

**ScottishPower Renewables UK Limited**  
**An Iberdrola Renewables Company**

**Proposed Queniborough Wind Farm,  
Leicestershire**

**Request for a Scoping Opinion**  
**Under Part IV, Paragraph 10 of Statutory Instrument 1999 No 293**

**December 2008**

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**Figure 1: Location of Proposed Queniborough Wind Farm**

**Figure 2: Proposed Area for Queniborough Wind Farm Development**

# 1 Introduction

## Background

- 1.1 ScottishPower Renewables (UK) Limited, an Iberdrola Renovables company (hereafter referred to as ScottishPower Renewables) is responsible for developing, operating and maintaining renewable energy developments across the UK and Ireland. It has identified a location at Queniborough, north east of Leicester, as a potential site for wind energy development.
- 1.2 ScottishPower Renewables is the UK's leading wind farm developer, owner and operator with eighteen wind farms currently operating in the UK and the Republic of Ireland totalling 383 megawatts (MW). ScottishPower has a further 790MW consented and/or under construction (including Europe's largest wind farm at Whitelee, south of Glasgow), and around 500MW at an advanced stage of planning.
- 1.3 Driven by commitments to address climate change and contribute to Government targets to increase the proportion of electricity generated from renewable sources, ScottishPower Renewables aims to expand its renewables capacity in line with the Renewables Obligation (RO). ScottishPower Renewables is attempting to identify suitable wind farm sites across the UK suitable for wind energy schemes. It has identified Queniborough as one of a number of preferred sites for development, subject to detailed feasibility study. However, it has been established that the site has many of the attributes required for wind farm operation.
- 1.4 The proposed wind farm site lies within the local authority area of Charnwood Borough Council in the County of Leicestershire. The site is located approximately 4.5km north east of Leicester close to the villages of Queniborough and Syston. The location of the proposed development site is shown in Figure 1.
- 1.5 ScottishPower Renewables has appointed an independent renewable energy specialist consultancy, Dulas Ltd, to advise them on the scope of EIA work and environmental issues, draw up preliminary conceptualisations of the proposed wind farm, and to provide sufficient environmental information to enable the formulation of an Environmental Statement which will accompany the planning application.

## Scoping Consultation Document purpose

- 1.6 In order to facilitate the formulation of a Scoping Opinion by Charnwood Borough District Council under Paragraph 10, Part IV of Statutory Instrument 1999 No. 293, this Scoping Consultation Document presents relevant provisional information which describes the development and the potential environmental issues that may arise from construction, operation and decommissioning of the wind farm scheme. In addition the methodologies of assessment are included for scrutiny by the statutory parties. We would welcome any advised alterations to the proposed methodologies. The purpose of this scoping consultation document is to inform Charnwood Borough Council and Statutory Consultees on aspects of the proposal prior to the formulation of a formal Scoping Opinion under Statutory Instrument No.293 1999. The information contained herein is indicative only and several iterative alterations to the design and layout of the wind farm will arise prior to a formal planning submission. All Statutory Consultees (listed at the end of this document) have been issued copies of this document and it is requested that their replies on aspects of the environmental assessments to be undertaken should be sent to

the Principal Planning Officer, Jacqueline Jackson, Charnwood Borough Council at the following address within five weeks of receipt of this document:

Planning Services, Southfield Road, Loughborough, Leicestershire LE11 2TN

- 1.7 Any comments or suggestions for assessments that should be included in the Scoped Issues should be forwarded to the planning officer stated above. Copies please should be forwarded to the EIA consultants [FAO Matt Wilson] at Dulas Ltd, Unit 1, Dyfi Eco Park, Machynlleth, Powys, Wales SY20 8AX (tel: 01654 705015).
- 1.8 The wind farm developer, ScottishPower Renewables, will make arrangements with the Council to host a formal Scoping meeting 3-4 weeks following issue of this document. This meeting will enable face-to-face discussions on the proposal and refinement of the environmental assessment work required.
- 1.9 This scoping consultation document outlines the technical details of the proposed wind farm and the perceived and/or likely environmental effects that should be addressed by an environmental impact assessment. Once a Scoping Opinion has been issued by the Council and on the basis of the scoping consultations, ScottishPower Renewables will ensure that its appointed consultants will address the matters raised and specified.
- 1.10 It is stressed that this is an early stage in the project development and therefore only brief technical details and a provisional site boundary are provided. This is to allow comments and feedback received from consultees, together with information from the environmental assessment, to guide the most appropriate design and layout of the wind farm, if feasible at this location.

### **Scoping Consultation Document structure**

- 1.11 Section 2 provides the policy context and legal framework applicable to the proposed wind farm.
- 1.12 Section 3 provides an overview of the proposal, including a brief description of the nature and purpose of the proposed development and its possible effects on the environment.
- 1.13 Section 4 provides an outline of the proposed contents of the Environmental Statement.
- 1.14 Figure 1 shows the location of the site of the proposed development and Figure 2 demonstrates the site development boundary.
- 1.15 The Appendices provide a list of consultees to whom this report has been sent and information relating to the environmental assessment methodologies that will be used. These may be revised in response to the comments of scoping consultees and discussions with specialist consultants appointed for the environmental assessment.

## 2 Renewable Energy and Wind Power

### Policy Context

- 2.1 Renewable energy sources are natural energy sources such as sunlight, wind, waves and tides, which are continuously replenished and do not run out. Of these, wind power is the most economical and technically advanced of the different renewable energy technologies (see Planning Policy Statement 22: Renewable Energy). It offers benefits in terms of electricity generation that is free from emissions of carbon dioxide (the main 'greenhouse' gas associated with global warming) and other pollutants.
- 2.2 Wind energy is an efficient means of generating electricity. Research has shown that a modern wind turbine will recover all of the energy expended in its manufacture, operation and decommissioning within approximately three to five months<sup>1</sup>. Although exact figures for the energy costs for a particular wind farm will vary depending on the type of turbine, location, etc, this proposal is predicted to generate at least 50 times more energy than it costs over its 25 year projected lifespan.
- 2.3 The UK government, as part of its strategy to reduce greenhouse gases and tackle global warming, has now placed a national obligation on all electricity suppliers to provide 10 per cent of their electricity from renewable sources by 2010, and 15% by 2015. This is the Renewables Obligation. It is likely that these targets will be increased over time. It is these obligations on the suppliers that are driving the identification and development of wind farms in the UK.
- 2.4 Recent relevant policy directions by UK government for renewable energy are as follows:
- Energy White Paper (2003)
  - Planning Policy Statement 22: Renewable Energy (2004)
  - Planning Policy Statement 1: Planning and Climate Change Supplement (2007)
  - Renewable Energy Strategy (consultation draft) (2008)

### The Environmental Impact Assessment Regulations

- 2.5 Wind energy proposals of 50 MW or less are determined by the relevant local authority under planning legislation - the Town and Country Planning Act 1990. Proposed developments likely to have a significant effect on the environment require the potential effects to be systematically evaluated through an Environmental Impact Assessment (EIA) under the Town and Country Planning (EIA) (England and Wales) Regulations 1999.
- 2.6 Wind energy proposals are covered under Schedule 2 of the Regulations and also in DETR Circular 02/99. ScottishPower Renewables proposes to submit an Environmental Statement as part of its planning application. Accordingly, the application will be an EIA application and it is not necessary to request a screening decision from the Council as to whether EIA is required.
- 2.7 The purpose of an ES is to describe the proposal, predict and evaluate the impacts (both positive and negative) and identify mitigation measures that can be taken to prevent, reduce or offset any significant adverse effects arising as a result of such impacts. The EIA process begins at project initiation and progresses through several inter-linked stages:

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<sup>1</sup> Hansard, Written Answers to Questions, 4 February 2004, Jacqui Smith, Minister of State for Industry and the Regions (152448)

- Scoping and pre-application discussions
- Environmental studies, including baseline surveys
- Preparation of an Environmental Statement (ES)
- Submission of an ES along with a planning application
- Review and evaluation of the ES by the planning authority and consultees
- Decision
- Implementation and monitoring.

