



Benbrack Wind Farm

Scoping Report

November 2012

Report for

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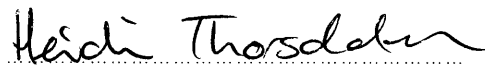
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E.ON Climate and Renewables

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Document Revisions

No.	Details	Date
1	Draft Scoping Report	Nov 12
2	Scoping Report	Nov 12

Executive Summary

Purpose of this Report

The proposed Benbrack Wind Farm scheme by E.ON Climate and Renewables (EC&R) is anticipated to have an installed capacity of over 50MW. This would fall under Section 36 of the Electricity Act 1989. The purpose of this report is to serve as a formal request to the Scottish Ministers to provide a scoping opinion under Regulation 7 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000.

This report sets out the proposed scope of the Environmental Impact Assessment, the findings of which will be presented in an Environmental Statement that will accompany the subsequent application for the proposed wind farm development at Benbrack. The Scottish Ministers and consultees are invited to make comments and suggestions on this scope and to highlight any pertinent information that they hold and can make available to EC&R for the assessment.



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1. Introduction

1.1 Introduction

E.ON Climate and Renewables (herein referred to as EC&R) has identified a potential opportunity to develop a commercial scale wind farm at Benbrack, located in Dumfries and Galloway approximately 6km to the south east of Dalmellington.

The proposed site is located between the settlements of Carsphairn and Dalmellington, just to the south of the border with East Ayrshire Council situated in a clearing within Carsphairn Forest. The national grid reference for the proposed site centre is 253000, 599500.

- **Figure 1** shows a site location map in the wider landscape.
- **Figure 2** shows the proposed site boundary.

For the purposes of this scoping request, Benbrack Wind Farm (the development) would consist of 27 turbines with a potential generating capacity of around 81MW, together with access tracks, crane hard standings, an electricity sub-station, 1 permanent anemometer masts and a temporary construction compound. An initial proposed site layout does not form part of this Scoping Request, but will be developed to inform the preliminary environmental assessments. For the purpose of identifying scope, a maximum tip height of 150m has been considered.

Under Section 36 of the Electricity Act 1989, consent is required from the Scottish Ministers for the construction and operation of all power generating plant that would have an installed capacity of more than 50MW. The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (the EIA Regulations) apply to Section 36 applications.

The development falls under Schedule 2 of the EIA Regulations (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). A Schedule 2 development constitutes EIA development if the application is supported by an Environmental Statement (ES) or the development is likely to have significant effects on the environment by virtue of factors such as its nature, size or location as set out in Section 3.

EC&R recognises that due to the size of the development, the proposal has the potential to result in significant effects on the environment. Therefore EC&R proposes to undertake an EIA to accompany the application submission.

AMEC Environment and Infrastructure UK Ltd (AMEC) have been commissioned to prepare this report requesting a '*Scoping Opinion*' from the Scottish Ministers in relation to the proposed Benbrack Wind Farm as per Regulation 7 of the EIA Regulations.

We have assumed that an EIA will be required in this instance, and we therefore request formal confirmation of this from the Scottish Ministers within the Scoping Opinion.

1.1.1 The Developer

E.ON is one of the world's largest power and gas companies. In the UK, E.ON supplies energy to more than 5 million customers and generates enough electricity for around 8 million homes. E.ON Climate & Renewables was set up in 2007 as a global business that's responsible for developing, constructing and operating all E.ON's renewable energy projects.

In the UK, EC&R focuses on developing onshore and offshore wind, biomass and marine energy technologies. At the moment, EC&R owns and operates 19 onshore and 3 offshore wind farms as well as a dedicated biomass plant, Steven's Croft at Lockerbie.

1.1.2 Report Structure

To keep the scoping report clear and to follow a logical process, the following structure has been used:

- Development proposal overview including site context, design process, development elements;
- Approach to EIA and Consultation;
- Identification of applicable legislation, policy and guidance;
- Identification of relevant environmental issues and proposed EIA scope: Ecology (4) to Other Issues (13); and
- A summary of the proposed scope of the EIA based drawing upon **Chapters 4 to 13**.

1.2 Proposed Development

1.2.1 Site Context

The nearest settlements to the proposed site are Carsphairn located approximately 5km to the south west, and Dalmellington in East Ayrshire which is located approximately 6km to the north. The nearest residential properties to the proposed site are Lamford (located within the proposed site), Eriff (located directly north west) and Waterhead (located directly east). The proposed site is lies within the former Stewartry District of Dumfries and Galloway Council, directly south of the border with East Ayrshire Council.

The A713, an identified tourist route runs in a north south direction through the western part of the site, connecting the settlements of Dalmellington and Casphairn. The Carsphairn Forest surrounds the site to the north, east and south and Loch Doon is located to the west.

The elevation of the proposed site is approximately 260m-430m above ordnance datum (AOD). The proposed site covers an area of 12.6ha, the majority of which is rough grazing land. The topography of the site is defined by three summits, Lamford Hill located in the southern section and Benbrack and Dodd Hills which are both located in the northern section of the proposed site. A track runs through the centre of the site with access onto the A713 road.

The proposed site is located within the 'Southern Upland' Regional Landscape Character Area as set out in the Dumfries and Galloway Wind Farm Landscape Capacity Study appendix report and in particular the Southern Uplands with Forest Landscape Character Type (19a). The

characteristics of the Southern Uplands are large smooth domed or slightly conical shaped hills. The hills often have steep sides and glens, many of which have been enlarged by glacial erosion. The landscape is large with a remote quality. The more local landscape type, the Southern Uplands with Forest is similar to that of the Southern Uplands, however the characteristic is very different due to the dominant forest cover (Sitka Spruce). The Galloway Hills Regional Scenic Area (RSA) lies within and to the west of the proposed site. The East Ayrshire Council Scenic Area joins the RSA and is located directly west of the proposed site. The Southern Uplands Way together with the 'Raiders Road' are located to the 11km of the proposed site.

The Muirkirk and North Lowther Uplands Special Protection Area (SPA) and Site of Special Scientific Interest (SSSI) is located approximately 17km to the north east of the proposed site and is designated for the breeding season in terms of short eared owls, hen harrier, merlin, peregrine falcon and golden plover, and during the winter season for hen harrier. The Loch Doon SSSI is located directly to the west of the proposed site.

The proposed site is located within an area of search for large/medium scale wind farm development as identified by the Dumfries and Galloway Wind Energy Interim Planning Policy (2012)

1.2.2 Development Elements

An overview of the main development elements which will form the basis for the EIA are outlined in **Table 1.1**.

Table 1.1 Overview of Development Elements

Elements	Overview
Turbines	<p>There are a number of three bladed vertical axis turbine makes and models which are expected to be suitable for this Site.</p> <p>The final choice of the turbines that would be installed will be subject to a competitive tendering procedure. A set of parameters will however be established to create the scheme on which the environmental assessment is undertaken and with which the final turbine selection will need to comply.</p> <p>The turbines are expected to be installed on reinforced concrete foundations, established on load bearing strata or bedrock (following excavation) though pilings may be required depending on ground conditions. These concrete foundations would be backfilled with the excavated soil so only the turbine tower base is exposed (typically a 4-5m diameter tube). The final choice of foundation design will be based on the turbine selection, most efficient use of materials, water table and local ground conditions.</p>
Access Tracks	<p>Access tracks will need to be constructed onsite to link turbines and other infrastructure and to connect the Site to the public highway network. Some tracks already exist on-site and these may be upgraded, though new tracks will also need to be established. These are likely to be constructed by scraping back surface material to bedrock or suitable load bearing strata followed by placement of geogrid and crushed stone capping. Stone for such tracks can sometimes be won from borrow pits opened on-site, provided suitable sources of material can be identified. If off-site materials are required then these would be sourced as locally as is reasonably practicable. A number of quarries are known to be located locally, and it is anticipated that one or more of these would be used to supply stone to the site if off-site stone is required.</p>
Associated Infrastructure	<p>Wind turbine generators require transformers to convert generated electricity to a voltage suitable for the distribution grid. These transformers could be housed within the tower structure or may be housed in external kiosks (typically 4m x 3m x 3m). Underground cables will link the transformers at each of the turbines to an on-site control building. Detailed construction and trenching specifications will depend on the ground conditions encountered at the time, but typically cables will be laid in a trench 1100mm deep and 600mm wide. To minimise ground disturbance, cables will be routed along the side of the access tracks wherever practicable.</p> <p>The grid connection for the proposed development would be via a new control building in an on-site location yet to be determined. Metering and switchgear will be contained in this building.</p>

Elements	Overview
Construction Process	<p>The construction period for the wind turbines is expected to last approximately 18 months, depending upon the final form of the scheme put forward, weather conditions and ground conditions encountered during the construction period. The construction process will consist of the following principal activities:</p> <ul style="list-style-type: none"> • Extraction of aggregates from borrow pits or import of this material from an adjacent off-site source for access track and turbine base construction; • Construction of on-site access roads inter-linking the turbine locations and control building incorporating relevant works to maintain site hydrology and manage surface water run-off from the roads; • Construction of temporary hard standing and temporary site office facilities; • Construction of turbine foundations; • Construction of control building (and substation compound if required); • Excavation of trenches and cable laying adjacent to site roads; • Connection of electrical distribution and signal cables; • Delivery to site and erection of wind turbines; • Commissioning of site equipment; and • Site restoration. <p>Many of these operations will be carried out concurrently, although predominantly in the order identified. Site restoration will be programmed and carried out to allow restoration of disturbed areas as early as possible and in a progressive manner.</p>
Grid Connection	<p>The connection between the proposed site and the wider grid would be subject to a separate consent procedure and will therefore not be considered within the ES.</p>
Decommissioning	<p>The proposed development will be designed with an operational life of 25 years. At the end of this life a number of options exist:</p> <ul style="list-style-type: none"> • The Site will be decommissioned and turbines removed; • An application could be made to extend the operational life of the Site using the existing equipment; or • An application could be made to replace the existing equipment with new equipment. <p>It is the former option that will be covered by the EIA and planning application submission and will include the removal of all above ground structures and equipment, cables cut off below ground but otherwise left in situ, base of turbines cut off below ground level and covered with topsoil to encourage regeneration.</p> <p>Roads would either be left for use by the Site occupier/landowner, or where appropriate material is available, may be covered with topsoil to allow regeneration. The environmental effects of this approach to decommissioning are considered to be less than those arising from the break up and removal of road and turbine bases from the Site.</p>

2. EIA and Consultation

2.1 EIA Overview

EIA is a systematic procedure that must be followed for certain categories of project before they can be consented. It aims to assess a project's likely significant environmental effects. This helps to ensure that the predicted significant effects and the scope for reducing them are properly understood by the public, consultees and in this instance, the Scottish Ministers before it makes its decision.

The EIA process should be systematic, analytical, impartial, consultative and iterative and is presented in an ES. Typically, a number of design iterations take place in response to environmental constraints identified during the EIA process (in effect, incorporating mitigation measures to avoid, reduce or compensate for identified adverse effects). Schedule 4 of the EIA Regulations specifies that the ES should describe those:

“aspects of the environment likely to be significantly affected by the development, including, in particular population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the inter-relationship between the above factors.”

