at a national level. The assessment will include for any specific proposed Development related effects, cumulative effects, and potential mitigation measures. The chapter will also include the findings of other chapters, specifically the Landscape and Visual chapter. This is particularly relevant to ensure an adequate assessment of the effects on tourism and recreation.

13.2 Baseline conditions

South Ayrshire is the 17th largest Council area out of 32 in Scotland. The bulk of the 111,700 population live in the major settlements of Ayr, Troon and Prestwick followed by the smaller towns of Girvan and Maybole. Approximately 11 percent live in settlements of less than 500 people. Estimated 2008 data suggests that 21 percent of the population are of pensionable age in comparison to 17 percent for the rest of Scotland. Population levels are predicted to decline in the future (to 2031) with a growth in the number of people of pensionable age (rise of 26%) (South Ayrshire Proposed Local Development Plan).

In terms of industry, South Ayrshire has had a long tradition of manufacturing and processing operations. The local economy has faced numerous challenges in recent years, not least from the latest economic downturn. There has been a decline in engineering, textiles, coal mining and fishing, which has affected businesses and employment. Over the past decade, South Ayrshire has underperformed relative to the Scottish and UK average however; the export market has increased over the past five years with main exports including metal aerospace products, softwood timber, food and drinks.

Recent data has shown that unemployment has increased in recent years. There are localised areas of unemployment because of economic restructuring in areas such as Girvan and North Ayr. Over 13 percent of the population are employed in tourism, directly and indirectly and the area has an abundance of tourist attractions. Agricultural employment has declined in recent years with a move away from intensive farming into land management practices. There is now a recognised need for diversification to complement existing services.

Land use

The principal land use within the proposed Development area is commercial forestry. Commercial forestry is a growing sector within South Ayrshire with the conversion of marginal farming land into forests for commercial planting. The production and processing of timber has supported over 1,500 jobs in the local economy and helps to support the area's ports.

Tourism

Tourism is very important to the economy of Ayrshire and Arran, generating £348 million of revenue per year, from some 3.5 million visitors. This directly supports almost 9,000 jobs. The tourism industry in Ayrshire and Arran is relatively well developed, comprising a bed stock of 21,620 beds in serviced (7,360 beds) and non-serviced (14,260 beds) accommodation and a wide range of attractions and activities that draw visitors to the area.[58]

The region has assets and strengths that offer the visitor a range of experiences, spanning rural, coastal, historic and built environments; golf, sailing, culture and heritage; islands, marine and countryside.

Recreation

South Ayrshire has an extensive path and cycle network including National Cycle Network (NCN) 7 and numerous local routes. There are various recreational facilities located around the Council area including forest and country parks such as Galloway Forest Park, open space, activity and leisure centres at Ayr, Prestwick, Troon and Maybole, golf courses and sports clubs.

The Galloway Forest Park covers extensive areas of forestry to the east of the proposed Development, which includes numerous areas for outdoor recreation including walking and mountain biking. The first Dark Sky Park in the UK was established within the Galloway Forest Park in 2009. Dark skies are skies which allow for the observation of the night sky without obscuration by light pollution. The International Dark-Sky Association (IDA) defines light pollution as any adverse effect of artificial light including sky glow and glare. Any potential effects associated with the proposed Development will be assessed as part of the EIA.

Two local paths are identified within the proposed Development area[59], and both of them are included in the Draft Core Path Plan[60]:

- Barrhill (Corwar Mains): A714 to Loch Nevan; and
- Barr: Alton Albany to Feoch Bank.

Once approved the Core Path Plan will form a central part of outdoor access provision in South Ayrshire. The Core Paths Plan includes access for walking, cycling and equestrians with a variety of urban and rural routes. The watercourses within the proposed Development area are used by Barrhill Angling Club.

[58] East, North and South Ayrshire Councils (2012). *Ayrshire & Arran Tourims Strategy 2012-17.* Available at: http://www.south-ayrshire.gov.uk/documents/sac_tourism_strat.pdf. [Accessed 21 June 2013]
[59] Available at: http://www.south-ayrshire.gov.uk/leisure/walking-cycling/ [Accessed 21 June 2013]
[60] Available at: http://www.south-ayrshire.gov.uk/outdooraccess/corepathsmaps.aspx [Accessed 21 June 2013]

13.3 Potential effects

Potential effects may include:

- Effects on the local and national economy through job creation and investment throughout construction, operation and decommissioning of the proposed Development;
- Effects on the local tourism industry and recreation activities including walking, cycling and angling; and
- Effects related to the alteration of land use within the proposed Development area.

13.4 EIA methodology

Legislation and guidance

The National Planning Framework is the Scottish Government's Strategy for Scotland's long term spatial development. SPP is the statement of Scottish Government policy on land use planning.