2.8 In reality the EIA process is both iterative and cyclic, and runs in tandem with project design. As potential significant effects are identified, the design of the project, e.g. the layout of the turbines, will be adjusted and either avoidance or mitigation measures proposed in the event that the layout cannot be adjusted. Consultation, a vital component of the EIA process, continues throughout each stage and contributes both to the identification of potential significant adverse effects and avoidance built in at the design stage, or mitigation measures to offset such effects.

2.9 The EIA process therefore provides the opportunity to develop wind farm projects, for which the significant environmental effects have effectively been avoided altogether or minimised through iterative design. In many cases significant effects on, for example, ecology, birds, archaeology and noise can be avoided through sensitive site selection, and design via the introduction of buffers zones. Others, for example the effects of construction, can be effectively mitigated through the adoption of best practice construction techniques.

2.10 At this early scoping stage, however, it is important to identify all ‘potential’ effects (either positive/negative) so that a rigorous assessment process, with input from independent experts, is followed based on sound objective evidence. The *potential* effects of the proposed Queniborough Wind Farm development are therefore described in Section 4 of this report.

### 3 Description of the Proposal

#### Site location

- 3.1 The potential wind farm site is located east of the village of Queniborough and south of the minor C class road linking Queniborough with South Croxton. The location is north east of the large urban setting of Leicester. The land within the site boundary is predominantly used for arable farming, and the area is dotted with many small farm buildings denoting an agricultural setting on the edge of a large conurbation. There are several minor C class roads in the area, and a number of rights of way traversing the farmland. Queniborough Brook is located to the northern edge of the potential site boundary.
- 3.2 Within the detailed study area there are a number of relevant landscape designations. These include:
- The proposed development site and the area to the north, east and south is an Area of Particularly Attractive Countryside (Policy CT/1 and CT/7),
  - Baggrave Hall Registered Park and Garden (Grade II) occurs approximately 5km to the south east,
  - Many of the surrounding villages are Conservation Areas (Policy EV/10 and EV/13) including South Croxton, Barkby, Queniborough, Rearsby, Thrussington and Ratcliffe on the Wreake.
- 3.3 In terms of Landscape Character, the proposed wind farm development site is within The Countryside Agency regional High Leicestershire Countryside Character Area (93) and has been broadly defined as an area of broad rolling ridges and varied, often steep sided valleys.
- 3.4 At a county scale, the proposed wind farm development site is on the boundary of the High Leicestershire landscape character area to the south and Wreake Valley landscape character area to the north. The High Leicestershire landscape character area consists of a hilly plateau dissected by radiating watercourses, which have formed moderate to steep sided valleys separated by broad ridges. The Wreake Valley landscape character area is a flat bottomed, east-west orientated river valley, its gently sloping sides form sometimes indistinct boundaries, for example with High Leicestershire.
- 3.5 On a local scale, the proposed wind farm development site is located on the slopes of a shallow valley. The sloping landform consists of large mixed pasture and arable fields divided by generally low trimmed hedgerows and fences. The occasional mature tree or small regular woodland block does however provide some enclosure in this otherwise gently undulating and open landscape.
- 3.6 Straight roads and public rights of way cross the ridge and valley landscape. These connect to numerous scattered, but compact, small towns and villages in the wider landscape. The largely red brick villages and towns are generally focussed around a church. The church towers form a repetitive, vertical focal point in the wider landscape.
- 3.7 In respect of the principal visual receptors in proximity to the proposed wind farm, the following will be taken into account:
- Residential areas including towns, villages and scattered farms and properties, which may include Queniborough immediately to the north west, Gaddesby, Barsby and South Croxton to the east, Beeby and Keyham to the south, the fringes of Leicester to the south west, Syston to the west and East Goscote, Rearsby and Thrussington to the north

- The network of transport corridors including roads, lanes, railway line and public rights of way including recreational routes and cycle paths, likely to include South Croxton Road and the A607 to the north, Syston Road and the network of minor lanes and roads to the east, Ridgemere Lane to the south, Queniborough Road and the network of roads within Syston including the A46, the A607 and the railway line to the west; changes of views from the surrounding network of public rights of way, including the bridleway and footpath that cross the site to the west and north and the recreational footpaths to the north including the Leicestershire Round and Midshires Way
- Public open space including parks, recreation grounds and country parks, including Watermead Country Park to the west and the ‘Open Spaces of Special Character’ within Queniborough and South Croxton.

## Nature and purpose of the proposed development

- 3.8 The proposed wind farm would generate renewable electricity from wind power. Wind power, in contrast to many other conventional forms of electricity generation, does not produce waste, emissions to air, or contribute to global environmental problems, and has the potential to reduce carbon dioxide (CO<sub>2</sub>) emissions through the avoided use of fossil fuels.
- 3.9 The total electrical output of the proposed wind farm would be approximately 10 MW – equivalent to the annual energy use of approximately 5,590 homes<sup>2</sup>. Annual electricity output would therefore be equivalent to the domestic electricity requirements of 9% of Charnwood homes (there were 60,472 homes in Charnwood under the 2001 Census).

## Wind Farm Infrastructure

- 3.10 It is likely that a wind turbine of around 2MW would be used at this site. The turbine parameters being used for the purposes of the assessment assume a have a hub height of approximately 80m and a blade length of approximately 45m, giving a height of blade tip of 125m.
- 3.11 The main elements of the wind farm development comprise:
- approximately 5 wind turbines
  - underground power cables
  - access tracks within the wind farm site
  - potential on-site excavation of borrow pit(s)
  - substation / switchgear facility
  - permanent meteorological mast
- 3.12 Any existing, suitable infrastructure within the proposed development area, such as farmtracks, will be used where possible to minimise the impacts of the proposed development. Some upgrading of existing infrastructure in the vicinity of the wind farm is likely to be required. Studies are currently underway on the grid connection for the site. It should be noted that the

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<sup>2</sup> This is based on the following: An installed capacity of 20MW. Assuming a 30% capacity factor this wind farm would produce  $8760 \times 10 \times 30/100 = 26280$ MWh of electricity per year. The average household uses approximately 4700kWh (4.7MWh) of electricity per year, meaning in an average year the wind farm would generate enough electricity equivalent to the domestic requirements of 5,590 homes

developer will not be responsible for an application for the grid connection, the responsibility for which will fall to the Distribution Network Operator, Central Networks, under Section 37 of the Electricity Act 1989. The application will be accompanied by a full Environmental Statement (ES). Consequently the environmental effects of the grid connection will not be assessed in detail in the ES. Indicative information only on the route and potential issues with known sensitivities along the grid route will be identified in the ES.

- 3.13 As yet a layout for the wind farm has not been developed. This will be influenced by the findings of the various environmental and technical studies currently underway. It is expected that the independent landscape architects that will be appointed will have a significant influence on the layout. There are various options for turbine size and number. ScottishPower is keen to obtain feedback from consultees and local residents to help shape the development of the wind farm.
- 3.14 The access route to the site will be subject to survey and will be selected to minimise potential impacts on the local area and transport infrastructure. Some upgrading of existing tracks and new track construction on site may be necessary to deliver turbines. Where new site tracks are required stone for construction will be sourced predominantly from on-site borrow pits if possible. In the event that suitable stone is not available it will be sourced from a quarry off site. Worst case assumptions will be made for the purposes of the EIA for example traffic generation figures will assume that all stone will be imported.
- 3.15 The construction period for a wind farm of this scale would last approximately 10-12 months. It is currently proposed that the wind farm would have an operational life of 25 years. At the end of this period, the wind farm would be decommissioned and the turbines removed. Alternatively, a fresh application may be made to extend the life of the wind farm or replace the existing turbines.