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. The proposed scope of this EIA is set out in the subsequent Chapters and summarised in **Chapter 14**.

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. The assessment methodologies are based on recognised good practice and guidelines specific to each topic area as outlined within this report, **Chapter 4** to **13**.

2.2 Consultation

Consultation is an essential element of the EIA process and will be reported on within the ES.

EC&R is committed to promoting dialogue with statutory and non-statutory consultees and the local community throughout the development process, and acknowledges that the development of wind turbines and other renewable energy technologies can be controversial. Given that a significant amount of information is required to support any meaningful assessment of a wind farm project, it is a challenge to communicate such developments to a diverse range of people.

EC&R are seeking to engage with all those with an interest in the development in order to inform the evolution of the proposal and to ensure that their concerns and ideas are identified and considered. Contact will be made through the EIA process with those who hold information that may inform the design of the development and the assessment process; including a range of statutory and non-statutory consultees. EC&R consult widely with the local community and councillors during the development process. Engagement starts very early and allows meaningful consultation with those living close to the development. A variety of public exhibitions and engagement events will be arranged to allow ample opportunity for the public and local councillors to comment on the proposals and discuss any concerns they have with the project.

Early discussions have taken place with Dumfries and Galloway Council, Scottish Natural Heritage (SNH), Historic Scotland, the Royal Society for the Protection of Birds (RSPB) and the Ministry of Defence (MOD).

3. Legislation, Policy and Guidance

3.1 Introduction

The EIA will be progressed taking account of applicable legislation, policy and guidance. This chapter firstly outlines the planning policy framework followed by an overview of further legislation, policy and guidance applicable to the various technical subject areas outlined in **chapter 4** and onwards.

3.2 Energy and Planning Policy Framework

Under the provisions of Section 25 of the Town and Country Planning (Scotland) Act of 1997 as amended by the Planning etc (Scotland) Act 2006, there is a requirement placed on the decision-maker dealing with applications whereby the decision has to be made in accordance with the development plan, unless material considerations indicate otherwise. Emerging development plans are examples of material considerations, as is national planning and energy policy issued by the Scottish Government.

This section briefly outlines the applicable energy and planning policy framework which will inform the EIA.

3.2.1 National Policy Context

Energy and Climate Policy

The following legislation and policy are applicable:

- Climate Change (Scotland) Act 2009;
- The Climate Change Delivery Plan 2009;
- The Scottish Government Renewables Action Plan June 2009 and 2011; and
- Draft Electricity Generation Policy Statement 2010.

National Planning Policy & Guidance

- The National Planning Framework 2 (NPF2);
- The Scottish Planning Policy (SPP); and
- Relevant guidance is included in **Table 3.1** below.

Table 3.1 Key National Planning Advice

National Planning Advice
Specific Advice Sheet (updated August 2012) Onshore Wind Turbines
PAN 1 (March 2011) Planning and Noise
PAN 2 (July 2011) Planning and Archaeology
PAN 3 (August 2010) Community Engagement
PAN 51 (Revised 2006) Planning, Environmental Protection and Regulation
PAN58 (September 1999) Environmental Impact Assessment
PAN60 (updated January 2008) Planning for Natural Heritage
PAN61 (July 2001) Planning and Sustainable Urban Drainage Systems
PAN75 (August 2005) Planning for Transport
PAN79 (September 2006) Water and Drainage
PAN 81 Community Engagements

3.2.2 The Development Plan

The applicable Development Plan comprises the approved Dumfries and Galloway Structure Plan (1999) and the adopted Stewartry District Local Plan (July 2006). Both the Structure Plan and Local Plan will eventually be replaced by the Dumfries and Galloway New Local Development Plan (currently at Main Issues stage). Relevant policies against which the development will be assessed are set out in **Tables 3.2** below.

Table 3.2 Relevant Development Plan Policies

Development Plan	Relevant Policies
The Dumfries and Galloway Structure Plan 1999	Policy D36 – Design of Development Policy D37 – Private Sector Contributions Policy E2 – Regional Scenic Areas Policy E3 - Landscape Character Policy E6 – Conservation of Habitat and Species Policy E8 – Development in Conservation Areas Policy E9 – Listed Buildings Policy E11 – Historic Parks and Designated Landscapes Policy E12 – Development affecting archaeological sites Policy S2 – Development affecting ground water resources Policy S3 – Development in flood risk areas Policy S21 – Renewable Energy Policy S22 – Wind Farm and Wind Turbine Development

Development Plan	Relevant Policies
The Stewartry Local Plan 2006	General Policy 1 – Development Principle General Policy 2 – Development Considerations General Policy 3 – Settlement Boundaries General Policy 7 – Siting & Design General Policy 12 – Potentially Polluting Development General Policy 37 – Public Rights of Way General Policy 44 – Nature Conservation Sites of International Importance General Policy 45 – Nature Conservation Sites of National Importance General Policy 46 – Nature Conservation Sites of Local Importance General Policy 50 – Conservation Areas General Policy 51 – Listed Buildings General Policy 53a – Historic Gardens and Designated Landscapes General Policy 56 – Protecting Quality of Groundwater General Policy 62 – Freight Transport General Policy 65 - Traffic management and Road Safety General Policy 71 – Road Design

3.2.3 Emerging Development Plan and Supplementary Planning Guidance

Dumfries and Galloway Wind Energy Interim Planning Policy

The Dumfries and Galloway Wind Energy Interim Planning Policy (IPP) was approved in February 2012 and superseded Technical Paper No 5 ‘Preparation of Wind Energy Diagram’ from the Structure Plan. This IPP provides the most up to date position in respect of assessing wind energy proposals and is now a material consideration in assessing proposed wind turbine developments.

The IPP identifies a number of areas which could be suitable for wind turbines over 50m in height subject to a number of considerations which are outlined and which against proposals will be assessed. The aim of this IPP is to *‘accommodate renewable energy developments where the technology can operate efficiently, and environmental and cumulative impacts can be addressed satisfactorily’*.

The proposed site is located within an area of search for large/medium scale wind farm development. Policy WEP 2 – Areas of Search for Large and Medium Scale Wind Energy is of relevance.

Dumfries and Galloway New Local Development Plan

The forthcoming Dumfries and Galloway New Local Development Plan (LDP) is anticipated to be adopted in October 2013. A ‘Main Issues’ report was published in March 2011 and sets out the Council’s general proposals for development in the area and suggests where development could occur and where it should not occur. It will also include one or more reasonable alternative sets of proposals.

With regards to climate change and renewable energy the Council recognises that it can assist in the reduction of greenhouse gas emissions through *‘making the best use of renewable energy sources’*.

Dumfries and Galloway Wind Farm Landscape Study

The Wind Farm Landscape Study (January 2011) considers the capacity of landscape character areas to accommodate wind farm developments. The capacity study has informed the IPP noted above.

3.2.4 Other relevant Development Plans

Given the site's proximity to East Ayrshire Council relevant development plan policies, comprising the Ayrshire Joint Structure Plan (2007) and the East Ayrshire Local Plan (2010) from this area will also be considered in the EIA process

3.3 Further Technical Legislation and Guidance

The following legislation and guidance will inform applicable technical sections of the EIA as outlined in **Chapter 5** and onwards.

- Scotland's Transport Strategy 2006
- South Western Transport Partnership (SwestTrans) 2008
- Institute of Environmental Assessment (IEA) publication Guidance Notes No. 1: Guidelines for the Environmental Assessment of Road Traffic (1993)
- The Highways Agency et al – Design manual for roads and bridges, Volume 11: Environmental Assessment (1993)
- Scottish Executive – Transport Assessment for development proposals (2002) 12.8.1 (2006) Development Control: Planning for Air Quality)
- ETSU-R-97 The Assessment and Rating of Noise from Wind Farms (ETSU 1996)
- Acoustics Bulletin, volume 34, number 2, March/April 2009
- Institute of Acoustics 'Discussion Document' on the 'Good Practice Guide to the Application of ETSU-R-97 for Wind Turbine Noise Assessment'
- The Water Framework Directive / Water Environment and Water Services (Scotland) Act 2003
- River Basin Management Planning
- Controlled Activities Regulations
- The EU Floods Directive / Flood Risk Management Act (Scotland) 2009
- Institute of Ecology and Environmental Management guidelines (IEEM 2006)
- Guidelines for Landscape and Visual Impact Assessment, Second Edition, Landscape Institute and IEMA (2002).
- Siting and Designing Windfarms in the Landscape, SNH (2009) and Guidelines on the Environmental Impacts of Wind Farms and Small Scale Hydroelectric Schemes, Scottish Natural Heritage (SNH) (2001).

- Guidance: Cumulative Effects of Wind Farms, Version 2 revised 13/04/05, SNH (2005).
- Visual Representation of Wind farms: Good Practice Guidance for SNH, The Scottish Renewables Forum and the Scottish Society of Directors of Planning, Horner & MacLennan and Envision (2006).
- Visual Assessment of Windfarms: Best Practice, University of Newcastle for Scottish Natural Heritage (2002); Commissioned Report F01AA303A.
- Council Directive 2009/147/EC on the conservation of wild birds (the Birds Directive);
- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive) as translated into UK law by the Conservation (Natural Habitats) Regulations 1994 (as amended);
- The Wildlife & Countryside Act 1981 (as amended);
- The Nature Conservation (Scotland) Act (2004);
- The Wildlife and Natural Environment (Scotland) Act 2011;
- Survey methods for use in the assessment of the impacts of onshore wind farms on bird communities (SNH 20101);
- Assessing significance of impacts of onshore wind farms on birds outwith designated areas (SNH 20062);
- Assessing the cumulative impact of onshore wind energy developments (SNH 20123);
- Guidelines for Ecological Impact Assessment in the UK (IEEM 2006); and
- Ayrshire Local Biodiversity Action Plan (LBAP).
- Institute of Ecology and Environmental Management guidelines (IEEM 2006)⁴.

¹ Scottish Natural Heritage (2010). Survey methods for use in the assessment of the impacts of onshore wind farms on bird communities.

² Scottish Natural Heritage (2006). Assessing significance of impacts of onshore wind farms on birds outwith designated areas.

³ Scottish Natural Heritage (2012). Assessing the cumulative impacts of onshore wind energy developments.

⁴ The IEEM EcIA Guidelines (Terrestrial, Freshwater and Coastal, 2006) are currently under review. Until such time as a revised version is published, the 2006 version remains current.



4. Ecology

4.1 Introduction

The ecology impact assessment will identify the baseline ecology of the proposed site and the surrounding area and will then assess the potential effects on identified ecological receptors which may arise as a result of the various different stages of the development. Policies, guidance and strategies outlined in **Chapter 3** will be taken into account in the ecological impact assessment.