The assessment will also follow current planning policy and best practice guidance as set out in the following documents:

- SNH (2009). *A handbook on environmental impact assessment*;
- Scottish Government (2012). *Good Practice Wind Guidance*;
- Scottish Enterprise (2010). *National Renewables Infrastructure Plan*;
- Ayrshire & Arran Tourism Strategy (2012-17);
- Scottish Government (2007). *Scottish Government's Research on the Impact of Wind Farms on Tourism*;
- South Ayrshire Council (2013). *South Ayrshire Local Development Plan*;
- Scottish Government (2011). *Scotland's first Land Use Strategy*; and
- Scottish Government (2008). *The Economic Impacts of Wind Farms on Scottish Tourism.*

Baseline determination

The local conditions relating to socio-economics, land use and recreation will be assessed, particularly those directly within and adjacent to the proposed Development.

A desk study will be undertaken to gather socio-economic data (population characteristics, employment, etc) and tourism industry related data (existing infrastructure, housing, recreation, services, transport, etc). The desk study will be supplemented by a site visit.

Assessment of effects

The assessment process will identify the key constraints to the proposed Development. This will include areas of specific tourism value both regional and national such as the Southern Upland Way, routes designated by SUSTRANS and land designated by the National Trust. Local constraints such as picnic areas, community facilities, play parks and lochs and water courses used for recreation, will also be included. Local businesses will be identified

including business parks, industrial estates and agricultural businesses. Land identified by the council for strategic development will also be included within the baseline.

The assessment will analyse the effects of the proposed Development on the local and national economy. This will include how the proposed Development would contribute to investment and jobs both during construction and at the operational and decommissioning phases. Effects on land use will be assessed, together with any alterations to access and visual impacts (in coordination with the landscape and visual assessment).

There are no guidelines for significance, magnitude or sensitivity of receptors, however appropriate criteria will be utilised within the ES based on the guidance and the judgement of the assessor.

Mitigation

Mitigation measures will be incorporated where appropriate to optimise any positive effects and minimise any significant negative effects. Mitigation may form part of the ongoing design process. However where this has not been possible it will be stated as specific mitigation to be taken forward during subsequent phases of the proposed Development.

Cumulative effects

The assessment will seek to assess any cumulative effects likely to arise through the proposed Development and other similar developments, both consented and in the planning system.

13.5 Consultation

Consultation will be undertaken with but is not limited to, the following organisations:

- Association of Salmon Fisheries Boards;
- Ayrshire Chamber of Commerce & Industry;
- Barrhill Angling Club;
- Barrhill Community Council;
- British Horse Society;
  Mountaineering Council of Scotland;
- Scottish Enterprise;
- Scottish Rights of Way & Access;
- South Ayrshire Council; and
- Visit Scotland.

The consultation process will be supplemented by open information events to accurately gauge the views of local people. Information gathered at these events will be taken into consideration during the design of the proposed Development.

Scoping Question: Have the most likely and significant effects been identified at this stage?

Scoping Question: Are there any likely or significant effects that should be considered for

inclusion in the full assessment process and if so why?

Scoping Question: Do the requirements outlined for assessment of effects look appropriate and complete?

Scoping Question: Are there any additional key sources of environmental information to be consulted?

14. Other issues

14.1 Introduction

The ES will include an assessment of other issues considered to be relevant to the proposed Development. An assessment of effects on the following will be undertaken;

- Aviation and defence;
- Local air quality;
- Telecommunications and television; and
- Shadow flicker.

A carbon balance assessment will also be undertaken.

14.2 Aviation and defence

The introduction of wind powered turbines within an area has the potential to create certain problems for aviation. In addition to their potential for presenting a physical obstacle to air navigation, wind turbines can affect signals radiated from and received by aeronautical systems. The amount of interference depends on the number of wind turbines, on a wind turbines size, construction materials and location and on the shape of its blades.

The proposed Development lies within a Tactical Training Area (TTA)[61] and consultation with the Ministry of Defence (MoD) will be required to evaluate and mitigate any possible impacts of the proposed Development upon this.

National Air Traffic Services (NATS) has published Self-assessment Maps[62] which have been designed as an aid to developers in understanding where interference with NATS En Route Ltd (NERL) infrastructure is likely. These maps indicate no NERL infrastructure nor related safeguarded zones are located inside of the proposed Development area.

The guidance document Wind Energy and Aviation Interests: Interim Guidelines (DTI, 2002)[63] will be taken into account within the EIA assessment process.

Specific significance criteria are not proposed at this stage, however the ES will clearly identify where effects on aviation and defence systems are likely and appropriate mitigation will be incorporated into the design process.

The MoD, Civil Aviation Authority (CAA) and NATS have a statutory duty to safeguard certain sites and airspace from radar interference in the interests of national security and for the safe operation of passenger and military aviation - this duty was restated in the 2003 Energy White Paper. Consultation will be undertaken with MoD, CAA and NERL. Glasgow Airport and Prestwick Airport will also be consulted.