### **Planning authorities and policy**

- 3.16 Planning Policy Statement 22 (2004) defines the factors to which planning authorities will have regard when considering renewable energy development proposals, including wind farms.
- 3.17 The proposed wind farm lies within the local planning authority area of Charnwood Borough Council. The following Plans and Strategies provide the Development Plan framework for the site:
- Charnwood Borough Local Plan (Adopted 2004)
  - Leicestershire, Leicester and Rutland Structure Plan (Adopted 2001)
  - East Midlands Regional Spatial Strategy (2005)
- 3.18 The local plan offers relevant guidance to renewable energy schemes and related landscape and ecology matters in the following policies:
- Policy EV/41: Renewable Energy
  - Policy EV/42: Wind Energy
  - Policy EV/2: Nationally Important Archaeological Sites
  - Policy EV/3: Archaeological Sites of County and Local Significance

- Policy EV/5: The setting of Listed Buildings
  - Policy EV/9: Historic Parks and Gardens
  - Policy EV/10: Development in Conservation Areas
  - Policy CT/7: Areas of Particularly Attractive Countryside
- 3.19 The Structure Plan contains guidance on renewable energy schemes and related landscape and ecology matters in the following:
- Resource Management Policy 3: Energy Installations
  - Strategy Policy 8: Development in the countryside
  - Environment Policy 1: Historic Environment
  - Environment Policy 3A: Protection of important species and habitats
  - Environment Policy 4: Geology
- 3.20 For the East Midlands, the relevant policy guidance in the 2005 Regional Spatial Strategy is contained in the following:
- Policy 1 of the EMRSS in relation to the Regional Core Objectives states under Section 9 that through development plans and local development frameworks the region will seek to “maximise the role of renewable energy generation”
  - Policy 41: Regional Priorities for Renewable Energy, identifies that the core strategy would exploit opportunities to develop and use renewable energy.
  - Policy ENG 11 sets out “to ensure that an increasing amount of the electricity used is generated from renewable sources”.
  - Policy ENG 12 states that wind energy can ensure through the sensitivity of site design, respect for the historic and natural environment, whilst recognising that some impacts are unavoidable.
- 3.21 It is the East Midlands Energy Challenge: Regional Energy Strategy Part 1 that appears to be the only current reference to renewable energy targets. The report identifies the national target of 10% of electricity supplied to come from renewable sources by 2010 and the aspirational target of 20% by 2020 (now superseded). It identifies that renewable energy contributes only 1.4% of region’s current energy generation capacity.
- 3.22 Charnwood 2026 is the emerging Charnwood Local Development Framework. The Core strategy document is currently in consultation, closing 5th December 2008. The LDF will not be adopted during the development phase of the project for which the Local Plan Policies will remain extant until the core strategy is adopted.

## 4 Environmental baseline and potential effects

- 4.1 Although the wind farm layout has not yet been developed, past experience of wind farm developments, combined with some knowledge of the baseline environment of the site, enables the possible significant effects of the wind farm development on the environment to be identified.
- 4.2 Consultation will be held with key consultees, including Charnwood Borough Council, Natural England, the RSPB, English Heritage, Leicestershire County Council, and the Environment Agency. These discussions will help identify possible effects and ensure that the development of the proposal is as responsive as possible to local issues and concerns.
- 4.3 This section is structured to present the general approach to surveys to establish the environmental baseline for the site area, and how predictions of effect are undertaken. Information is also provided on initial features or sensitivities that may be relevant to each environmental discipline. More detailed presentations of the methodologies of surveys and environmental assessments are presented in Section 5 of this report, including the methods for determining 'significance'.
- 4.4 Whilst we have presented below the typical environmental disciplines requiring environmental assessment for a wind energy development, e.g. landscape and visual, noise, ecology etc, this is not meant to prejudice the eventual scope of EIA works which is a matter for Charnwood Borough Council to determine.

### Landscape and visual amenity

#### Baseline

- 4.5 The proposed wind farm at Queniborough is approximately 4.5kms north east of Leicestershire and is close to the villages of Queniborough and Syston. The site area is predominantly agricultural with the land being used primarily for arable cultivation.
- 4.6 At a county scale, the proposed wind farm development site is located in a landscape character area to the south consisting of a hilly plateau dissected by radiating watercourses, which have formed moderate to steep sided valleys separated by broad ridges. To the north the landscape character is more flat bottomed, often defined by east-west orientated river valleys.
- 4.7 Locally, the proposed wind farm development site is located on the slopes of a shallow valley. The sloping landform consists of large mixed pasture and arable fields divided by generally low trimmed hedgerows and fences. The occasional mature tree or small regular woodland block does however provide some enclosure in this otherwise gently undulating and open landscape.
- 4.8 Straight roads and public rights of way cross the ridge and valley landscape. These connect to numerous scattered, but compact, small towns and villages in the wider landscape. The largely red brick villages and towns are generally focussed around a church. The church towers form a repetitive, vertical focal point in the wider landscape.

#### Landscape designations

- 4.9 The potential wind farm is not located within any national landscape designation. It is however located in an Area of Particularly Attractive Countryside, a local landscape designation under the Local Plan. The explanatory note to Policy CT/7 explains the characteristics of this designation: *The landform comprises three valleys where the Gaddesby, Queniborough and Barkby Brooks flow north-westwards eventually to join the River Wreake. On either side of these watercourses*

*the land forms a series of ridgelines sloping down to the river valley. The area is characterised by dispersed farmsteads and small unspoilt villages like South Croxton, Barkby and Beeby. For the most part the area is unaffected by large scale built development. With the exception of Barkby Holt, tree cover is limited to strong planting along the brooks coupled with a few isolated stands of woodland. Visually the area forms the western edge of the more extensive area of High Leicestershire where pleasing long range views can be enjoyed across a broad sweep of countryside largely unspoilt by built development.*

## **Potential effects**

- 4.10 Landscape and visual effects are perhaps the most obvious effects of an operating wind farm, and while opinions on this are individual and varied, a clear and objective assessment of effects can be made using established guidance and procedures. The effects of the proposed wind farm on the landscape are assessed on the basis of the magnitude of change that this will bring, and the sensitivity of the receptor (for example area of landscape or viewpoint) to that change. The presence of a designated area is one factor that would increase the sensitivity of receptors.
- 4.11 The size and scale of a wind farm in particular determines the extent of the impacts on the landscape and visual amenity, in addition to the presence of existing features in the landscape and the scale and character of the landscape. The landscape and visual impacts can be reduced and modified through careful site design, layout and choice of turbine. As noted previously, there is currently no working layout for this site. ScottishPower Renewables is seeking feedback from consultees to help design a wind farm where negative landscape and visual impacts will be minimised.

## **Landscape fabric and character**

- 4.12 The wind farm will potentially affect the landscape fabric and character of the landscape within which it is located by altering the existing baseline condition. Given the landscape character of the site it is possible that the wind farm is likely to have a localised significant effect on the landscape character area within which the wind farm sits. Landscape fabric (the actual composition of the landscape in terms of field patterns, hedgerows, built infrastructure etc) may be affected to a minor degree, but this can often be offset with enhancement and mitigation measures to restore the landscape features of the site.

## **Visual amenity**

- 4.13 The location of this wind farm is likely to impact on some aspects of visual amenity, due to its proximity to a number of settlements and individual properties. Under ideal conditions it is reported that turbines can be discerned in views of up to 20-30km and more. At this range they are however only marginally visible, and only when the visibility conditions are near perfect. At this range the effects of the wind farm on the visual amenity are generally very limited. It is only at a much closer range that significant effects on the visual amenity might be expected. The exact range at which these effects might become significant depends on the detailed layout of the wind farm, the location of the viewpoint and the context of the view. As a result of the combinations of factors, which will result in significant (or otherwise) effects, it is not possible to predict a distance within which all effects will be significant. Depending on circumstances the effect on some closer views may be not significant due for example to topography screening views, whilst others from a greater range may be significant as a result of the specific context, for example due to the high sensitivity of that receptor, and content of the views.
- 4.14 The visual receptors of greatest sensitivity are likely to include the villages and settlements surrounding the site. These settlements may include Queniborough immediately to the north west, Gaddesby, Barsby and South Croxton to the east, Beeby and Keyham to the south, the fringes of

Leicester to the south west, Syston to the west and East Goscote, Rearsby and Thrussington to the north.