4.2 Proposed Scope of Assessment

A key consideration in assessing the effects of any development on ecology and nature conservation interests is to define the areas of land cover and the species and habitats that need to be considered in the assessment. The importance of this lies in two inter-related considerations:

- A development can affect habitats and species directly (e.g. the land-take required) and indirectly (e.g. disturbance), the impacts potentially extending beyond the development site boundaries; and
- It is impractical for an ecological assessment to consider every individual species and habitat that may potentially be affected, rather it should focus on species and habitats that are valued in some way (e.g. designated nature conservation sites, habitats or species identified as having priority value in biodiversity terms, species protected by specific legislation or species which have economic value) and which could potentially be affected by the proposed development.

It is against this background that the scope of this assessment has been defined and will evolve throughout the assessment process. The ES chapter will detail the findings of the desk study together with the results of the ecological surveys undertaken. These will form the baseline against which the potential impacts of the development will be assessed, based in both the 'value' of the receptor (using an evaluation methodology adapted from IEEM Guidelines) and the nature and magnitude of the effect that the development will have on it.

A range of environmental measures will be incorporated as part of the development where appropriate, to avoid significant effects at the construction, operation and decommissioning phases. These measures are anticipated to include the identification of any ecological constraints that will be accounted for in the layout design ('mitigation through design'), though may also include controls during construction to reduce/avoid ecological impacts and enhancement measures as appropriate.

The ES chapter will report the significance of predicted residual impacts on valued ecological receptors, assuming the incorporation of the environmental measures which will form part of the scheme.

4.2.1 Baseline Overview

The proposed site lies on moderately sloping ground to the east of Loch Doon in Dumfries and Galloway. Carsphairn forest adjoins the proposed site approximately three quarters of the way around its boundary; the remaining boundary adjoins similar habitats to those found within the proposed site itself. The Water of Deugh runs adjacent to the proposed site boundary at its south eastern edge.

In terms of land use, the proposed site is intensively sheep grazed. It is comprised largely of unenclosed moorland supporting dry modified bog with pockets of intact bog, acid flushes along small burns and habitats which are characteristic of mire. The remainder of the proposed site consists of wet modified bog, neutral grassland, rush pasture, wet heath and acid grassland.

Statutory and Non-statutory Designated Sites

Consultation with relevant environmental bodies, local wildlife organisations and the completion of a desk-based study have identified the presence of the following statutory and non-statutory designated sites within 2km of the proposed site boundary, as detailed in **Table 4.1**.

Table 4.1 Nature Conservation (non-ornithological) Sites within 2km of the Site

Boundary Site Name	Designation	Distance (km) from Site Boundary and Direction	Features/ Reasons for Notification
Loch Doon	SSSI ⁵	2.0km – west	Supports last naturally occurring population of Arctic Charr in south west Scotland.
Carsphairn Forest	Red Squirrel Priority Woodland	Immediately adjacent to Site	Important as a priority habitat for red squirrel conservation ⁶ .

⁵ SSSIs are those areas of land and water (to the seaward limits of local authority areas) that Scottish Natural Heritage (SNH) considers to best represent Scotland's natural heritage. They are designated by SNH under the Nature Conservation (Scotland) Act 2004 and are protected by law.

⁶ Reynolds, J. and Bently, S. (2001). Selecting refuge sites for red squirrel conservation. Paper prepared for UK Red Squirrel Group.

Field Surveys

The ecology baseline surveys carried out within the proposed site and part of the surrounding area during 2011 are as follows:

- Extended Phase 1 Habitat Survey⁷: The following habitats were recorded: dry modified bog, blanket bog, wet modified bog, acid grassland, acid/neutral flush, basic flush, unimproved and semi-improved acid grassland, neutral grassland, marshy grassland, coniferous plantation woodland and running water;
- National Vegetation Classification (NVC) Survey⁸: Nine different communities were recorded on Site. In addition to their ecological value, the potential presence of groundwater dependent terrestrial ecosystems (GWDTEs⁹) was assessed by correlating the NVC data with SEPA (2012)¹⁰ and UKTAG Guidance (2004)¹¹. Six of these communities have some level of groundwater dependency;
- Badger Survey¹²: No signs of badger activity were recorded within the survey area. Overall the habitats present within the survey area, which are dominated by boggy habitats, are considered to be unsuitable for badgers as wet ground is unsuitable for construction of setts;
- Otter Survey¹³: Otter activity within the survey area was confirmed by the presence of otter spraints (both old and fragmented spraints and more recent spraints) in addition to otter prints. Suitable habitat for foraging and commuting otter was identified along the Water of Deugh and Brownhill Burn and its tributaries. Some areas with otter holt building and rest area potential were identified along banks where boulders formed areas of shelter;
- Water vole survey¹⁴: No signs of water vole were recorded but upstream and tributaries of Polgavin and Brownhill Burns were identified as having some suitable water vole habitat where banks are suitable for burrowing and there is suitable vegetation; and

⁷ JNCC (2010). Handbook for Phase 1 Habitat Survey: A Technique for Environmental Audit.

⁸ Rodwell JS (2006). National Vegetation Classification: Users' Handbook. JNCC, Peterborough.

⁹ Groundwater Dependent Terrestrial Ecosystems (GWDTEs) are defined in SEPA's land use planning guidelines for wind farm developments (SEPA, 2012). Dewatering of below-ground works as a result of development may change the quantity of groundwater supplying GWDTEs. Such de-watering is controlled by the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR). SEPA requires sufficient information in relation to GWDTE to advise the determining authority of the likelihood of an authorisation being granted.

¹⁰ SEPA (2012). Land Use Planning System SEPA Guidance Note 4 – Planning Guidance on Windfarm Developments. Issue date 12th March 2012. Ref. LUPS-GU4, Version 6.

¹¹ UK Technical Advisory Group on the Water Framework Directive (UK TAG) (2004). Guidance on the identification of groundwater dependent terrestrial ecosystems. Working draft paper version 5 by the Wetlands Task Team.

¹² Harris S, Cresswell P and Jefferies D (1989). Surveying Badgers. Mammal Society

¹³ Chanin, P. (2003). Monitoring the Otter *Lutra lutra*. Conserving Natura 2000 Rivers Monitoring Series No. 10. English Nature: Peterborough

¹⁴ Strachan, R. and Moorhouse, T. (2006). The water vole conservation handbook. 2nd Edition. WildCRU, Oxford.

- Bat surveys were undertaken from May to October 2011 with reference to the prevailing guidance from Natural England (adopted by SNH) and the Bat Conservation Trust (BCT)¹⁵ and involved the use of static bat detectors as well as walked monthly transects: No confirmed bat roosts were recorded within the bat study area boundary and there is limited potential for bat roosting in the vicinity of the bat study area with the exception of scattered farm buildings. Bat activity levels were found to be very low during walked transect surveys, with a single contact (soprano pipistrelle) recorded in six surveys. Results from the static bat detectors recorded similarly low levels of activity, of the following species: *Nyctalus* species (i.e. Leisler's or noctule¹⁶), *Myotis* species (likely to be Natterer's or Daubenton's bat) and common and soprano pipistrelle.

An assessment was also made of the potential for the development area to support other protected species, such as red squirrel, pine marten, amphibians and reptiles during the Extended Phase 1 Habitat Survey. No amphibians were observed during the surveys. No suitable amphibian habitat (i.e. ponds) was recorded in the survey area. Reptile sightings were confined to common lizards being recorded on the slope of Dodd Hill adjacent to Polgavin Burn. The proposed site does not contain any habitat to support red squirrel or pine marten. The Water of Deugh and Brownhill Burn and lower reaches of some of the other minor watercourses within the survey area are considered suitable for salmonids.

Additional Baseline Information and Collection Methods

It is not anticipated that additional habitat surveys will be required. Although protected species surveys have been undertaken during 2011, there will be a requirement to update the otter, water vole and badger surveys to inform the EIA.

Reptile species receive limited legal protection in Scotland being protected against intentional or reckless killing or injury and against trade. Although a common lizard was recorded on site in 2011, it is considered that a range of standard mitigation measures can be incorporated into the scheme to adequately protect reptiles. In addition, further surveys are likely to re-confirm presence given the large scale of the site and homogenous nature of the habitats.

The Water of Deugh and Brownhill Burn and lower reaches of some of the other minor watercourses within the survey area are suitable for salmonids and, as such, the Galloway Fisheries Trust will be consulted regarding their importance for fish and the potential for additional surveys to be undertaken. It is anticipated at this stage that such surveys are not going to be necessary on the basis that any development at Benbrack will incorporate measures to protect the water environment, including adherence to best practice and SEPA pollution prevention guidance.

The results of these surveys will help inform the best approach when considering potential ecological impacts during the enabling, construction, operational and decommissioning phase of the development.

¹⁵ Natural England (February 2009) Bats and Onshore Wind Turbines: Interim Guidance, Technical Information Note TIN051; and Bat Conservation Trust (2007) Bat Surveys: Good Practice Guidelines. Bat Conservation Trust, London.

¹⁶ The presence of *Nyctalus* species is notable given the high risk posed to this species group by wind turbine developments. However the activity recorded at the Benbrack is consistent with infrequent passes by (an) individual bat(s) which appear to use the edges of the bat study area and, as such, the risk posed by a potential wind farm development may not be significant.

4.3 Assessment Methodology/Approach

The EIA will focus on assessing the potential impact of the development on any relevant designated sites and any species/habitats of nature conservation value on the site and surrounding area that have been identified as having the potential to be affected. Where necessary, mitigation and enhancement measures will be explored.

The construction phase may have potential indirect impacts on those designated sites, species and habitats of ecological value that have been identified within the proposed site and adjacent to its boundary. The following bullet points outline the potential ecological effects that have been identified at this stage:

- Temporary and permanent habitat loss associated with on-site access tracks, borrow pits, wind turbine foundations/ the construction compound and other associated infrastructure;
- Habitat damage of areas surrounding construction sites through changes in the hydrological regime and pollution with dust, silt or chemical contaminants (this includes potential effects on Groundwater Dependant Terrestrial Ecosystems (GWDTEs) and Loch Doon SSSI);
- Effects on areas of deep peat resulting in potential peat slide risk;
- The disturbance and/or damage to watercourses and potential injury, death or disturbance of their associated fauna (e.g. otter) through the construction of infrastructure with close proximity to the bank sides or at water crossings; and
- Potential for significant beneficial effects as a result of the implementation of enhancement measures to be set out in a Habitat Management Plan (HMP).

Once the development is operational, there will be minimal disturbance and/or impact on ecological receptors. One potential issue relates to killing/injury of foraging or commuting bats as a result of blade strike. However, relevant guidance will be taken into account, with regard to stand-off distances of turbines from features known to be used by bats, thereby reducing the potential for adverse effects to occur.

Occasional visits may be made to the site in order to undertake maintenance works. The vehicles used for these visits are likely to be 4x4 vehicles and there may be a need for a HGV to access the site for maintenance and repairs. It is considered that the impact of operational traffic on ecological features would be minimal.

The ecology baseline at the time of decommissioning following 25 years of operation may be different to the current ecology baseline conditions. The impacts are likely to be similar in nature, however of lower magnitude than those relating to the construction phase, for example, access roads will already be in place. Nonetheless, appropriate mitigation to be implemented during decommissioning will be considered in the EIA.

A cumulative impact assessment will also be undertaken, including other wind farms in the vicinity which have the potential to impact on valued ecological receptors.