[61] Available at: https://www.gov.uk/government/publications/operational-low-flying-training-timetable [Accessed 21 June 2013]
[62] Available at: http://www.nats.co.uk/services/information/wind-farms/self-assessment-maps/ [Accessed 21 June 2013]
[63] DTI (2002). *Wind Energy and Aviation Interests – Interim Guidelines* (ETSU W/14/00626/REP)

14.3 Local air quality

Windfarm operation generates no direct emissions to the surrounding air. As a result the ES will include an analysis of the potential emissions to the local air that could be produced during the construction phase, due to excavation activities, vehicular movement, etc. Mitigation measures and best practice during construction will be stated in order to eliminate or reduce the risk of dust effects.

14.4 Carbon balance

The Scottish Government's ambition is that by 2020 renewable sources generate the equivalent of 100% of Scotland's electricity consumption. One clear aspiration within that ambition is that onshore wind developments, ranging from small and community-scale to large power utility scale windfarms, help to reduce carbon emissions through the displacement of fossil fuel generation.

Applications for windfarms (or extensions of windfarms) submitted under Section 36 of the Electricity Act 1989 are screened to establish whether they are on deep peat sites (i.e. greater than 0.5m) and where loss or disturbance to peat could occur; where they do, developers will be expected to use the carbon calculator in preparing their application.

Therefore, in the ES there will be a carbon balance assessment, using the Scottish Ministers tool 'Calculating Carbon Savings from Wind Farms on Scottish Peatlands' version 2.7.0. (31 October 2012)[64]. The method uses a full life cycle analysis approach, quantifying the gains over the life of the project against the release of carbon dioxide during construction.

14.5 Telecommunications and television

The presence of a windfarm has the potential to interfere with electromagnetic transmission either by reflecting or blocking electromagnetic signals which pass by the turbine or by emitting an electromagnetic signal. Principally this relates to microwave and scanning telemetry communications, television broadcasting and radar.

The EIA will assess the effect of the proposed Development on established and planned radio, television and telecommunications transmission and will include appropriate mitigation measures to avoid significant effects.

The baseline study will include the identification of telecommunications, television and radio signal transmission in the area, an analysis of the turbine layout and the properties of the material used for construction of the turbines.

Any effects will be assessed through analysis of the geometry of the proposed turbine layout and its position relative to the main sources of transmission.

[64] Available at: http://www.scotland.gov.uk/Topics/Business-Industry/Energy/Energy-sources/19185/17852-1/CSavings/CC-270 [Accessed 21 June 2013]

At this stage, significance criteria for the assessment of telecommunications effects are not proposed. The assessment will clearly identify communities or systems that are likely to be affected by the proposed Development.

Any interference problems identified during the course of the EIA would be mitigated through the design process via established remediation techniques and would be detailed within the ES.

Consultation will be undertaken with Ofcom and subsequently any telecommunication operators identified by Ofcom, including Arqiva, Airwave, mobile operators and Joint Radio Company (JRC). The BBC's online tool for windfarms will also be consulted within the assessment. The results of the consultation will inform the need for further detailed study.

14.6 Shadow flicker

Shadow flicker is best described by the following:

'Under certain combinations of geographical position, time of day and time of year, the sun may pass behind the rotor and cast a shadow over neighbouring properties. When the blades rotate, the shadow flicks on and off. It occurs only within buildings where the flicker appears through a narrow window opening'[65].

Only dwellings within 130 degrees either side of north relative to a turbine can be affected and the shadow can be experienced only within ten rotor diameters of the windfarm[66].

Where the final turbine layout results in turbines being located within ten times the rotor diameter of residential dwellings an appropriate assessment will be undertaken to assess potential effects. It is likely however, that the design process will negate the need for such assessment.

Scoping Question: Have the most likely and significant effects been identified at this stage?

Scoping Question: Are there any likely or significant effects that should be considered for inclusion in the full assessment process and if so why?

Scoping Question: Do the requirements outlined for assessment of effects look appropriate and complete?

Scoping Question: Are there any additional key sources of environmental information to be consulted?

[65] The Scottish Government. *Onshore wind turbines (Updated October 24, 2012).* [online] Available at: http://www.scotland.gov.uk/Topics/Built-Environment/planning/National-Planning-Policy/themes/renewables/Onshore [Accessed 20 June 2013].
[66] Renewables Advisory Board and BERR (2007). *Onshore Wind Energy Planning Conditions Guidance Note*.

15. Draft outline of the environmental statement

It is proposed that the ES will comprise three documents as follows:

- Volume 1) Non-Technical Summary;
- Volume 2) Environmental Statement; and
- Volume 3) Technical Appendices.

The Environmental Statement will contain the following Chapters:

- Introduction;
- Policy and legislative context;
- Site selection and design strategy;
- Project description;
- EIA methodology;
- Scoping and consultation;
- Landscape and visual;
- Ornithology;
- Ecology (non-avian) ;
- Geology, soils and water resources;
- Noise;
- Archaeology and cultural heritage;
- Access, traffic and transport;
- Socio-economics, land use and recreation;
- Other issues; and
- Summary of effects.

Forestry will be included as a Technical Appendix

The Chapters from 7 to 15 will have the following structure (where possible):

- Introduction;
- Consultation;
- Assessment methodology;
- Baseline conditions;
- Assessment of effects
- Mitigation;
- Cumulative effects;
- Residual effects; and
- Conclusions.