- 4.15 In addition there are public open space including parks, recreation grounds and country parks, including Watermead Country Park to the west and the 'Open Spaces of Special Character' within Queniborough and South Croxton

### **Cumulative effects**

- 4.16 The assessment will consider the cumulative landscape and visual impacts of the proposal in relation to wind farms within a specified radius of the site, to include those which are built, with consent and not yet built, and those for which applications for consent have been submitted but are still within the determination process as at a date to be agreed with the local planning authority. At this current time, there are is a large number of operational, consented and in planning wind energy sites within 60kms of the proposed Queniborough site, including:

- Burton Wold
- Coldham
- Deeping St Nicholas
- Stags Holt
- Brush Falcon Works
- McCains Foods
- Shipdham resubmission
- WW Steadfold Lane
- East Midlands Airport
- Catworth
- Nutsgrove Farm

We would appreciate your providing any information you may hold on other potential wind farm developments in this area.

### **Sequential effects**

- 4.17 The size and scale of the proposed wind farm indicates that the experience of travellers is likely to be affected from local roads, rights of way, and some highways, including the South Croxton Road and the A607 to the north, Syston Road and the network of minor lanes and roads to the east, Ridgemere Lane to the south, Queniborough Road and the network of roads within Syston including the A46, the A607 and the railway line to the west; changes of views from the surrounding network of public rights of way, including the bridleway and footpath that cross the site to the west and north and the recreational footpaths to the north including the Leicestershire Round and Midshires Way.
- 4.18 There are no public roads within the site boundary. There is a single public footpath within the site boundary and a single bridleway. There are a large number of rights of way in the area

surrounding the proposed wind farm, and the Midshires Way is located approximately 5km due east of the site.

### **Construction and other effects**

4.19 The development of the proposed wind farm will potentially have different effects on the above considerations during the different phases of its lifecycle and these will be considered through the assessment. Typically the resultant effects associated with construction, operation, and the decommissioning impacts of the wind farm and any changes subsequent to this would be considered within the assessment.

4.20 Please refer to the appendices which outline the proposed assessment methodology.

## **Ecology and nature conservation**

### **Baseline**

4.21 No internationally important sites have been identified within 10 km of the study area. However, Rutland Water is located 22.5 km to the east and is designated as a SPA. The SPA supports populations of European importance of the over wintering Gadwall and Shoveler. The area also regularly supports large numbers of other over wintering waterfowl including: Lapwing, Coot, Goldeneye, Tufted Duck, Pochard, Teal, Wigeon, Cormorant, Great Crested Grebe and Little Grebe. Furthermore, Ospreys have recently been reintroduced at the site.

4.22 No National Nature Reserves has been have been identified within the 10 km search area. However, nine SSSIs have been identified including:

- Frisby Marsh (6.5 km northeast). Contains some of the best remaining areas of marsh in Leicestershire and is representative of marsh in Central England;
- Main Quarry, Mountsorrel (8.5 km northwest). A site of geological interest;
- Twenty Acre Piece (9.5 km north). Includes some of the best remaining examples of acidic clay grassland in Leicestershire and is representative of such habitat in the English Midlands;
- Buddon Wood and Swithland Reservoir (9.6km west). Buddon Wood remains one of the best Birch-Oak woodlands in Leicestershire of a type not found elsewhere in the East Midlands.
- Barrow Gravel Pits (10km northwest). One of the best remaining complexes of open water, grassland, scrub and woodland in Leicestershire, with a rich flora and fauna representative of flood plain habitats in the English Midlands;
- Swithland Wood and The Brand (11.5 km west). Includes some of the best remaining examples of Oak-Lime and Alder woodland in Leicestershire and is representative of ancient woodland on somewhat acid, loamy soils in the English Midlands;
- Bradgate Park and Cropston Reservoir (12 km west). Bradgate Park is one of the finest remaining examples of ancient parkland in Leicestershire. It contains some of the last remaining fragments of wet heathland in the County, and several nationally important geological features.
- Tilton Cutting (Gipsy Lane Pit) (13 km east). A key geological site.

## Potential effects

- 4.23 As mentioned previously this wind farm is proposed as part of the response of ScottishPower Renewables to targets set by UK government to increase the proportion of electricity generated from renewable sources and hence reduce the UK's contribution to climate change. Climate change is the single most important threat to the global environment, particularly to biodiversity and to birds. Most recent research suggests that climate change could drive between 18 and 35% of species to extinction by 2050.
- 4.24 There will be some change to, and loss of, areas of vegetation and plant communities on the site due to the siting of turbines and other infrastructure. This will be assessed in the light of detailed botanical, hydrological and/or ground condition information for the site. Avoidance measures will be adopted where appropriate dependant on the sensitivity of the habitat; where avoidance measures are not possible and significant adverse effects are considered likely to arise, mitigation measures will be developed in order to offset these effects
- 4.25 Habitats on site will be surveyed using methods that follow accepted best practice and up-to-date industry standards. In addition, walkover surveys of the site, biological records and consultations with relevant organisations will be used to determine the extent of any additional surveys for breeding birds or protected species that may be present on the site. Natural England and other relevant organisations will be consulted on the methods and scope of all ecological surveys. The findings of these surveys will be used to inform the design of the wind farm through avoidance of badger setts etc, and to develop any mitigation measures where required, in order to offset any potential significant effects which may arise.
- 4.26 It should be noted that ornithological and bat surveys have been ongoing at the site since April 2008. Currently the findings indicate that there are a number of bat species using or moving through the site, of which the single record of noctule is the most relevant for the wind farm. The meadows in the north of the site appear to support barn owl, grass snake and otter. The breeding bird surveys indicate a sprinkling of red and amber-listed species. Ongoing vantage points surveys have currently identified several flightlines of buzzard, kestrel and sparrowhawk ,and one small flock of golden plover. Also of interest is a sighting of willow tit, a relatively scarce bird.
- 4.27 Please refer to the appendices which outline the proposed methodology to be followed.

## Cultural heritage

- 4.28 For the purposes of this document, 'cultural heritage' resources include World Heritage Sites, Scheduled Ancient Monuments, other archaeological features, listed buildings, conservation areas, historic gardens and designed landscapes, and other cultural heritage designations.
- 4.29 There are five SAMs within the 5km study area, none of which lie within the proposed development area. The closest is LE43 (Bridge at Rearsby), 2.5km to the north of the development boundary. LE132 (Roman Villa in Hamilton Grounds Farm) and 17068 (Deserted Medieval Village of Hamilton) stand a short distance apart from each other, 3.7 km south of the development boundary. To the east are 90652 (Moated Site, South Croxton) and 13237 (Baggrave Deserted Medieval Village), 3.2km and 4.0km distant from the development boundary respectively.
- 4.30 There are no Listed Buildings within the development boundary. However, there are 31 Listed Buildings clustered within the settlement of Queniborough to the northwest. The closest of these (MLE15163) is 150m from the northwest boundary of the development, with the most distant being MLE13775 at 700m. All are Grade II, except for the Grade II\* Old Hall (MLE790). The only other Listed Building within the study area is at New York Farm, 500m to the southeast of the development boundary (MLE15260).

- 4.31 Queniborough, the only settlement within the study area, is designated as a Conservation Area.
- 4.32 In addition to the above the HER database contains 19 entries for known sites within the study area, spanning the Neolithic to post-medieval periods. A single HER site is located within the proposed development area. This is MLE 16180, which relates to the former Queniborough Airfield.
- 4.33 Some reasonably extensive traces of medieval ridge and furrow earthworks have also been identified around Queniborough. One tract of this relict agricultural landscape occupies a substantial part of the northeast part of the development area, approximately centred on NGR 465800,311800.
- 4.34 There are no Registered Parks and Gardens within the area of search.
- 4.35 Archaeological sites and monuments without statutory protection are curated by the planning authorities. Planning Policy Guidance 16, Archaeology and Planning, 1990 provide planning policy guidance and advice on the treatment of this resource.
- 4.36 Construction of the wind farm has the potential to directly disturb or damage known and unknown archaeological remains or features of cultural heritage. The presence of the wind farm may also indirectly affect the setting or amenity of a particular site. Both these direct and indirect effects on any such features present on or in the vicinity of the site will be addressed during the environmental assessment process.
- 4.37 Field reconnaissance of the site may potentially lead to the discovery of previously unrecorded cultural heritage sites, which may in themselves present constraints in terms of the siting of turbines. This information along with information on the recorded sites will be used to inform the layout design, avoidance measures will be adopted where possible, and mitigation measures developed where avoidance measures are not achievable.
- 4.38 Previous experience indicates that it is likely that, even if archaeologically sensitive areas are located, minor adjustments to design and the adoption of sensitive construction practices can fully mitigate any significant effects.
- 4.39 The cultural heritage assessment will also take account of all listed buildings, conservation areas and historic parks and gardens within 5km of the site boundary. Physical effects to such designated historic features are unlikely; however, effects to the ‘setting’ of such features are possible as a result of the wind turbines and may in some instances be significant. Accepted methodologies for the assessment of effects to historic features such as listed buildings will be employed. Protection to the setting of such features may well influence the development of the wind farm.