The ecological impact assessment will take into account the recognised Institute of Ecology and Environmental Management guidelines (IEEM, 2006)¹⁷.

¹⁷ The IEEM EcIA Guidelines (Terrestrial, Freshwater and Coastal, 2006) are currently under review. Until such time as a revised version is published, the 2006 version remains current.

5. Ornithology

5.1 Introduction

Ornithological impact assessment commonly forms one of the key components of wind farm EIAs which has led to the publication of a number of bird/wind farm guidance documents. The ornithological impact assessment will be prepared in accordance legislation, policy and a number of ‘best practice’ documents included in **Chapter 3** and in particular, the following publications and guidelines:

- Survey methods for use in assessment of the impact of proposed onshore windfarms on bird communities (SNH 2010);
- Assessing significance of impacts from onshore windfarms on birds outwith designated areas (SNH 2006); and
- Developing field and analytical methods to assess avian collision risk at wind farms (Band et al 2007).

5.2 Proposed Scope of Assessment

5.2.1 Baseline Overview

Desk Study

The desk study included the identification¹⁸ of any SPAs, Ramsar sites and SSSIs within 20km of the development for which birds were principal reasons for notification or designation. The following sites have been identified:

- Muirkirk and North Lowther Uplands SPA/SSSI (17km north-east) is designated for: breeding short-eared owl, hen harrier, merlin, peregrine falcon and golden plover; and overwintering hen harrier.
- Merrick Kells SSSI/SAC (6.2km to the south-west) - an upland, moorland site noted for its breeding bird assemblage of national importance; and
- Bogton Loch SSSI (6.4km to the north_ - a wetland site noted for its’ nationally important breeding bird community.

A literature search and review has also been carried out in order to obtain contextual data and to gain further information on aspects of the ecology and behaviour of key species that could potentially be affected by the development. Primary sources of contextual data that have been consulted to date are:

- Birds in Dumfries and Galloway 2002-2008¹⁹ ;
- Ayrshire Bird & Butterfly Report 2008²⁰ ;

¹⁸ Sources include Multi-Agency Geographic Information for the Countryside (MAGIC) (<http://magic.defra.gov.uk/>) and SNH SiteLink (<http://gateway.snh.gov.uk/sitelink/>)

¹⁹ Norman, P. (eds.) 2002-2008. Birds in Dumfries and Galloway. Scottish Ornithologists’ Union, Aberlady.

- The Birds of Scotland²¹; and
- Breeding Birds in the Wider Countryside: their conservation status 2008. BTO Research Report No. 516²².

The key objective of the desk study and breeding bird surveys at Benbrack was to establish whether any species or populations of nature conservation importance were likely to make regular use of the site and adjacent areas, or the airspace above it. This included collecting bird flight-line data suitable for modelling the potential collision-risk with the development.

SNH, the RSPB, the local raptor group and other relevant consultees will be contacted to request ornithological protected species records for the proposed site, particularly with regard to both breeding goshawk and black grouse.

Field Surveys

Initial desk study indicated that the development area was likely to support a typical range of species associated with grass dominated moorland but with the potential for presence of conservation notable species such as black grouse, protected raptors and wintering wildfowl.

A scheme of ornithological surveys based on SNH 2010²³ guidance has been undertaken at the proposed site (and appropriate buffer zones), between April 2011 and July 2012 inclusive and is scheduled to continue until the end of March 2013.

Table 5.1 Survey Programme

Surveys	Survey Activity
2011 Breeding Season	<ul style="list-style-type: none"> • Vantage point surveys – 39 hours per VP (three VPs) between 24 April and 09 August; • Brown & Shepherd Survey (extending to 500m from the core survey area where this fell within the wider survey area – three visits (April-June)); • Raptor walkover survey (of the entire wider survey area) – four visits (April-July); and • Black grouse lek survey (of the entire wider survey area) – four visits (April-July).
2012 Breeding Season	<ul style="list-style-type: none"> • A second full season of breeding bird surveys was not considered necessary, given that the only target species recorded as breeding on Site was black grouse, and this species was lekking outside of the proposed turbine array. No ground nesting raptors were recorded as breeding and the habitats are considered to be of poor quality for such use. Therefore, it was decided that a small number of 'updating' surveys were required, in order to confirm that target species activity remained broadly unchanged. • Breeding Season Vantage Point Surveys, 3 VPs: 6 hours in June and 6 hours in July; • Brown & Shepherd Survey (extending to 500m from the core survey area where this fell within the wider survey area) – two visits (June-July); • Black Grouse Surveys: two dawn visits to the two lek sites recorded in 2011 (June-July).

²⁰ Simpson, F. (eds.) 2008. Ayrshire Bird and Butterfly Report 2008. Scottish Ornithologists' Union, Aberlady.

²¹ Forrester R.W., Andrews, I.J., McInnery, C.J., Murray, R.D., McGown, R.Y., Zonfrillo, B., Betts, M.W., Jardine,

D.C. & Grundy, D.S. (eds.) 2007. The Birds of Scotland. Scottish Ornithologists' Union, Aberlady.

²² Baillie, S.R., Marchant, J.H., Leech, D.I., Joys, A.C., Noble, D.G., Barimore, C., Downie, I.S., Grantham, M.J., Risely, K. & Robinson, R.A. (2009) Breeding Birds in the Wider Countryside: their conservation status 2008. Research Report 516. BTO, Thetford.

²³ Scottish Natural Heritage (2010) Survey methods for use in the assessment of the impacts of onshore wind farms on bird communities.

Surveys	Survey Activity
2011/2012 Winter Season	<ul style="list-style-type: none"> • Vantage point surveys – 48 hours per VP (three VPs) between 18 August 2011 and 13 March 2012; • Winter walkover survey (extending to 1km from the core survey area where this fell within the wider survey area) – monthly visits, September-March; • Loch counts at Loch Muck and Loch Doon – monthly visits, September-March
2012/13 Winter Season	<ul style="list-style-type: none"> • Vantage point surveys – 42 hours per VP (three VPs) between September and March; • Winter walkover survey (extending to 1km from the core survey area where this fell within the wider survey area) – monthly visits, September-March; • Loch counts at Loch Muck and Loch Doon – monthly visits, September-March.

Field Survey Summary

Notable findings of the surveys to date can be summarised as follows:

- Two black grouse leks, a single displaying male at one and up to two displaying males at another were recorded. These leks are both located outside of the developable area for turbines. Black Grouse were only noted incidentally on three occasions during the 2011 breeding season. This species was only observed lekking and not in-flight while no other records occurred during the formal surveys;
- Infrequent activity of hen harrier throughout the year - all identified as males and concentrated during the winter. No evidence of roosting by this species was recorded;
- Occasional activity of goshawk between winter 2011-12 and breeding season 2012. Activity mainly over the plantation to the North although a single soaring flight was observed over the Site on 13 March 2012. A juvenile was also heard calling from a conifer plantation on Cullendoch Hill on 29 June 2012, <1km to the West of the Site. ;
- Occasional flights of other raptors and owls (including merlin, hobby, peregrine and white-tailed eagle);
- No regular wildfowl or wader flights or significant use of nearby waterbodies (Loch Doon or Loch Muck) in winter although occasional flights of pink-footed goose; and
- Regular crossbill activity in adjacent conifer plantations.

There are no potentially significant ornithological effects that have been identified at this stage in connection with the development. It is considered that the main potential impacts relate to construction and operational disturbance of black grouse and goshawk collision mortality. These two potential impacts will be considered in detail within the ornithology chapter of the ES, however they are not considered likely to be significant given the separation distances between leks and proposed turbines and given the level of recorded goshawk flight activity.

Additional Baseline Information and Collection Methods

An updated desk study will be produced, whilst consultation with SNH, RSPB and other relevant local groups, including the local raptor study group and the Forestry Commission, will be undertaken. Additional desk study data on conservation notable species in the wider area will be collected from such relevant local groups.

Surveys as detailed above will be undertaken over the course of the 2012/13 non-breeding season.

5.3 Assessment Methods/Approach

In general the main issues relating to birds and wind farms are considered to be:

- The effects of direct habitat loss due to land take by wind turbine bases, tracks and other infrastructure;
- The effects of indirect habitat loss resulting from the displacement of birds from the proximity of wind turbines. Such disturbance may occur as a consequence of construction work or due to the presence of the wind farm close to nesting or feeding sites or on regular flight paths;
- The effects of collisions with turbine blades, overhead wires and guy lines (i.e. killing or injury to birds) which is of particular relevance for sites regularly used by certain species of raptor and/or large concentrations of wildfowl.

The EIA will focus on assessing the potential impact of the development on any relevant designated sites and any bird species of nature conservation value on the site and surrounding area that have been identified as having the potential to be affected. This will include an assessment of collision risk²⁴ to birds of high nature conservation importance where appropriate and, where necessary, mitigation and enhancement measures will be explored. A cumulative impact assessment will also be undertaken, including other wind farms or other developments in the vicinity which have the potential to impact on ornithological receptor populations in accordance with SNH advice²⁵.

Consideration will be given to potential impacts during the phases of construction, operation and decommissioning.

²⁴ The predicted rate of bird collisions with wind turbines will be calculated using the model developed by W. Band (Band et al. 2007), as recommended by SNH (2010). Avoidance rates will be obtained from SNH guidance note 2010.

²⁵ Scottish Natural heritage (2012). Assessing the cumulative impacts of onshore wind energy developments.

6. Geology, Hydrogeology and Hydrology

6.1 Introduction

Impacts on hydrology and hydrogeology can occur during wind farm construction, operation and decommissioning. Due to the number of turbines proposed and the proximity of the wind farm infrastructure to the water receptors, it is considered that effects on the water environment from the development would be likely without suitable mitigation.

Applicable policy, guidance and strategies set out in **Chapter 3** will be taken into account in the EIA assessment of geology, hydrology and hydrogeology. The Geology, Hydrology and Hydrogeology chapter of the ES will assess the baseline water environment within the proposed site, and will then assess the impact on identified features, including tributaries to the Water of Deugh, from the various different stages of the development.

A preliminary assessment of the proposed site from OS mapping indicates that the main potential receptors of development construction activity impacts are all of the on-site watercourses that drain into the Water of Deugh to the east and Loch Much and Loch Doon to the west.

Private water supplies are also potential receptors that must be addressed during the assessment. The presence, or otherwise, of wells at the properties at Waterhead, Darnsaw, Eriff, Meadowhead, Lamford, Drumjohn and Brockloch Cottage should be investigated within the EIA, and consultation will be undertaken with SEPA and local authorities to identify private water supplies.

There is presence of peat in the northern section of the proposed site. In terms of assessing impact from wind farm activities on peat, if the NVC survey indicates the presence of species that have some groundwater dependency, then there will be a requirement to assess groundwater dependant terrestrial ecosystems (GWDTEs) as potential receptors.

6.2 Proposed Scope of the Assessment

The scope of assessment will involve collating of data to determine the sensitivity of the surface water and groundwater environment. Geological data will also be used to inform this process. The potential significant impacts on the identified hydrological and hydrogeological receptors from the development will be considered and assessed. Impacts on the underlying geology is not considered to be a key issue but will be covered and further informed by future site investigation work prior to construction that will review the geotechnical issues.