16. Consultation strategy

Consultation is an essential element of the EIA process and will be reported within the ES and supplementary documentation. A well considered and implemented consultation strategy is a vital tool in the progression of any proposed development.

The primary aim of the consultation strategy is to inform, engage and resolve any issues that may arise during the course of the proposed Development.

SPR is committed to promoting dialogue with statutory and non-statutory consultees and the local community. Effective public participation is key during the development process and this is identified throughout relevant legislation and planning guidance.

The benefits of a well considered and implemented consultation strategy include:

- Ensuring statutory bodies are informed in line with relevant legislation and guidance; and
- Actively encouraging local groups and other non statutory organisations to comment on the proposed development. These organisations and individuals may possess local knowledge and information, useful in compiling the ES.

It is important to engage with statutory and non-statutory consultees as early in the process as possible. This will ensure the design and planning of a development to take account of any alterations and measures that may resolve any potential issues and minimise possible impacts. SPR have held initial meetings with ECDU, SNH and South Ayrshire Council. These meetings were seen as an opportunity to introduce the proposed Development and obtain initial feedback.

The consultation strategy will include provision for the ECDU Gate Check procedure. A Design Report will be produced which will clearly state how consultation responses have been incorporated into the design process of the proposed Development.

It is anticipated that consultation will be undertaken with the following statutory and non-statutory organisations:

- Arqiva
- Association of Salmon Fisheries Boards
- Ayr District Salmon Fishery Board
- Ayrshire Chamber of Commerce & Industry
- Ayrshire River Trust
- Barrhill Angling Club
- Barrhill Community Council
- BAA-Glasgow Airport
- BAA Safeguarding
- BBC
- British Horse Society
- British Telecom (BT)
- Civil Aviation Authority – Airspace (CAA Airspace)

- Cree District Salmon Fishery Board
- Cree Valley Community Council
- The Crown Estate
- Defence Infrastructure Organisation
- Directorate for the Built Environment
- Dumfries & Galloway Council
- Forestry Commission Scotland
- Galloway Fisheries Trust
- Glasgow Prestwick Airport
- Halcrow Group Ltd
- Health & Safety Executive
- Highlands and Islands Airport
- Historic Scotland
- John Muir Trust
- Joint Radio Company
- Marine Scotland
- Mountaineering Council of Scotland
- National Air Traffic Services (NATS)
- Nuclear Safety Directorate (HSE)
- OFCOM
- Pinwherry and Pinmore Community Council
- Ramblers Association
- RSPB Scotland
- Scottish Enterprise
- Scottish Environment Protection Agency
- Scottish Gas Networks
- Scottish Natural Heritage
- Scottish Rights of Way & Access Society
- Scottish Water
- Scottish Wildlife Trust
- Scottish Anglers Association
- South Ayrshire Council
- The Southern Uplands Partnership
- Transport Scotland
- Visit Scotland
- West of Scotland Archaeology Service (WoSAS)

The GP Wind strategy (2010)[67] reconciles Good Practice in wind energy with environmental objectives and community engagement. The strategy promotes comprehensive, multi-lateral communications between a project promoter, planning and consenting authorities and the community at the outset as this will help communities to understand the environmental and

[67]GPwind (2010), *Good Practice Wind – Good Practice Guide*, available from: http://www.project-gpwind.eu/index.php?option=com_content&view=article&id=8&Itemid=113 [Accessed 20th June 2013]

economic effects and benefits of a project and developers to understand and address the genuine concerns of communities.

Communication will be facilitated by various approaches including this Request for a Scoping Opinion and through the arrangement of open information events to provide an opportunity for the public and other interested parties to comment and engage with ScottishPower Renewables and the EIA project team.

Scoping Question: Does the list of proposal consultees reflect the range of stakeholders that should be considered for this project?

17. Scoping questions

The complete list of scoping questions that have been presented in this report are detailed below. Please take these questions into consideration when providing comment and feedback.

Scoping Question: Have all regulatory requirements, which should be taken into account, been identified?

Scoping Question: Do the requirements outlined for assessment of effects look appropriate and complete?