## Noise

- 4.40 Noise can arise from both the construction and the operation of a wind farm. During wind farm construction, noise can arise from both on-site activities such as the construction of access tracks, turbine foundations, substation buildings etc., and also from the movement of construction related traffic both on-site and travelling on public roads to and from the site.
- 4.41 Well established standardised techniques for calculating construction noise levels in accordance with BS5228:1997 ‘Noise and Vibration Control on Construction and Open Sites’ will be employed.
- 4.42 During their operation, wind farms have the potential to create noise effects through both aerodynamic noise and mechanical noise. Aerodynamic noise is caused by the interaction of the

turbine blades with the air. Mechanically generated noise is generally caused by the operation of mechanical components, although in some instances a noise source may arise from the presence of transformers located outside the wind turbines. However, the level of both aerodynamic and mechanical noise radiated from current technology wind turbines due to improvements in blade design, and nacelle design and insulation is generally engineered to a low level.

- 4.43 Over recent years, many wind farms have been constructed within the UK and a better understanding has been gained into what constitutes an acceptable level of noise from these types of development. As a result of this increased understanding, a methodology for assessing the impact of noise from wind farms has been formulated by the Department of Trade and Industry (now DBERR). This methodology was developed by a Noise Working Group that comprised a cross section of interested persons including, amongst others, environmental health officers, wind farm operators and independent acoustic experts. The outcome recommendations are presented in the report ETSU-R-97, '*The Assessment and Rating of Noise from Windfarms*'.
- 4.44 The ETSU-R-97 recommendations provide a robust basis for assessing the noise implications of an operational wind farm and have become the accepted standard for such developments within the UK. Indeed, the use of ETSU-R-97 is recommended as the appropriate good practice for the assessment and rating of wind farm noise in PPS22.
- 4.45 Noise problems are uncommon with modern wind turbines and noise can be minimised by careful site selection, turbine design and wind farm layout. The methodology for assessing noise levels will be agreed with specialist noise consultants appointed for the environmental assessment, and local authority environmental health officers. Guidance given in *The Assessment and Rating of Noise from Wind Turbines*, (ETSU Report ETSU-R-97, 1996) will be followed as appropriate.

## Access Transport and Traffic

- 4.46 Given the scale of the proposed wind farm there are likely to be some transport effects during construction of the wind farm although it is anticipated that there will be negligible transport effects during operation.
- 4.47 A preferred access route will be identified and assessed, and traffic management measures proposed to minimise traffic effects on the main public roads during construction will be proposed.
- 4.48 The ports of entry with sufficient size to receive turbine components could potentially be on the east coast, Humberside or Liverpool. This has yet to be determined and work is ongoing on the preferred route to the site for turbine delivery.
- 4.49 It is anticipated that there will be some transport impacts during the construction phase of the development. These will be mainly associated with off-site traffic movements, for example, the use of abnormal vehicles for turbine delivery. There would be negligible transport effects during operation. Access routes will be carefully selected and traffic management measures taken to minimise traffic flows on the main public roads during construction. In addition, HGV traffic on the main road network will be reduced by sourcing stone for road construction, wherever possible, from sensitively located on-site borrow pits.
- 4.50 Construction of the wind farm may give rise to some emissions of dust during construction. It is not possible to completely eliminate these, but the use of best management practices will reduce the risk of dust impacts during construction. Wind farm operation generates no emissions to air, therefore local air quality will not be adversely affected during operation.

## Socio-economic

### Local employment

- 4.51 In terms of local benefits, the wind farm would be unlikely to provide significantly increased local employment opportunities. However, there would be considerable opportunity for employment during the construction and decommissioning phase of the project.

### Land use and ownership

- 4.52 The principal land use on the site is agricultural production through arable farming and fruit orchards. The site is part of two privately owned farms. The wind farm will not significantly change the existing land management practices during operation.

### Recreation and tourism

- 4.53 The effects of the wind farm on tourist and recreational routes and facilities will be addressed as part of the environmental assessment. Specific landscape and visual effects on tourist routes and facilities will be addressed in the detailed landscape and visual impact assessment.

## Hydrology and ground conditions

- 4.54 This section will cover the assessment of hydrology, geology including site drainage, water quality and ground conditions. Potential effects on hydrology (including private water supplies) will be fully assessed during the EIA, and in particular effects on: watercourses, hydrology, and private water supplies. Potential hydrological impacts from borrow pits will also be investigated.
- 4.55 General ground elevations across the site vary between 90m Above Ordnance Datum (AOD) in the south to 70mAOD in the north and it is underlain by fine loamy over clayey soils that are subject to light seasonal water-logging and chalky till geology, which is classified as Minor Aquifer.
- 4.56 Review of 1 to 50,000 scale Ordnance survey mapping indicates that there is only one surface water feature located within the site boundary of the proposed wind farm, the Queniborough Brook, which flows through the northern portion of the site. This watercourse rises in the vicinity of Lowesby and flows north west to its confluence with the Gaddesby Brook approximately 1.3km downstream of the site. The hydrological catchment to the south of the development site is drained by the Barkby Brook, a tributary of which flows approximately 1km to the south of the site boundary.
- 4.57 The EA website and flood maps indicate that the proposed turbines are not located within an area defined to be at risk from flooding.
- 4.58 It is anticipated that the wind farm itself would have limited effects on the hydrology of the area. Minor effects on the hydrogeology might be expected due to the turbine foundations, bases and access tracks disrupting near surface groundwater flow paths.
- 4.59 On-site track design will be addressed as part of the environmental impact assessment process and with the aim of mitigating potential disruption of groundwater flows. Road drainage would also be designed to have minimal effect on the hydrology.
- 4.60 Potential effects on the surface and groundwater environment may also occur as the result of erosion or sedimentation associated with construction operations, accidental spillages, or tree-felling. These can be addressed by following best practice guidance together with appropriate pollution prevention plans.
- 4.61 Mitigation strategies would be devised in consultation with Natural England and the Environment Agency and will follow best practice guidelines.

## Airsafeguarding

- 4.62 Wind turbines have the potential to interfere with military and civil aviation operations, primarily through effects on radar systems but also in respect of their location within military low flying areas. Various aviation interests, including the Ministry of Defence (MOD) and Civil Aviation Authority (CAA) have joined with the British Wind Energy Association (BWEA) to publish guidance on these issues: *Wind Energy and Aviation Interests: Interim Guidelines* of the Wind Energy, Defence & Civil Aviation Interest Working Group (DTI, 2002). The closest airports to the site are East Midlands and Nottingham. It is believed that the turbines would not be visible to the radar at either of these airports although consultations are ongoing.
- 4.63 A GIS mapping tool is available from NATS, which allows a provisional analysis of possible impact navigation infrastructure maintained by NATS En Route Limited (NERL). The tool identifies areas likely to interfere with the operational infrastructure, and areas where there remains a limited potential to interfere with this infrastructure, for a range of turbine tip heights. Assessment of the tool for tip heights from 80 to 120m has shown that the site is in a zone where a development of this scale is considered likely to impact on NERL operations. It is strongly recommended that consultations with NATS proceed at an early stage in order to identify and resolve (if possible) any conflict. The NATS constraint is not included on the mapping presented here as it extends across a large area including the entirety of the site for turbines of 120m tip height or greater.
- 4.64 The site is located 24km from East Midlands Airport and 24km from Nottingham Airport. RAF Cottesmore is 25.5km to the East of the Queniborough site. This places the site within the standard consultation zones around these facilities and contact should therefore be made with the MoD and the airport operators at an early stage to identify and if possible address any conflicts. Preliminary line of sight calculations indicate that the Queniborough site would not benefit from any terrain screening from East Midlands Airport, and is on the margin of potential screening from RAF Cottesmore. It appears likely that the site will be screened from Nottingham Airport by terrain. Any requirement for a more detailed line of sight analysis should be identified dependent on whether radar or other sensitive navigational equipment is operated from this facility.
- 4.65 In addition, OS maps indicate the presence of airfields within the local area (50km search), as follows:
- Desford (Alder Hall) 19km from site
  - Leicester (Rearsby) 9.5km from site
  - Kibworth (The Paddocks Farm) 15.5km from site
  - Saltby 24km from site
  - Battleflats 27km from site
- 4.66 Two military bases / sites have been identified as likely to conduct aviation / telecommunication operations within the vicinity of the site (approximately 60km search area). The MoD has been consulted, and their response indicated that they had “no concerns” with the proposed wind farm. Two of their RAF bases, Cottesmore and Wittering, are 26km and 38km (respectively) to the east of the proposed wind farm development.
- 4.67 Currently consultations with the Civil Aviation Authority and the Ministry of Defence are ongoing but based on preliminary discussions no objections have been identified.