The main potential hydrological/hydrogeological impacts associated with the development relate to its construction phase. These include potential impacts from tracks and watercourse crossings. The assessment will identify the location and the nature of the impact from these construction activities, in particular the potential for the generation of silt-laden runoff. It will then prescribe measures to be adopted during construction to mitigate against such potential negative impacts on the water environment.

Other activities include the construction of wind turbine foundations and crane pads, the control building and potential substation. The impacts from these activities, such as the leaching of

concrete residues to the water environment and changes in the runoff/recharge characteristics, will be addressed in the assessment. Again, mitigation measures will be outlined that would reduce negative impacts from these activities.

The possibility for borrow pits will be explored in the EIA. Should the proposed site be suitable for borrow pits, the impacts these would have on the water environment will also be addressed. Appropriate mitigation measures would need to be prescribed to reduce any negative impacts on the water environment from borrow pits. Alternatively, stone/aggregate could be imported from a suitable off-site location.

Once the development is operational, impacts on hydrology/hydrogeology would be minimal and addressed through appropriate site design. Occasional maintenance works may be undertaken at the proposed site, and a potential impact from this could be from chemical spillages during maintenance operations or from on-site storage. However, similar potential impacts would already have been assessed and mitigated during the construction phase and it is therefore proposed that consideration of operational effects is scoped out of the EIA.

Potential residual impacts during decommissioning are likely to be similar to those during the construction phase, but would depend on the exact nature of the decommissioning activities that take place. However, it is likely that the ground disturbance would be less. The most likely impacts would be from spillages and leaks associated with plant and machinery. Mitigation similar to that implemented during the construction and operation phases (updated to reflect changes in legislation/guidance) would help ensure that the significance of such impacts is minimised.

6.3 Assessment Methodology/Approach

The geology, hydrology, hydrogeology of the proposed site will be assessed through a desk-based study to understand the baseline environment in relation to geology, hydrology and hydrogeology and to subsequently determine, in detail, the presence of sensitive receptors. Consultations with SEPA, council and the water supply undertaker will be carried out to obtain more local detailed information of the area. The data collation exercise will be supplemented by a site visit to develop a conceptual understanding of the site.

The assessment will be based on the design of mitigation measures, which will be fed into the method statement for the development covering: the control of drainage runoff from excavations and access tracks; watercourse crossings; and, the control of concrete pouring. Drainage control will involve treatment and discharge into surrounding vegetation so that no increase in runoff into the watercourse would be experienced. These measures will reflect current best practice in the industry and will serve to prevent increase in flood risk. Standard construction practices adopted on wind farm developments would be assessed, and modified where necessary, to ensure that predicted impacts and effects could be controlled. Guidance on the protection of the water environment will also be used to assist with the development of mitigation. Such guidance will be based on SEPA and CIRIA guidance. It is anticipated that no residual significant effects will remain following adoption of the proposed mitigation, but this will be explored within the ES.

7. Cultural Heritage

7.1 Introduction

Cultural heritage is represented by features, or assets, resulting from past use of the landscape, including buildings, archaeological remains and artefact scatters. Some heritage assets have been designated as Scheduled Monuments²⁶, Listed Buildings or Conservation Areas²⁷, Historic Gardens and Designed Landscapes and Historic Battlefields²⁸. These and non-designated assets are managed in the planning process in accordance with national and local planning policy and guidance set out in **Chapter 3**²⁹ and the development plan. Baseline data was obtained from the PastMap³⁰ online spatial database for the proposed site and immediate vicinity and from HLAMap³¹ and Historic Scotland spatial datasets of designated heritage assets for a study area up to 10km from the proposed Site.

7.2 Proposed Scope of Assessment

7.2.1 Baseline Overview

The proposed site is located within an area of upland moor enclosed by areas of commercial forestry plantation. The historic landscape character of the area around Benbrack has been subject to extensive and far-reaching change in the 20th century including the construction of the reservoirs at Loch Doon in the 1930s and establishment of Carsphairn Forest and related forestry plantation during the 1970s. It is noted that some areas of moorland and grazing, such as the proposed site, survive. The scheduled cairn at Lamford Burn is the only designated heritage asset within the Site boundary, but Pastmap records several non-designated heritage assets within the proposed Site boundary, primarily post-medieval agricultural features. Other than the cairn at Lamford Burn, the only recorded prehistoric feature is a cup and ring-marked rock.

There are seven further scheduled monuments within 5km of the proposed site boundary. There are seven listed building entries within 5km of the proposed site, including the Category A listed Craigengillan and Stables, within the Craigengillan designated garden and designed landscape. Designated heritage assets within 10km of the proposed Site primarily comprise further listed buildings within the Craigengillan designed landscape and the Dalmellington conservation area. Scheduled monuments between 5km and 10km from the proposed site include a variety of asset types, none of which would normally be considered to have spatially extensive settings.

There are no world heritage sites or historic battlefields within 10km of the proposed site.

²⁶ Ancient Monuments and Archaeological Areas Act 1979

²⁷ Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997

²⁸ Historic Environment (Amendment) Act (Scotland) 2011

²⁹ SPP draws on the Scottish Historic Environment Policy (SHEP) and is amplified in respect of archaeology in the planning process by Planning Advice Note (PAN) 2/2011

³⁰ <http://www.rcahms.gov.uk/pastmap.html>

³¹ <http://hla.rcahms.gov.uk/>

7.2.2 Direct Effects

Direct effects primarily occur during the construction phase and are permanent and irreversible, but are restricted to the footprint of the development.

Direct effects will arise only from physical disturbance caused by the construction of the development. Therefore effects on known heritage assets will be considered only where these are located within the footprint of the development. Direct effects on heritage assets outside the footprint of the development will not be considered and are scoped out.

Archaeological features, primarily related to agricultural use in the post-medieval and modern period, are present within the proposed site boundary, particularly at Peat Hill; some are known only from historic mapping, and may no longer be present in a recognisable form.

There is a potential for previously unrecorded heritage assets to be directly affected by the proposed development. Such effects will be considered with reference to a characterisation of the potential presence of such heritage assets developed from historic landscape context, and by reference to appropriate cartographic and documentary sources. Measures to avoid known assets, including any identified during the assessment, and to identify and record any assets where disturbance cannot be avoided, will be set out to ensure that adverse direct effects can be effectively mitigated.

Information on known non- designated heritage assets within a study area extending up to 500m from the proposed site will be used to identify the archaeological potential of the proposed Site, although relevant contextual information will be taken into account. All work will be completed in accordance with existing best practice. The following sources of information will be consulted during the assessment:

- Sites and monuments records and other relevant sources held by the West of Scotland Archaeology Service Sites and Monuments Record (WoSAS SMR) and the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS);
- Historic Landuse Assessment (HLA) data;
- Relevant cartographic and documentary sources held by the National Archives of Scotland and National Library of Scotland where this is available for study;
- Relevant published sources and internet sources; and
- Aerial photography held at the RCAHMS.

A site walkover will also be undertaken, with the aim of identifying any visible heritage assets within the proposed site, checking available records and noting general ground conditions. Ongoing consultation will also be undertaken with Historic Scotland and the local planning authority as appropriate.

7.2.3 Indirect Effects

Indirect effects arise where the construction of the development harms heritage assets without causing direct disturbance and primarily arise from change to the setting of heritage assets. These effects principally relate to the operational phase of the development and in this case can be considered entirely reversible on the decommissioning of the development.

All designated heritage assets within 5km of the Site have initially been considered for inclusion within the scope of the assessment. Designated heritage assets located over 5km from the proposed site are less likely to be indirectly affected, and only those which are particularly sensitive or important have been considered. Significant effects in these cases may occur where the proposed turbines intervene in specific views that make a substantial contribution to the significance of an asset, and it is only elements of the designated garden and designed landscape at Craigeingillan that have been identified in this case. In addition, no non-designated heritage assets which have the potential to be affected to the degree that a discernible indirect effect might arise have been identified. Summary rationales for the inclusion or exclusion of designated assets from the scope are provided in **Table 7.1**.

Table 7.1 Summary rationale for inclusion of assets within the scope of assessment

Asset	Name	Included within assessment	Rationale
SM 1034	Lamford Burn, cairn 800m NE of Lamford Bridge	Yes	Proximity of asset to proposed development.
SM 1046	The King's Cairn, chambered cairn and cairn to W of Water of Deugh	Yes	Proximity to proposed development though asset is within forestry plantation.
GDL	Craigeingillan	Yes	Assets may be located to take advantage of specific views created by the parkland scheme and/or important views of assets have been fortuitously created. Views from the GDL are variably filtered by planting within the parkland and intervening landform, but turbines may appear in key views.
LBA 18794	Craigeingillan, Stable Block	Yes	Asset has theoretical visibility of turbines, but this is likely to be substantially filtered, if not entirely screened, by policy woodland.
LB A 18793	Craigeingillan	Yes	Asset has theoretical visibility of turbines, but this is likely to be substantially filtered, if not entirely screened, by policy woodland
LB C(S) 1089	Craigeingillan, River Doon, Stone Bridge	No	Asset is outwith ZTV of proposed development.
	Other listed buildings and scheduled monument within the Craigeingillan designed landscape	No	Effects on settings of all designated assets within the Craigeingillan GDL, including those over 5km from the Site and/or outwith the ZTV of the proposed development will be considered in terms of their contribution to the GDL as a whole rather than as individual assets.
Assets at Loch Doon			
LB A 18795	Loch Doon Castle		
SM 90203	Loch Doon Castle		
SM 8619	Loch Doon Castle, original site & remains of, 570m NE of Craigmalloch	Yes	Views of or from the assets along Loch Doon towards the proposed development may contribute to the setting of these assets. Turbines may appear in key views of or from the assets, although these views are substantially filtered by the intervening landform.
SM8616	Donald's Isle, Loch Doon, settlement		

Asset	Name	Included within assessment	Rationale
LB C(S) 51711	750m SSW of Lamdoughty Farm Galloway Hydro Electric Power Scheme, Loch Doon Dam	No	Asset is outwith ZTV of proposed development.
Assets at Holm of Daltaillochan			
LB B 3681	Holm of Daltaillochan	No	Setting of assets is defined by immediate surroundings and long views are precluded by shelter planting.
SM 1106	Holm of Daltaillochan, cross slab		
SM 1029	Holm of Daltaillochan, stone circle & standing stone	Yes	Turbines may intrude on longer views which contribute to the understanding of the asset.
Assets at Carsphairn			
LB C(S) 3677	Carsphairn Parish Church	No	Setting of assets is defined by immediate surroundings and relationship between church, churchyard and village.
LB B 3678	Carsphairn Parish Churchyard and Mcadam Mausoleum		
SM 5184	Woodhead lead mines and smelter, Carsphairn	No	Asset is almost entirely outwith the ZTV of proposed development. The small area of asset which is within the ZTV is heavily screened by forestry plantation.