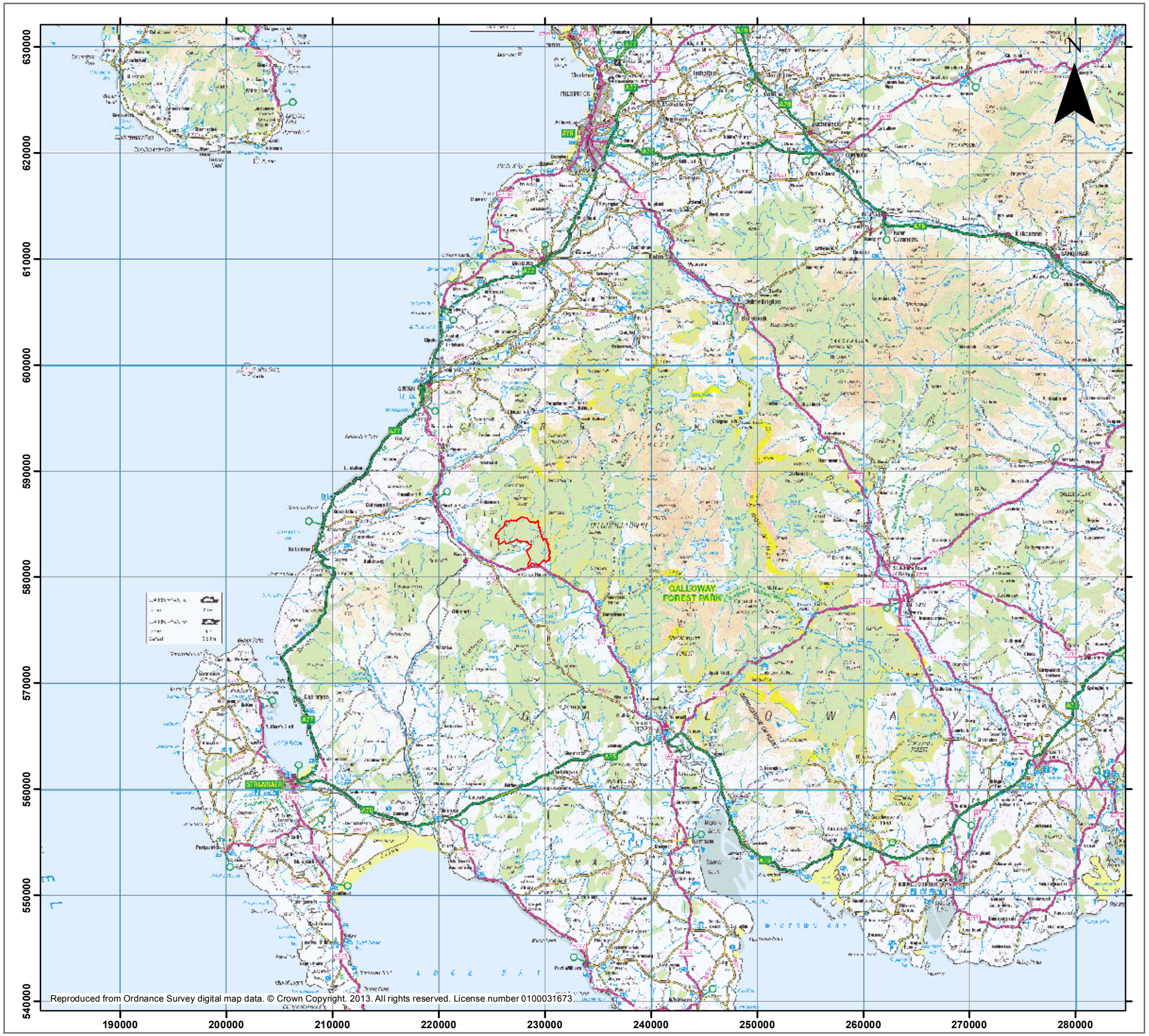
Scoping Question: Are there any additional key sources of environmental information to be consulted?

Scoping Question: Have the most likely and significant effects been identified at this stage?

Scoping Question: Are there any likely or significant effects that should be considered for inclusion in the full assessment process and if so why?

Scoping Question: Does the list of proposal consultees reflect the range of stakeholders that should be considered for this project?