## **Telecommunications and television/radio transmissions**

- 4.68 The experience of existing wind farms is that television reception and other communications services, including nearby communications masts, can be affected by the rotating blades of wind turbines. Preliminary consultations with organisations responsible for public and private communications services have commenced. Any interference problems identified would be mitigated during the design process via established remediation techniques.

## 5 Draft outline of the Environmental Statement

### Introduction

- 5.1 It is proposed at this stage that the Environmental Statement will comprise a single A3 document combining text and A3 illustrations. A separate A4 Non-Technical Summary of the information contained in the Environmental Statement will also be provided.
- 5.2 Detailed specialist reports, as required, will be included as separate Technical Appendices forming part of the Environmental Statement.
- 5.3 A separate Planning Statement will be prepared in support of the application for consent. The Planning Statement will not be part of the Environmental Statement. It will discuss the energy and environment policy origins of wind energy development, the Government's policies towards renewable energy development and the national and local planning policy context for the proposed wind farm.
- 5.4 It is proposed that the text of the Environmental Statement will be divided into 2 parts, as described below.

### Part 1: Introduction

- 5.5 Part 1 will comprise five chapters, as follows:
- **Chapter 1** will provide an introduction to renewable energy development and wind power in particular. It will give a brief description of the site, proposed development and the potential benefits of the wind farm in terms of reduced emissions.
  - **Chapter 2** will include an overview of the impact assessment methodology used by the team, including scoping and consultation responses and the identification of key environmental effects. It will describe the way in which mitigation of environmental effects has been considered during site selection, wind farm design and layout and the EIA process. It will also describe any measures designed to mitigate the significant environmental effects arising from the proposal, and emphasise its commitment to do so. This section will conclude by providing an overview of the Environmental Statement structure.
  - **Chapter 3** will describe the wind farm site selection process and the main reasons for the choice of this site, taking into account the environmental effects. This chapter will include the design strategy and development of the layout, and will describe the way in which the mitigation of environmental effects has been considered during the site selection, wind farm design and EIA process.
  - **Chapter 4** will provide details of the site and a description of the proposed wind farm development. This will include details of the size, layout and design of the turbines, access tracks, borrow pits, switchgear control building / sub-station, on-site grid connection and other associated infrastructure. Temporary infrastructure, e.g. laydown areas, will also be included. This chapter will also outline the construction, operational and decommissioning requirements of the project.
  - **Chapter 5** will present an overview of the relevant statutory planning guidance (e.g. *Planning Policy Statement 22*) and Development Plan policies which apply to the wind farm development on the proposed site.

## Part 2: The Environmental Impact Assessment

- 5.6 Part 2 will contain a number of chapters reporting the findings of the impact assessment on each of the topics that have been identified for inclusion in the EIA process during this scoping exercise.
- 5.7 The topics which will be addressed in the Environmental Statement are listed below, in the order in which it is currently envisaged that they will appear in the Environmental Statement:
- Landscape and visual
  - Ornithology
  - Ecology
  - Noise
  - Hydrology, hydrogeology and geology
  - Archaeology and cultural heritage
  - Traffic, transport and access
  - Other issues such as aviation, telecommunications, television, ice throw and shadow flicker.
- 5.8 Each of these ‘assessment chapters’ will be prepared by the relevant expert environmental consultant(s). ScottishPower Renewables, experts in wind farm development, construction and operation, and additional specialists, will provide input as required.
- 5.9 The assessment chapters will be structured using the same format, where practicable. Each chapter will begin with a brief introduction. This will be followed by a description of the method of assessment for the particular topic under discussion. This will include an outline of relevant consultations undertaken, documentation studied and the means of defining the Study Area for that topic. Should there be any difficulties (technical deficiencies or lack of know-how) encountered in compiling the required information, this will be noted.
- 5.10 The existing baseline conditions for the topic will then be described.
- 5.11 An assessment will then be made of the nature, magnitude, duration and significance of the likely effects of the construction, operation and decommissioning of the proposed wind farm on the topic. Mitigation measures that have been committed to will be taken into account in the assessment. These mitigation measures will be used to avoid, reduce and, if possible, offset any significant effects, where practical. An assessment will be made of the significance of the likely residual effect, following mitigation.

### Confidential annex

- 5.12 A confidential annex may be provided which would contain any sensitive, confidential information, e.g. ornithological information. Initial circulation will be restricted to Natural England and RSPB, with circulation to other parties subject to agreement by both organisations.

## 6 Appendices: assessment methodologies and scoping consultees

### Landscape and Visual Impact Assessment (LVIA)

The Landscape and Visual Impact Assessments will address the potential effects of the proposals upon the landscape and visual amenity of the area and comprise three distinct stages of work, as follows: baseline; advice on wind farm layout and design; and detailed landscape and visual assessment.

#### Stage One: Baseline

##### *Project Inception*

We would initially review the preliminary layout and detailed project description and related plans, including the location of any ancillary components of the wind farm such as the switch room/control building, any anemometer mast(s), access tracks and grid connection and details of initial construction operations (including excavation of borrow pits), final decommissioning and proposals for the reinstatement of the site. We would also review turbine dimensions and co-ordinates of other wind farms to be included in the cumulative assessment, if available.

##### *Desk Study*

We would be carrying out a desk study of relevant available background material including Scoping Opinion (when available), Development Plan(s) for the study area, published Landscape Character Assessments, Ordnance Survey maps and preliminary Zones of Theoretical Visibility (ZTVs). We would also identify landscape designations within the study area. This will enable us to complete the baseline landscape character assessment and to confirm potential receptors and viewpoint locations to be considered in the assessment.

##### *Site Visit*

We would carry out a preliminary site visit to verify locations of sensitive landscape and visual receptors within the study area to be included in the assessment, including specific viewpoint locations, as well as familiarising ourselves with the landscape character of the parts of the study area.

##### *Baseline Survey*

The baseline survey would classify the existing landscape character and visual amenity of the study area and identify potential receptors and their related sensitivities to the type of development proposed. This would involve a review of existing LCA characterisations of the study area. The baseline study would also identify the Landscape Character Types and designated landscapes likely to be affected by the proposals, as well as the range of visual receptors – residents, visitors, walkers or road users.

##### *Consultation*

We would consult with representatives of Natural England and the relevant county and local councils for the site in order to confirm the scope and methodology to be used in the LVIA, as well as to confirm the number and location of viewpoints to be included in the assessment. It would also be important to confirm the scope of the cumulative assessment. This would usually be limited to existing/consented wind farms and developments for which applications have been submitted.

The viewpoint selection would be informed by the preliminary ZTVs (preferably including cumulative ZTVs) and our initial site visit, as well as drawing on any advice from the local planning authority and other relevant consultees based on their local knowledge of the area and specific landscape issues which they would wish to see addressed in the assessment.

## Stage Two: Advice on Wind Farm Layout and Design

Following the baseline work, we would review the preliminary scheme and map showing all on-site constraints and would seek to optimise the layout to achieve a best fit within the context of the various technical and other environmental considerations.