The assessment will include consideration of the cumulative indirect effects of the development with other wind farms which have been built, consented or are the subject of a current planning application, where it is considered that these are sufficiently prominent in the views of or from these heritage assets that they may give rise to cumulative effects. An initial list of cumulative wind farm developments has been included in the LVIA (**Chapter 8**).

7.2.4 Assessment Methodology/Approach

The EIA would include a description of the research undertaken and results obtained, as well as an assessment of the nature and significance of the likely effects of the development. Consideration would be given to any necessary mitigation, following consultation with the developer and consultees. All work will be completed in accordance with the Institute for Archaeologists Code of Conduct and Standard and Guidance for Archaeological Desk-Based Assessments.

8. Landscape and Visual

8.1 Introduction

The Landscape and Visual Impact Assessment (LVIA) section of the EIA will be undertaken with reference to a number of best practice documents. The objective of the LVIA will be to assess the effects of the development on the following range of landscape and visual receptors.

- Landscape Effects: Assessment of the effects on areas of landscape character including key characteristics, elements, landscape qualities and the effects on designated landscapes.
- Visual Effects: Assessment of the effects on the views and visual amenity experienced by residents, tourists / visitors, recreational users, and road user receptors.

The study area for the project will be based on a 35km radius circle from the outermost turbines once the project design work on final proposed turbine locations has been completed. This study area is based on guidance from SNH in relation to turbine size. **Figure 4** illustrates the proposed site location and study area, including a provisional Zone of Theoretical Visibility (ZTV) and suggested viewpoint locations.

8.2 Proposed Scope of Assessment

8.2.1 Baseline Overview

The LVIA chapter will include two related assessments which will look at the effects on the landscape as a whole, as well as those of potential visual receptors located in the vicinity of the site. An inventory of the baseline landscape and visual receptors to be included in the LVIA and the cumulative assessment will be developed as part of the assessment process. An outline of this is provided as follows.

- Baseline Conditions: Landscape Receptors
 - Landscape Character as defined by the Ayrshire Landscape Character Assessment (SNH Review No.111) and Dumfries & Galloway Landscape Character Assessment (SNH Review No.94) Reports plus the SNH designated Area of Search for Wild Land at the Merrick Uplands.
 - The Southern Upland LCA (the 'host' landscape) including the key component landscape characteristics, qualities and elements.
 - Local Landscape Character at the Benbrack site and in the surrounding local areas including the key component landscape characteristics, qualities and elements within 15km.
 - Designated Landscapes within the study area (35km) including the Terregles Ridge, Thornhill Uplands and Galloway Hills Regional Scenic Areas (RSAs), the South Ayrshire Scenic Area and a number of Historic Gardens & Designed

Landscapes (the closest of which includes those at Craigen Gillan Estate and Dumfries House).

- Baseline Conditions: Visual Receptors
 - Residential Receptors: within 2km and settlements within 10km and within the ZTV.
 - Road Users: on main transport routes including the A713, A76 and A77 within 35km as well as selected B and minor roads within 10km.
 - Recreational Routes: including local routes, (core paths and promoted local footpaths, cycle ways, riding routes within 5km) and national routes (footpaths, cycleways and riding routes within the wider 35km study area).
 - Outdoor Recreational Destinations: including mapped or promoted features of local landscape interest such as hill summits and organised recreational areas including parks / public open space and golf courses within 10km.
 - Outdoor Tourist Destinations within the study area (35km): including mapped or promoted destinations of local landscape interest including the Galloway and Southern Ayrshire Biosphere Reserve designated by UNESCO, the Galloway Forest Park, (awarded Dark Sky Park status by the international Dark Sky Association), Gardens and Designed Landscapes open to the public such as those at Dumfries House, and the Open Championship Course at Turnberry.

Consultees are encouraged to suggest other landscape or visual receptors that should be considered in the assessment.

8.2.2 ZTV and Viewpoint Analysis

A preliminary ZTV, illustrated in **Figure 4** has been produced based on a suggested initial layout and calculated to blade tip (up to 150m) and accounts for 16.84% of the total study area. It should be noted that the ZTV does not take into account the effect of screening provided by areas of woodland / plantation within the study zone which will be considered as part of the visual assessment. The proposed viewpoints are set out in the **Table 8.1** below:

Table 8.1 Suggested Viewpoints

Viewpoint	Receptor Type and Comment	Distance (km)*
1) Dumfries and Galloway Core Path 448	Recreational route	0.7
2) A713 Southern approach to site	A Road near to the proposed development running between Dumfries and Prestwick	1
3) A713 north west approach to site	A Road near to the proposed development running between Dumfries and Prestwick	1
4) Western shore of Loch Doon	Recreational route	4.3
5) Cairnsmore High Point (197m)	High Point, potential recreation destination	5.1
6) Craigenhillan Estate	Registered designed landscape	5.7
7) Loch Doon Castle	Registered historic monument	5.8
8) A713 Carsphairn	A Road near to the proposed development running between Dumfries and Prestwick	6.8
9) A713 NW of Dalmellington	A Road near to the proposed development running between Dumfries and Prestwick	7.9
10) A713 south west of Patna	A Road near to the proposed development running between Dumfries and Prestwick	11
11) Blackcraig Hill High Point (700m) south of New Cumnock	High point close to East Ayrshire Core Path 10; Coalfield Cycle Route	11.4
12) Southern Upland Way north of St Johns Town of Dairy	Regional recreational route	12.4
13) A713 Patna	A Road near to the proposed development running between Dumfries and Prestwick	14.1
14) Tariessock High Point (768m)	High Point, potential recreation destination	14.7
15) Meikle Milliye High Point (746m)	High Point, potential recreation destination	16.4
16) South Ayrshire Core Path SA1 south of South Balloch	Recreational route	19
17) A702 St John's Town of Dairy	A Road near to the proposed development running between Dumfries and Prestwick	20.3
18) A77 Maybole	A road running from Maybole to Prestwick	24.2

*Distances shown represent the approximate distance from the viewpoint to the nearest visible turbine.

The total number of viewpoints proposed in the LVIA will be approximately 18. Illustrative material to support the visual assessment will include ZTV maps, photographs, wireframes, and photomontages. These will be produced in accordance with the guidance contained in SNH's *Visual Representation of Windfarms: Good Practice Guidance* (2006).

Where there is a strong case to do so, consultees are encouraged to suggest alternative viewpoint assessment locations that should be considered in the assessment.

8.2.3 Landscape Effects

Landscape effects are defined by the Landscape Institute as “Change in the elements, characteristics, character, and qualities of the landscape as a result of development. These effects can be positive or negative.” Development may have a direct (physical) effect on the landscape as well as an indirect effect perceived from outside the ‘host’ landscape character or character unit (type or area) within which it is located. The potential landscape effects occurring during the construction, decommissioning, and operation phases, may therefore include, but are not restricted to, the following.

- Changes to landscape elements: the addition of new elements or the removal of trees, vegetation, and buildings and other characteristic elements of the landscape character;
- Changes to landscape qualities and characteristics: change to the condition of the landscape and / or the landscapes qualities and characteristics (including elements, patterns, and perceptual characteristics) particularly those which are considered as ‘key’ or defining characteristics.
- Changes to landscape character: the magnitude of change is sufficient to alter a notable part of the overall landscape character of a particular area.
- Cumulative landscape effects: where cumulative development change, in this case more than one wind farm, may lead to a potential landscape effect.

It is considered that the development is likely to have an effect on a part of the undesignated Southern Uplands LCA and associated local landscape subdivisions, and potentially an indirect effect (concerning landscape qualities related to perceptual or visual characteristics) on undesignated landscape character within the wider Dumfries & Galloway area.

8.2.4 Visual Effects

Visual effects are concerned wholly with the effect of development on views, and the general visual amenity. The visual effects are identified for different receptors (people) who would experience the view at their places of residence, during recreational activities, at work, or when travelling through the area.

The potential visual effects, occurring during the construction, decommissioning, and operation phases, may therefore include, but are not restricted to, the following:

- Visual effect: a change to an existing view, views or wider visual amenity as a result of development; and

- Cumulative visual effects: the cumulative visibility of development change and in particular the cumulative visibility of more than one wind farm, which may combine to have a cumulative visual effect.

8.2.5 Cumulative Effects

A 70km search area for other wind energy development will be identified in the Cumulative LVIA (CLVIA). This will include existing and approved wind farms and those currently at planning application stage at a cut of date that will be identified in the environmental statement (usually at the point of layout design freeze when the assessment begins in earnest).

Cumulative viewpoints showing 360° wireframes and cumulative ZTV's will be included in the CLVIA in order to identify areas of simultaneous, successive and sequential visibility.

Information on turbines between 25-50m in height and within 10km of the Benbrack Wind Farm proposal will also be identified to establish the condition of the base line landscape. It is anticipated that the height of most of these would be within or below tree height and are likely to be excluded from the CLVIA for this reason. Any micro generation schemes smaller than 25m will not be considered. Sites which may be at the scoping stages will be mapped within the search area, but are likely to be excluded from further assessment in accordance with national guidance and on the basis that sufficient detail is seldom available (on location and size of turbines) to allow assessment.

A provisional list of key wind farms (operational, consented or planning application status) to be included in the CLVIA is set out in **Table 8.2** below. This list has been included as a starting point for consultation. It should be noted that the Lorg and Enoch Hill proposals will also be included within the CLVIA.

Table 8.2 Provisional List of Wind farms to be included in the CLVIA

Existing / Consented wind energy development	Wind Energy subject to Planning Applications
Mark Hill	Kype Muir
Hadyard Hill Wind Farm	Ashmark Hill Windfarm
Windy Standard	Hare Hill Extension
Wether Hill	Afton
Whiteside Hill	Margree
Hare Hill	Ulzieside
Bankend Rig	Dersalloch Windfarm
Dongavel Wind Farm	Knowside
Windy Standard Extension	Tralorg Windfarm
Torrs Hill	Assel Valley Windfarm
Blackcraig	Galawhistle Wind Farm
	Sanquhar
	Loch Hill
	Knockman Hill

It is anticipated that EC&R proposed schemes at Lorg and Enoch Hill, which are at a similar stage of progress as the development, will also be included within the CLVIA. Additional schemes currently at scoping and which are likely to form part of the CLVIA include Loch Urr, Quantans Hill, and South Kyle. *Consultees are requested to provide further information on any other wind farm development they are aware of that may need to be included in the assessment.*

8.2.6 Assessment Methodology / Approach

With regard to the detailed design of the turbine layout and ancillary elements of the proposal and the development of mitigation proposals, it is intended to adopt a design led approach through collaboration between the landscape consultant, the project engineers and the developer/landowner. Key design principles with regard to turbine layouts will be used to review and guide the layout design process through a number of layout iterations. Environmental and technical constraints will be mapped, and along with aesthetic considerations, these will be used as a template against which layout options will be reviewed to achieve an appropriate 'landscape and visual fit'. Design issues that will be considered will include the selection criteria for the turbines including their height. As part of this process it is envisaged wireframes will be produced from some or all of the visualisation viewpoints. These will allow recommendations for the micro-siting of the turbines to minimise the incidences of potentially adverse design features such as the clustering of turbines; the presence of isolated 'outlier' turbines; the formation of an unbalanced turbine array or excessive amounts of blade overlapping. As the LVIA proceeds, mitigation proposals will also be developed with regard to variables such as the colour of the turbines, location and detail design of ancillary elements such as the control building and access routes and any potential for screen planting close to individual sensitive visual receptors.