Figure 1 Site location



SCOTTISHPOWER RENEWABLES

Legend

Site Boundary

1:350,000
SCALE @ A3

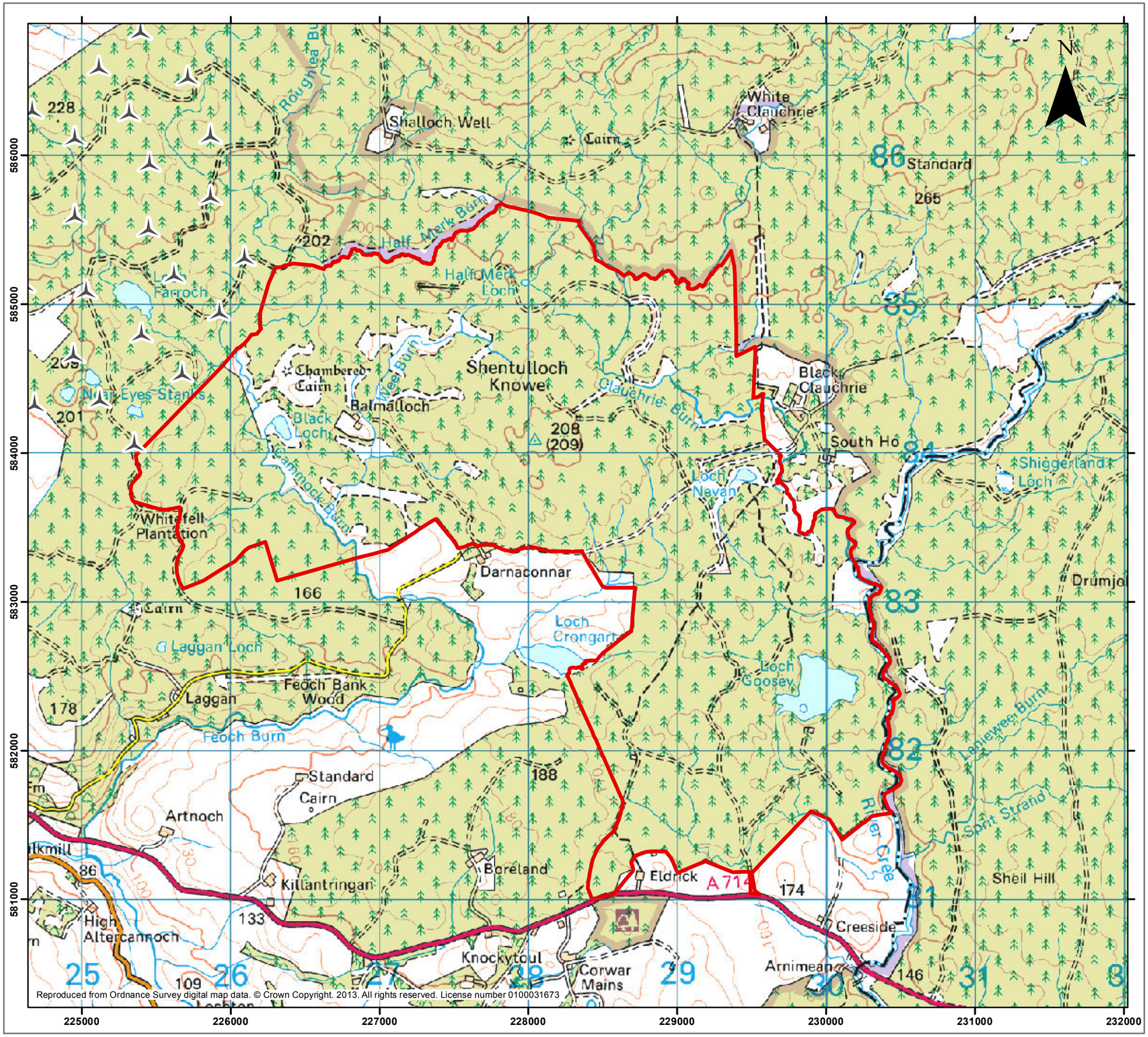
0 7,5 15 Km

DATE: 14/08/2013

Figure 1. Site location

Mark Hill Windfarm Extension
Request for a Scoping Opinion

Figure 2 Indicative boundary



SCOTTISHPOWER RENEWABLES

Legend

Site Boundary

Mark Hill existing turbines

1:25,000
SCALE @ A3

0 500 1,000 m

DATE: 14/08/2013

Figure 2. Indicative boundary

Mark Hill Windfarm Extension
Request for a Scoping Opinion

Figure 3 LVIA study area

SCOTTISHPOWER RENEWABLES

open
optimised environments

Legend

- Mark Hill Operational Turbines
- Site Boundary
- LVIA Study Area (35km)