ScottishPower Renewables would use ReSoft's Windfarm programme to support the LVIA and would review alternative layouts, as appropriate, with corresponding wireline diagrams from a limited number of key receptor locations. Consideration would also be given to related siting, layout and construction methods for ancillary components of the scheme including on-site access tracks and borrow pits (if applicable). We would also take into consideration landscape and visual considerations related to any necessary off-site road works.

## Stage Three: Detailed Landscape and Visual Impact Assessment

### *Methodology*

Once the wind farm layout has been finalised and agreed with the client, the LVIA would be carried out in accordance with the agreed methodology and to consider the effects of the proposed development during construction, operation and de-commissioning stages on the landscape and visual receptors identified in the agreed study area.

The assessment would be based on the following sources of guidance:

- Guidelines for Landscape and Visual Impact Assessment produced by the Landscape Institute and Institute of Environmental Management and Assessment (GLVIA) (2002);
- Landscape Character Assessment (The Countryside Agency and Scottish Natural Heritage 2002);
- Guidelines on the Environmental Impacts of Wind Farms and Small Scale Hydroelectric Schemes, published by Scottish Natural Heritage (2002);
- Visual Assessment of Windfarms: Best Practice published by University of Newcastle and Scottish Natural Heritage (Revised April, 2005); and
- Visual Analysis of Windfarms: Good Practice Guidance, Consultation Draft, Scottish Natural heritage. Produced by the Scottish Renewables Forum and the Scottish Society of Directors of Planning, July 2005;

The cumulative assessment would draw on the following guidance:

- Guidance: Cumulative Effect on Wind Farms, Version 2, Scottish Natural Heritage (Revised 13.04.05); and
- A Guide to the Assessment of Cumulative Effects of Wind Farm developments prepared by ETSU/DTI (2000).

The detailed LVIA would identify the predicted visibility of the proposed wind farm in the study area and assess the residual impacts arising from the optimised design on landscape and visual receptors. The prediction of magnitude of change and assessment of significance of residual landscape and visual impacts would be based on pre-defined criteria, as discussed below.

### *Field Work*

A second more detailed stage of field work would be carried out once the design has been finalised to refine the landscape character assessment of the study area and to visit and photograph each of the agreed viewpoints. Wireline diagrams based on the final layout would be taken to site to assist in the assessment process.

### *Sensitivity*

The sensitivity of the landscape to changes is defined as high, medium, low or negligible based on professional interpretation of a combination of parameters<sup>3</sup> including:

- the value placed on the landscape. landscape quality;
- existing land-use;
- the pattern and scale of the landscape;
- visual enclosure/openness of views and distribution of visual receptors;
- the scope for mitigation, which would be in character with the existing landscape; and
- the degree to which the particular element or characteristic contribution to the landscape character and can be replaced or substituted.

Viewpoint sensitivity is defined as high, medium, low or negligible based on an interpretation of a combination of parameters, as follows:

- location and land use at the viewpoint;
- landscape character and quality in the immediate vicinity of the viewpoint;
- landscape character and quality of the intervening landscape and backdrop to the development;
- frequency of use; and
- whether the receptor is static or transitory.

In relation to land use at the viewpoint, visual sensitivity is generally defined as follows:

- High: Users of outdoor recreational facilities including strategic recreational footpaths and vantage points, cycle routes and rights of way, where the viewer's attention may be focused on the landscape; important landscape features with physical, cultural or historic attributes; principal views from residential properties; beauty spots or picnic areas.
- Medium: Other footpaths; secondary views from residential properties, people travelling through the landscape on roads, trains or other transport routes.
- Low: People engaged in outdoor sports or recreation (other than appreciation of the landscape), commercial buildings, and other locations where people's attention may be focused on their work or activity.
- Negligible: Views from industrial areas.

### *Magnitude*

The magnitude of change to landscape and visual amenity is determined by a combination of largely quantifiable parameters, as follows:

- the distance of the viewpoint from the development;
- the duration of predicted effects;
- in the case of character areas and/or designated areas, the extent of the landscape affected;
- in the case of roads, cycleways and footpaths, the length of the route affected by the development;
- the extent of the view affected by the proposed development (i.e. the horizontal angle subtended by the development);
- the elevation of the proposed development in relation to the receptor; and
- the extent of other built development visible, particularly vertical elements.

Magnitude of change is described as substantial, moderate, slight, negligible or none. These terms are explained in the table below:

<sup>3</sup> Based on criteria in paragraph 7.16 of the Guidelines for Landscape and Visual Impact Assessment (Landscape Institute and Institute of Environmental Management and Assessment, Second Edition, 2002).

<b>Level of Magnitude</b>	<b>Definition</b>
Substantial	Total loss or considerable alteration/interruption of key elements, features or characteristics of the landscape character and/or composition of views.
Moderate	Partial loss or modest alteration to one or more key features or characteristics of the baseline, resulting in localised change within a broader unaltered context.
Slight	Limited loss or small alteration to one or more key elements, features or characteristics of the baseline conditions. Change arising from the loss/alteration will be discernible but underlying landscape character or view composition will be similar to baseline.
Negligible	Very limited or imperceptible loss or alteration to one or more key elements/characteristics of the baseline. Change may be barely discernable.
None	No aspect of the development would be discernable. The development would result in no appreciable change to the landscape resource or view.

#### *Cumulative Magnitude*

The additional parameters which would be used to evaluate magnitude of cumulative change are the number of wind farm developments visible; distance to each of the wind farms; direction in which each of the other wind farms is located relative to the viewpoint; and increase in the proportion of view occupied by turbines.

#### *Significance*

The significance of effects would be assessed as major, moderate, minor or none by combining viewpoint or landscape sensitivity and predicted magnitude of change, as indicated in the table below. Major and major/moderate effects are considered to represent significant effects in terms of the EIA Regulations.

These matrices are not used in an arithmetic way or as a prescriptive tool. The methodology and analysis of potential effects at any particular location must allow for the exercise of professional judgment.

It is important to note that, with the exception of potential impacts on the landscape fabric of the site, no determination is made in the assessment to whether effects are beneficial or adverse. This is because such a conclusion necessitates some subjective judgements to be made. It is felt that, at this stage of the decision-making process, the role of the LVIA should be to present information on the nature and extent of landscape and visual effects to assist the local planning authority in determining their acceptability.

## Significance of Landscape and Visual Effects

Sensitivity	Magnitude of Change			
	Substantial	Moderate	Slight	Negligible
High	<b>Major</b>	<b>Major/ Moderate</b>	Moderate	Moderate/ Minor
Medium	<b>Major/Moderate</b>	Moderate	Moderate/ Minor	Minor
Low	Moderate	Moderate/ Minor	Minor	Minor/None
Negligible	Moderate/Minor	Minor	Minor/None	None

### Report

The LVIA report would include the following sections:

- Introduction;
- Methodology;
- Baseline landscape character and visual amenity to include topography, land use and vegetation;
- Landscape planning policy;
- Landscape designations and classifications;
- Project description (i.e. aspects of the proposed wind farm with potential to give rise to landscape and/or visual effects);
- Embedded mitigation – design optimisation;
- Assessment of residual effects including cumulative effects – including visibility analysis and assessment of effects on landscape and visual receptors; and
- Conclusions and discussion.

### Figures

Figures in the LVIA would include:

- A Topography plan for the agreed study area;
- A Landscape Designation plan for the agreed study area;
- A Landscape Character Plan for the agreed study area;
- ZTVs; and
- Photographs of existing views, 3D wirelines and or photomontages, as appropriate.

ZTVs present the “maximum potential effect” insofar as they are based on Ordnance Survey (OS) digital terrain data at 50m horizontal interval resolution and therefore do not take account of local landforms and vegetation (e.g. trees, hedges and forestry), nor any built forms in the landscape. This means that the visibility predicted on the ZTVs will be more extensive than actual visibility on the ground. Where the ZTVs show no visibility, it is generally predicted that no turbines would be seen.

Cumulative ZTVs will ascertain the potential cumulative visibility of the proposed development in conjunction with the other wind farms considered in the cumulative assessment.