The LVIA will clearly set out its methodology in its early sections utilising tables wherever possible to maximise its transparency and replicability. Following on from the methodology section, the LVIA will present the baseline conditions in a comprehensive but succinct manner using a number of sub-headings to provide an overall analysis of the prevailing landscape and visual conditions within the 35km radius study area, again concentrating upon the detailed study area³². It will review relevant landscape commentaries, in particular the relevant sections in the landscape character assessments produced by Dumfries and Galloway Council. It will also review the relevant policies in the relevant development plans. The baseline will be supported by a number of figures on OS plans and annotated photographs of the application site and its landscape setting.

As recommended by the GLVIA, the LVIA will consider the potential landscape and visual effects of the development in separate sections.

³² It should be noted that these radii would be from the nearest proposed turbine as opposed to from the site centre.

9. Noise

9.1 Introduction

Noise from turbine development can take place during construction, operation and decommissioning. Due to the number of turbines proposed, the proximity of sensitive receptors to the site and the existence of other wind farm sites in the local area, it is considered likely that some properties may experience noise from the proposed wind farm development. Applicable policies, guidance and strategies set out in **Chapter 3** will be taken into account in the EIA assessment of noise.

9.2 Proposed Scope of the Assessment

The main objective of the noise assessment is to compare current noise levels in the site area to those that would pertain should the development proceed and to determine acceptability for relevant receptors. In this case relevant receptors are considered to be restricted to those living in residential property close to elements of the development.

The ES Chapter will present a review of relevant policy and how it guides the assessment, the results of noise measurements, and finally the assessment of the noise predictions against the noise limits. It is pertinent to note that noise impacts could arise from the two main phases of the development: during construction; and the operation and these will be assessed in the ES. In terms of noise impacts during decommissioning, the effects on any sensitive receptors are likely to be similar in nature but of lower magnitude than those during the construction phase. As a result, it is not proposed to assess the decommissioning phase of the development in addition to that of the construction phase. Therefore the decommissioning element has been scoped out. Furthermore, it is also proposed that traffic noise during the operation of the development is scoped out as the amount of traffic associated with development operation would be minimal.

Cumulative noise effects from other wind farms in the area may impact on sensitive receptors within the study area when assessed in combination with the development. A cumulative noise assessment will therefore also be included within the EIA. This assessment will identify other wind turbine development (operational, consented or subject to application) in the area that may impact on sensitive receptors together with the Benbrack Wind farm site. A cut off date for the assessment will be identified in the ES and a list of wind turbine developments identified for the cumulative assessment.

9.3 Assessment Methodology/Approach

In order to undertake construction noise calculations, details of the construction programme, phasing of the works and types and numbers of plant are required. Such data would only become available once the contract(s) to construct the proposed development have been finalised. Notwithstanding the above, a worst-case scenario for construction noise assessment, based upon experience of similar projects, will be presented in the ES.

Depending upon the outcome of the Traffic and Transport Assessment (see **Chapter 10**), the impact of traffic along the site access route and the interim access track will be assessed on the

basis of either the methodology within BS5228:2009 or the Department of Transport publication *Calculation of Road Traffic Noise* (1988), where appropriate.

In most cases, construction noise (including construction traffic) is controlled through the implementation of mitigation measures (such as limiting hours during which construction can be undertaken) and undertaking construction works in accordance with good practices as described in BS5228 (such as using well maintained and serviced plant, and the appointment of a Site contact to whom complaints/queries can be directed).

In terms of operational noise, a full ETSU-R-97 assessment is to identify suitable noise limits for the proposed development. In order to achieve this, an understanding of the change in background noise levels with wind speed at receptors is required. This is achieved by monitoring background noise levels at sensitive receptors, and simultaneously measuring the variation in wind speed and direction at the wind farm site, using either a >50m met mast with anemometers at dual heights, or by a LiDAR or SoDAR system. Noise and wind speed measurements are taken as a series of simultaneous ten-minute averaged measurements, over a period of at least two weeks. From these data, regression analysis is performed to determine typical background noise levels for each receptor across a range of wind speeds (1m/s-12m/s).

Noise limits are defined separately for day time and night time. During quiet day time periods (18:00 - 23:00 weekdays, 13:00 - 23:00 Saturdays and 07:00 - 23:00 Sundays), noise limits are as follows:

- 5dB above the background noise curve for wind speeds up to 12m/s;
- where background noise levels are below 30-35dB LA90,10min, the lower limit should be fixed at 35-40dB; and
- For properties with a financial interest in the scheme, the lower limit is fixed at 45dB.

For night-time periods (23:00 - 07:00 every day), noise limits are as follows:

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

A study area will be identified to carry out the noise monitoring survey work to inform a baseline for the noise assessment. This will identify all those properties located within a 35dB Modelling contour. Initial investigations have identified four representative properties from where noise monitoring is proposed (subject to landowner agreement where this is private property). These properties are considered to be the closest properties to the proposed site and give a good reflection the local area and therefore the back ground noise levels for the local area. The properties are located at:

- Lamford - presumed to be representative of Meadowhead as well, both of which are properties within the site boundary and owned by the site landowner;
- Eriff – west of site near Polnaskie Bridge;

- Waterhead – east of the site (presumed representative of Darnscaaw); and
- Glenmuck – north west of the site.

Figure 3 sets out the location of the noise monitoring locations. Measurement at the chosen monitoring locations will depend upon arranging access to the properties. We request that these locations are considered by the Dumfries and Galloway Council, Environmental Health Officer and, if necessary, we would welcome the suggestion of alternatives where appropriate.

The Institute of Acoustics (IoA) bulletin article (Acoustics Bulletin, volume 34, number 2, March/April 2009) suggests two methods by which to address wind shear within the full assessment, by effectively correlating the measured background noise levels with hub height wind speeds. This means that the noise limits are derived with reference to the wind speeds which determine the noise emissions of the turbines. It is also proposed to adopt the recommendations of the article in respect of wind shear within the assessment.

The noise chapter of the ES will assess the impact of the operation of the development on the four properties at various different stages of the development on the existing baseline noise levels in the study area and take into account shear and issues regarding low frequency noise, tonality and Amplitude modulation. It is intended to carry out noise predictions in accordance with the modelling parameters specified in the article ‘Acoustics Bulletin, volume 34, number 2, March/April 2009’.

A cumulative noise assessment will be included within the EIA. This assessment will identify other wind turbine development (operational, consented or subject to an application) in the area that may impact on sensitive receptors together with the development. A cut off date for the assessment will be identified in the ES and a list of wind turbine developments identified for the cumulative assessment.



10. Traffic and Transport

10.1 Introduction

Applicable policies, guidance and strategies outlined in **Chapter 3** will be taken into account in the EIA assessment of traffic and transportation.

The Traffic and Transport chapter of the ES will assess the impact of the various different stages of the development on the existing road network in the area. The baseline study area for the EIA will include all transport routes associated with the proposed development and will consider the impact of, construction works, site operations and decommissioning of the wind farm on the transport routes.

10.2 Baseline Overview

An initial desk top study into access to the site has been done as part of the feasibility study, which concluded that the most feasible route from the Port of Ayr to the site boundary access point would be via the A77 and A713. The study identified a number of pinch points where localised widening and / or removal of street furniture would be required. This information will be examined to check it is still valid and updated as necessary.

10.3 Proposed Scope of the Assessment

The main transportation impacts will be associated with the movements of commercial heavy goods vehicles (HGVs) travelling to and from the site during the construction phase of the development and this will be considered in the ES.

Once the development is operational, it is envisaged that the amount of traffic associated with the scheme would be minimal. Occasional visits may be made to the site for maintenance checks. The vehicles used for these visits are likely to be a Land Rover or similar and there may be an occasional need for an HGV to access the site for maintenance and repairs. It is considered that the effects of operational traffic would be negligible and therefore no detailed assessment of the operational phase of the development is proposed in the EIA.

The traffic baseline may be different to the current baseline traffic conditions when decommissioning is undertaken after the 25 year operational phase. However the effects on the road network are likely to be similar in nature though of lower magnitude than that relating to the construction phase as less vehicle movements would be required. As a result, it is not proposed to assess the decommissioning phase of the development in relation to traffic and transport in addition to that of the construction phase of the development.

10.4 Assessment Methodology/Approach

The main transportation impacts associated with a wind farm relate to the construction phase of the development. This would include the movement of HGV traffic travelling to and from a site bringing in material for the construction of the access, tracks, foundations, crane hard standing etc. The assessment will identify the number of HGV movements required for the development.

It will identify the most appropriate route to the site and give an explanation as to why the route has been chosen, together with the provision of a swept path analysis.

Other construction impacts relate to the delivery of the turbine components. These components, by their nature are large and require abnormal load delivery. The assessment will identify the number of abnormal loads required for the development. It will identify the most appropriate route from the Port of Ayr to the site and give an explanation as to why the route has been chosen, together with the provision of any updated swept path analysis if necessary and the identification of any enabling works required.

The potential for borrow pits will be explored in the EIA. Should the proposed site be suitable for borrow pits, the impacts on the road network would be significantly reduced. Alternatively, stone/aggregate could be imported from a suitable off-site location (which will be identified during the EIA process if borrow-pits cannot be established). To cover both eventualities if the final option is not confirmed at the time of the planning application, the assessment will be carried out for two scenarios, i.e. with and without borrow pits.

Once suitable routes have been identified, the assessment will include the identification of the baseline data through relevant survey information for all the roads associated with the different elements of the development. The assessment will identify the:

- Existing traffic flows;
- Potential impacts (of changes in traffic flows) on local roads;
- Potential impacts (of changes in traffic flows) on users of those roads; and
- Potential impacts (of changes in traffic flows) on land uses and environmental resources and sensitive receptors fronting those roads, including the relevant occupiers and users.

The assessment will consider the following environmental effects that may be caused by changes in traffic flows as a result of the development.

- Severance;
- Driver delay;
- Pedestrian delay;
- Pedestrian amenity;
- Fear and intimidation; and
- Accidents and safety.

An increase of 30% or more in total movements of HGVs, or a 10% increase where sensitive locations are present such as schools and hospitals would be considered to be potentially significant:

11. Shadow Flicker

Under certain combinations of geographical position and time of day, the sun may pass behind the rotors of a wind turbine and cast a shadow over neighbouring properties. When the blades rotate, the shadow flicks on and off; this effect is known as ‘shadow flicker’. It only occurs inside buildings where the flicker appears through a narrow window opening. Only properties located within a 130 degree segment either side of due north, relative to the turbines, are affected at UK latitudes. Flicker effects have been proven to occur only within ten rotor diameters of a turbine as outlined in Specific Advice Sheet Onshore Wind Turbines (updated August 2012).

All properties located within a 130 degree segment either side of due north, relative to the turbines and within ten rotor diameters of a turbine (as per the guidance) will be assessed for shadow flicker. Properties outwith this area will not be affected by shadow flicker. There are four properties that could potentially be affected by shadow flicker depending on the final development layout, namely Darnscaw, Lamford, Meadowhead and Eriff.