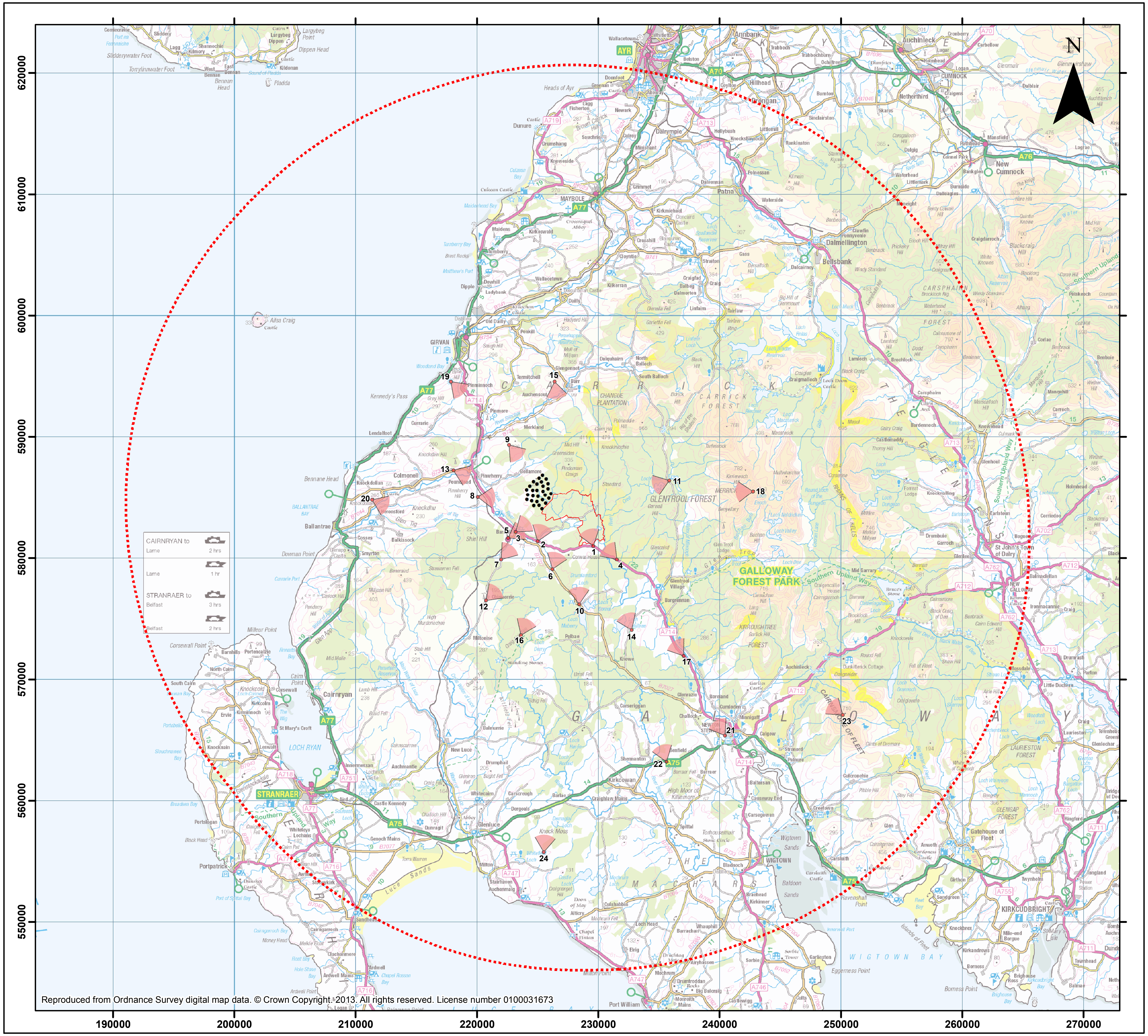
1:300,000
SCALE @ A3
0 5 10 Km

DATE: 14/08/2013

Figure 3. LVIA study area

Mark Hill Windfarm Extension
Request for a Scoping Opinion

Figure 4 Viewpoint location plan



SCOTTISHPOWER RENEWABLES

open
optimised environments

Legend

- Mark Hill Operational Turbines
- Site Boundary
- LVIA Study Area (35km)
- Viewpoints

1. A714, Creeside
2. A714, Feoch Burn
3. Barrhill, Gowlands Terrace
4. A714, near Cairnderry Cairn
5. Barrhill Station
6. B7027, Knockycoid/Craigance
7. Barrhill Road (C72), Cross Water
8. Core Path, Duisk Valley near Pinwherry
9. Footpath, Pinmore-Muck Water
10. B7027, Loch Maberry
11. Kirriereoch
12. Chirmorrie
13. B734, Poundland
14. Glenvernoch Fell (SUW)
15. Auchensoul Hill
16. Craig Airie Fell (SUW)
17. A714, Cree Valley
18. Merrick
19. Byrne Hill
20. Knockdolian
21. Newton Stewart, Blair Monument
22. A75, near Kirkcowan
23. Cairnsmore of Fleet
24. Knock Fell

1:300,000
SCALE @ A3
0 5 10 Km

DATE: 14/08/2013

Figure 4. Viewpoint location plan

Mark Hill Windfarm Extension
Request for a Scoping Opinion

Figure 5 Cumulative search area

SCOTTISHPOWER RENEWABLES

open
optimised environments

Legend

- Site Boundary
- 5km Distance Bands
- LVIA Study Area (35km)
- 60km Radius Search Area
- Scoping Sites
- Application Turbines
- Consented Turbines
- Operational Turbines

1:500,000
SCALE @ A3
0 10 20 Km

DATE: 14/08/2013

Figure 5. Cumulative search area

Mark Hill Windfarm Extension
Request for a Scoping Opinion

Appendix 1: Wind energy developments within 60km

Table 1.1: Cumulative search (60km Radius)

NB – refer to Figure 5 for locations of wind energy developments

Wind energy development	Local Authority	Number of turbines	Blade tip height
Operational and under construction wind energy developments			
Arecleoch	South Ayrshire	60	118.4
Artfield Fell	Dumfries & Galloway	15	74
Balmurrie Fell	Dumfries & Galloway	7	80
Barlockhart Moor	Dumfries & Galloway	4	115
Hadyard Hill	South Ayrshire	52	110
Hare Hill	East Ayrshire	20	63.5
Mark Hill	South Ayrshire	28	110
North Rhins	Dumfries & Galloway	11	100
Torrs Hill	Dumfries & Galloway	2	100
Wether Hill	Dumfries & Galloway	14	91
Windy Standard	Dumfries & Galloway	36	53.5
Consented wind energy developments			
Blackcraig	Dumfries & Galloway	23	110
Carscreugh	Dumfries & Galloway	18	70
Dowhill Farm	South Ayrshire	1	77
Glenchamber	Dumfries & Galloway	11	126.5
Kilgallioch	Dumfries & Galloway and South Ayrshire	96	146.5/125
North Threave	South Ayrshire	1	53.71
Sanquhar (Blackhill)	Dumfries & Galloway	12	126.5
Shewalton Moss/Glaxo	North Ayrshire	3	110
Whiteside Hill	Dumfries & Galloway	11	120
Windy Standard Extension	Dumfries & Galloway	30	120/80
Application stage wind energy developments			
Afton	East Ayrshire	27	100/120
Airies Farm	Dumfries & Galloway	14	126.5
Ashmark Hill	East Ayrshire	7	116
Assel valley	South Ayrshire	17	126.5
Barcloy Hill	Dumfries & Galloway	5	115
Barlockhart Extension	Dumfries & Galloway	4	115
Burnhead	East Ayrshire	8	100
Corwar	Dumfries & Galloway	8	126.5

Wind energy development	Local Authority	Number of turbines	Blade tip height
Dersalloch	South Ayrshire	23	110, 115, 125
Garleffan	East Ayrshire	9	135
Glen App	South Ayrshire	14	126.5
Grangeston Industrial Estate	South Ayrshire	1	67
Hare Hill Extension	East Ayrshire	39	70,75,81,86,91
High Cumnock	East Ayrshire	8	132
Knockman Hill	Dumfries & Galloway	5	81
Loch Hill	Dumfries & Galloway	11	100
Margree	Dumfries & Galloway	17	120
Mayfield	Dumfries & Galloway	6	130
Sandy Knowe	Dumfries & Galloway	30	125
Shewalton Moss/Glaxo	North Ayrshire	1	110
Sorbie	North Ayrshire	3	104.3
South Threave Farm	South Ayrshire	2	65
Southmains	Dumfries & Galloway	3	84
Straid	South Ayrshire	14	99.5
Stranoch, New Luce	Dumfries & Galloway	28	110/135
Sunnyside Farm	Dumfries & Galloway	2	101
Twenty Shilling	Dumfries & Galloway	9	125
Ulzieside	Dumfries & Galloway	12	120
Scoping stage wind energy developments			
Airriequhillart	Dumfries & Galloway	18	136.5
Altercannoch	South Ayrshire	10	Unknown
Annabaglish (Derskelpin)	Dumfries & Galloway	14	110
Arnsheen	South Ayrshire		Unknown
Artnoch Farm	South Ayrshire	3	81
Auchenlongford	East Ayrshire	4	100
Auchleand	Dumfries & Galloway	14	130
Balunton Hill	Dumfries & Galloway	18	120
Benbrack	Dumfries & Galloway	27	150
Benshinnie	Dumfries & Galloway	24	125
Blackmyre Moor	Dumfries & Galloway	5 - 10	> 80
Blair Farm	South Ayrshire	1	79
Chirmorrie	South Ayrshire	60	Unknown
Cnoc An Fheidh (Arran)	North Ayrshire	8	Unknown
Collieston Hill	Dumfries & Galloway	18	141.4
Creeside Farm	South Ayrshire	1	79
Dalmorton	South Ayrshire	19	Unknown
Darngarroch	Dumfries & Galloway	20+	125

Wind energy development	Local Authority	Number of turbines	Blade tip height
Enoch Hill	Dumfries & Galloway	23	150
Gass	Dumfries & Galloway	19	126.5
Glenmount	East Ayrshire	26	130
Glenvernoch	Dumfries & Galloway	9	Unknown
Hadyard Hill Extension	South Ayrshire		Unknown
Hawkcleughside	Dumfries & Galloway	5	84
Kirkdale Hill	Dumfries & Galloway		Unknown
Knockendurrick	Dumfries & Galloway	10	132
Ladies Walk Farm	Dumfries & Galloway	2	Unknown
Lambdoughty	South Ayrshire		125
Larbrax	Dumfries & Galloway	8	125
Lessnessock Farm	East Ayrshire	1	84
Lethans	East Ayrshire	39	140
Linfairn Farm	South Ayrshire	25	126.5
Loch Urr	Dumfries & Galloway	50	127.5
Lochryan Port	Dumfries & Galloway	25	23.5
Longburn	Dumfries & Galloway	36	135
Lorg	Dumfries & Galloway	28	150
Mark Farm	Dumfries & Galloway	10	110
Marnhoul	Dumfries & Galloway	Up to 16	146.5
Mindork	Dumfries & Galloway	21	125
Mochrum Fell	Dumfries & Galloway	15	137
Monquhill	East Ayshire	5	150
Neuk Farm	Dumfries & Galloway		Unknown
Pencloe Forest	East Ayshire	33	Unknown
Polquhairn	East Ayrshire	21	126.5
Quantans Hill	Dumfries & Galloway	17 - 36	Unknown
Sclenteuch	South Ayrshire		Unknown
Shennanton	Dumfries & Galloway	11	100
Shepherds Rig	Dumfries & Galloway	45	146.5
South Kyle	East Ayrshire		Unknown
Spango	Dumfries & Galloway	14	135
Sypland	Dumfries & Galloway	4	107
Wether Hill Extension	Dumfries & Galloway	12	100