Where properties meet both of the criteria for there to be a potential shadow flicker effect, the seasonal duration of this effect will be calculated from the geometry of the turbine and the latitude of the Site, to assess potential impacts upon the amenity of local residents. Mitigation measures will be proposed in the ES should they be necessary.



12. Socio-Economics

12.1 Introduction

SPP in regards to wind farm development sets out a number of assessment criteria. These include consideration of effects on the local and national economy and tourism and recreation interests, in addition to benefits and disbenefits for communities. Relevant development plan policies outlined in **Chapter 3** will be taken into account.

12.2 Scope of Assessment

In order to assess the potential socio-economic effects of development, it is necessary to gain a view as to the current position of the local economy. The character of the local economy will therefore be examined as part of the EIA to provide an overview of potential linkages with the development. Tourist and recreational attractions along with any core paths or Public Rights of Way (PRoW) within or surrounding the proposed site identified within the LVIA will form part of the assessment. Ways in which benefits such as improved public and recreational access to the proposed site will be examined.

12.3 Proposed Scope of the Assessment

The assessment will examine the level of construction activity and job creation and the potential linkages with the wider local economy. This will include an assessment of potential multiplier effects within the local economy and the degree to which local businesses could benefit from involvement with the proposal's development, use and eventual decommissioning. Potential community effects will also be examined and, whilst it is considered unlikely to be significant, the assessment will also qualitatively consider the potential for the development to have an effect on other existing business activity.

Direct effects on existing public access will be considered within the assessment, however effects on the amenity of those using access routes will be considered within the LVIA. Public Safety will be considered with respect to potential accidents or injuries from a wind turbine, through proximity to the proposed installation.

12.4 Assessment Methodology/Approach

There is no standard approach to this element within an EIA, however the general approach will be to outline the areas of the development where there will be the potential for some economic/social effect within the wider area (including tourism, etc.). This will be undertaken with a view to examining the significance of these effects. Where possible (i.e. with quantifiable effects), the significance will be assessed by way of comparison of the factor (e.g. construction jobs) with the variance of related factors within the local economy. Where effects cannot be quantified, the assessment of significance will be undertaken using professional judgement and experience.



13. Other Issues

13.1 Air Quality and Climate

The only potential adverse effects on air quality that may arise from the development are from dust generated by construction activities including construction vehicle movements, excavation and road construction. Any potential effects can be controlled by standard construction practices which are assumed to be imposed as a planning condition.

It is therefore proposed that any further assessment of air quality effects is to be scoped out.

The proposed site incorporates areas of peat bog and in line with the Scottish Government's requirements an assessment of the proposed development's carbon balance will be completed. This will be undertaken using the Scottish Government's published methodology known as Nayak Analysis (Nayak et. al. 2008). An overview of the carbon balance assessment will be incorporated within the introductory chapters of the ES.

13.2 Infrastructure, Telecommunications, Utilities and Air Safeguarding Issues

The Scottish Government Specific Advice Sheet Onshore Wind Turbines (August 2012) identifies that wind turbines might impact on infrastructure, telecommunications, utilities and air safeguarding issues. Effects may, for example include disruption of microwave rebroadcast links or local radio communication systems. The quality of television reception may be affected, though to a lesser extent than prior to the switchover to digital transmissions, and viewers may suffer loss of picture quality and acoustic interference. Turbines can also potentially appear as returns on radar systems and interfere with communication networks.

Whilst it is not strictly an EIA issue, it is relevant to note that a range of other investigations are being undertaken to establish the presence of existing air safeguarding and radar issues, infrastructure associated with utilities such as water, gas, electricity, and telecommunications links to establish either the absence of effects or to identify appropriate mitigation to overcome any effects. These matters will be addressed through consultation with the relevant system operators and during the iterative design process of the wind turbine layout and the development of the rest of the proposed site, as necessary.

13.3 Lighting

The potential adverse effects from lighting may arise during construction activities and during the operation and decommissioning of the development. Any potential effects during construction and decommissioning can be controlled by standard construction practices and good site management. Any lighting required during operation would be very small in scale and candella. It is therefore proposed to scope out impacts from lighting.

13.4 Grid Connection

Grid connection will be subject to a separate consenting arrangement and therefore will not be considered within the EIA. Information on the potential grid connection location point together with the underground /above ground cable routing will be made available should this become known before the submission of the ES. Grid Connection has been scoped out of the EIA.

14. Summary of Proposed Scope of Assessment

A summary of the proposed technical scope outlined in **Chapters 4 to 13** is provided in **Table 14.1** below.

Table 14.1 Summary of EIA Scope

Environmental Topic	Summary of Proposed Scope of Assessment	Element proposed to be Scoped Out
Ecology	<p>The Ecology scope will include:</p> <ul style="list-style-type: none"> • A desktop study including consultation; • Protected Species surveys including badger, otter and water vole surveys; and • Assessment of the potential impact of the proposed development on those designated sites, species and habitats of ecological value that have been identified within the Site or adjacent to its boundary. 	<p>No species-specific surveys are proposed for reptiles or red squirrel*, although a record will be made of any sightings during the completion of other ecological surveys. No further manual bat surveys are proposed.</p>
Ornithology	<p>The Ornithology scope will include:</p> <ul style="list-style-type: none"> • A desktop study including consultation; and • Ornithological field surveys to a scope agreed with SNH to include vantage point surveys, breeding bird surveys, SPA roost watches, winter walkovers & winter wildfowl surveys. 	
Geology, Hydrology and Hydrogeology	<p>Desk study and Site visit of hydrological and hydrogeological receptors on the Site and within a 2km search radius and review of their sensitivity in relation to proposed development activities. The development of appropriate mitigation will be included to control potential effects on the receptors identified.</p>	<p>Operational effects minimal and addressed through design at construction stage, therefore propose to scope out operational effects.</p>
Archaeology and cultural heritage	<p>Direct effects on known heritage assets will be considered only where these are located within the footprint of the development</p> <p>Effects on the settings of stated designated and non-designated heritage assets:</p> <ul style="list-style-type: none"> • Lamford Burn • The Kings Cairn • Craigengillan Garden and Designated landscape • Loch Doon Castle listed building and Scheduled monument • Holm of Daltallochan Stone Circle and standing stone 	

Environmental Topic	Summary of Proposed Scope of Assessment	Element proposed to be Scoped Out
Landscape and visual amenity	<p>The landscape and visual amenity assessment is in three parts:</p> <p><u>Landscape effects:</u></p> <ul style="list-style-type: none"> • Direct effects upon landscape elements and landscape patterns within and immediately around the application site, and upon landscape character (as defined by SNH assessments); and • Indirect effects upon landscape designations within a 35km study area from turbines <p><u>Visual effects:</u></p> <ul style="list-style-type: none"> • Visual effects experienced by residential receptors close to the proposed Site within 2km • Recreational receptors close to the proposed Site within 5km; and • Visual effects experienced by recreational receptors (on footpaths, bridleways, cycle routes, and tracks), by road users; and by visitors to outdoor visitor / tourist facilities. <p><u>Cumulative effects</u></p> <ul style="list-style-type: none"> • Cumulative landscape and visual effects occurring within the 35km radius study area, resulting from the cumulative effect of two or more wind farms within the 70km radius search area. Other wind farms will include existing, consented and those proposals for which a full planning application has been submitted. 	<p><u>Landscape effects</u> - everything over 35km</p> <p><u>Visual effect</u> everything over 35km, and further limitations identified for various visual receptors subject to detailed review of the ZTV.</p> <p><u>Cumulative effects</u> – exclude proposals at the pre-planning application stage, wind turbines below 50m beyond 10km, and wind turbine developments below 25m in height. A cut-off date is set for design freeze to allow the assessment to proceed.</p>
Noise	<p>Operational noise from the proposed development following the ETSU-R-97 methodology with reference to the recommendations relating to wind farm noise assessment, including wind shear, in the UK Institute of Acoustics Bulletin (Bowdler <i>et al</i>, 2009).</p> <p>Consideration will be given to the adoption of standard environmental best practice during construction in accordance with BS5288:2009: Code of Practice for Noise and Vibration Control on Construction and Open Sites.</p>	<p>Detailed predictions of construction noise/vibration or construction traffic noise.</p> <p>Once the proposed development is operational, it is envisaged that the amount of traffic associated with it would be minimal. It is considered that the effects of operational traffic would be negligible and therefore further consideration does not need to be given to noise from operational traffic.</p>
Traffic and Transport	<p>Construction vehicle movements to be established and the need for assessment considered against standard guidance. Potential effects considered:</p> <ul style="list-style-type: none"> • Severance; • Driver delay; • Pedestrian delay; • Pedestrian amenity; • Fear and intimidation; and • Accidents and safety. 	<p>Minimal level of operational traffic and therefore propose to scope out the operational phase.</p> <p>Decommissioning, as traffic baseline can be expected to be very different to current conditions.</p>

Environmental Topic	Summary of Proposed Scope of Assessment	Element proposed to be Scoped Out
Shadow Flicker	Screening for shadow flicker will be done in accordance with the Planning Advice Sheet Onshore Wind Turbines. All properties located within a 130 degree segment either side of due north, relative to the turbines, and within ten rotor diameters of a turbine will be assessed for shadow flicker.	As per guidance, in the event that properties are greater than 10 rotor diameters from a turbine, properties will not require a shadow flicker assessment.
Socio-economic	To examine the baseline economic and social position of the local economy. Identification of potential facets of the proposed development that could have linkages with, and effects upon the local economy (including tourism, recreational pursuits and land use etc.) An assessment of the significance of such effects will be carried out. Direct effects on public access and safety will also be considered.	It should be noted that effects on visual amenity, noise amenity and visual impact etc will be assessed under the most relevant section of the EIA. See the noise and landscape and visual amenity sections of this table for a fuller explanation.
Air Quality & Climate	A carbon balance assessment will be completed following recognised methodology and incorporated within the front-end development description chapters of the ES. Energy and climate policies framework and associated development benefits will be incorporated within the introductory chapters	Dust can be controlled through standard mitigation therefore proposed to be scoped out.
Infrastructure, telecommunication utilities and air safeguarding	The scope will include investigations into establishing the presence of existing infrastructure associated with utilities such as water, gas, electricity, and telecommunications links. The extent of any effects, and necessary mitigation, will be addressed through consultation with the relevant system operators and during the iterative Site design process. Aviation issues will be addressed as part of this process.	
Grid Connection	None	Grid connection will be subject to a separate consenting arrangement and therefore will not be considered within the EIA. Information on the potential grid connection location point together with the underground /above ground cable routing will be made available should this become known before the submission of the ES. Grid Connection has been scoped out of the EIA.
Lighting	None	The potential adverse effects from lighting may arise during construction activities and during the operation and decommissioning of the wind farm. Any potential effects during construction and decommissioning can be controlled by standard construction practices and good site management. Any lighting required during operation would be very small in scale and candella. It is therefore proposed to scope out impacts from lighting.



Appendix A

Figures