The viewpoint analysis is illustrated by a range of tools including photographs, wirelines and photomontages. The photographs used to construct the photomontages will be taken by a professional photographer using a digital Single Lens Reflex (SLR) camera with a 50mm lens. This conforms to the Guidelines for Landscape and Visual Effect Assessment because this lens size is considered to most closely represent the view obtained by the human eye. Wirelines were generated using the same OS

digital data used to generate the ZTVs and therefore take no account of the screening effect of local landform or vegetation.

## **Noise Assessment**

### **Noise Planning Guidance**

The noise assessment will be based on the recommendations contained in ETSU-R-97, The Assessment and Rating of Noise from Wind Farms, as referred to in PPS22, Renewable Energy, and its companion guide, Planning for Renewable Energy. The noise assessment will address potential noise issues arising from construction, operation and decommissioning of the wind farm.

### **Provisional Noise Predictions**

Noise predictions will be carried out for an initial turbine layout using the highest source sound power level which occurs up to a 10m height wind speed of 10 m/s for an agreed turbine type. The results will be plotted in the form of noise contours and residential properties where the ETSU-R-97 simplified criterion of 35 dB LA90 is exceeded will be identified. A sample of such properties will be selected for baseline noise monitoring such that the prevailing background noise, required for determination of the full ETSU-R-97 noise limits, can be derived.

### **Liaison with Local Authority and Access to Monitoring Locations**

The Local Authority Environmental Health Department (or equivalent) will be informed of the intended assessment methodology and suggested baseline noise monitoring locations and response to any particular concerns will be invited. Access to the suggested monitoring locations will be arranged through Dulas or ScottishPower or their landowners.

### **Noise Monitoring**

Noise monitoring equipment consisting of IEC651 Type 1 sound level meters fitted with ½" microphones inside custom double skin wind shields mounted at 1.2m height will be installed at each of the agreed monitoring locations. These will be configured to log existing noise levels using a variety of measurement indices over successive 10 minute intervals, concurrent with wind speed measurements on the site, over a period of two weeks. Wind speed measurements will preferably be carried out at the intended hub height for the proposed turbines or at two heights less than hub height such that hub height wind speed can be derived from the measured wind shear for each 10 minute period. The noise consultancy has been informed, however, that this may not be possible at this site and measurements from a 10 metre mast may have to be used.

### **Noise Predictions**

Noise predictions will be carried out based on the ISO9613-2 methodology assuming a worst case of downwind propagation over hard ground and warranted source noise levels for a representative turbine type. Predicted noise levels will be derived at each assessment locations represented by the baseline measurements for wind speeds for which source noise data is available, preferably from cut-in to 12 m/s as required by ETSU-R-97.

### **Noise Assessment**

Baseline noise data expressed in terms of the LA90 measurement index will be plotted against 'standardised' 10m height wind speed (converted from hub height using reference ground roughness), or

actual 10 metre height wind speed if this is not available, for the 'quiet day-time' and 'night-time' hours as defined in ETSU-R-97. A best fit polynomial curve will be plotted through this data to define the 'prevailing' background noise as required by ETSU-R-97. Noise limits will be derived from this according to the requirements of ETSU-R-97 which specifies that noise should not exceed a value of X dBLA90 or 5 dB above the 'prevailing' background noise level, whichever is the greater. The value of X is 35-40 during the day, 43 at night and 45 for properties occupied by persons with a financial involvement in the site. Predicted noise levels will be compared to the derived noise limits and the results of the assessment sent to Dulas and ScottishPower for review. A detailed construction and decommissioning noise assessment will not be provided but comments on appropriate limits will be included and possible problems identified.

## Mitigation

Where predicted operational noise levels are found to exceed the derived noise limits mitigation will be discussed with Dulas and ScottishPower to ensure that the final proposed design will meet the required noise criteria.

## Final Report

Once a final design is agreed, the results of the noise assessment will be written up into a chapter for the ES. This will present all the aspects noted above together with an evaluation of other factors which may be of concern to interested parties such as tonal noise, amplitude modulation, wind shear and infrasound. The predicted noise levels will be deemed to be not significant where the ETSU-R-97 criteria are met.

## Ecological Assessment, including Ornithology

The intended methodologies for ecology site surveys are summarised below. These will be supported by consultations and by desk-based assessment (such as examination of local maps, aerial photographs and site plans) to identify important habitats and priority areas for targeting survey effort. The logic for the specification of study areas will be set out and supported, where possible, by reference to professional guidelines and site habitat/species.

This ecological impact assessment will be carried out according to the "*Guidelines for Ecological Impact Assessment*" produced by the Institute of Ecology and Environmental Management (IEEM 2006), which is recognised as current best practice.

As recognised in the IEEM Guidelines, the assignment of a value to an ecological receptor is a "*complex and subjective process*" which involves the "*application of professional judgement*". However, it recommends that when assessing value consideration is given to: site designations and features; biodiversity value; large populations or important assemblages of species; potential value, secondary or supporting value; social/community value; and economic value.

The potential ecological effects of the development are considered during both its construction, operation and decommissioning phases, encompassing the entire lifetime of the proposal. The decommissioning phase is considered to be similar to the construction phase in terms of potential impacts.

Baseline ecological information for the site will be collected through both desk-based study and original field survey.

The study area is defined here as being all land within 500 metres of the component parts of the Development, including new turbines and tracks.

Phase 1 and protected species surveys would ideally be conducted in accordance with the following guidance:

- Bat Conservation Trust (2007). Bat Surveys – Good Practice Guidelines. BCT
- Bibby CJ et al (2000) Bird Census Techniques – Second Edition. Academic Press
- Gilbert et al (1998). Bird Monitoring Methods. RSPB, Sandy
- English Nature (1999) Water voles: Guidance for planners and developers. English Nature
- English Nature (2001) Great crested newt mitigation guidelines. English Nature
- English Nature (2002) Badgers and Development. English Nature
- English Nature (2004) Bat Mitigation Guidelines. English Nature
- Froglife Advice Sheet 10: Reptile Survey. Froglife
- IEEM (2006). Guidelines for Ecological Impact Assessment. IEEM, Winchester
- JNCC, (2003), Field manual for Phase 1 habitat survey - a technique for environmental audit. JNCC
- Natural England (2008). Bats and Onshore Wind Turbines – Interim Guidance
- Scottish Natural Heritage (2005). Survey methods for assessing the impacts of onshore wind farms on bird communities. SNH, Battleby
- Scottish Natural Heritage – Otters and Development (Scottish Wildlife Series) online

Surveys are proposed in the following format:

Survey type	Season/ months	Description
Winter vantage point	October to March	6 hours per vp per month.
Bats and Roosting sites	April – September	See below
Water voles *	Late April - September	1 survey visit
Badgers	March - May	1 survey visit
Reptiles*	April - May, also September	Up to 7x visits using artificial refugia. Visits can be doubled up with other surveys.
Phase 1 and hedgerow survey + site flora assessment	Any time but preferably May – September	Summer visit ideal for identifying many plant species
Water Body Assessment	February to mid-March	Assess need and extent of Great Crested Newt survey
Great Crested Newt Presence/ Absence *	Mid-March - mid-June.	2 to be done between mid-April and mid-May
Great Crested Newt Population Estimate *	Mid-March – mid-June.	2 extra survey in the event of great crested newts being present

\*Required only if suitable habitat identified in Phase 1 survey

NB. Please be advised that breeding bird, migratory vantage point and bat surveys have already been conducted across the site in 2008. The methodologies for these studies will be notified to the relevant ecological bodies in order to seek their approval that such studies have been undertaken in accordance with contemporary guidelines.

## Birds

### *Vantage Point Study*

In accordance with best practice guidance for onshore wind farm avian impact assessment (Scottish Natural Heritage 2005), vantage point survey will be the means used to monitor and depict wintering bird flight activity at the study site. The study area will be visited to give a total of 6 hours observation per vantage point per month over the winter period 2008/9.

Observations and records will focus on 'target' bird species: 'target' species status is based on professional experience and published reviews of avian species at risk from wind farm developments (Langston and Pullan 2003; Scottish Natural Heritage 2006). Species groups recorded include waterfowl (ducks, geese and swans), waders, and birds of prey.

During the vantage point surveys, data will be recorded for each target species sighting. Data recorded for each observation will include: time of sighting, bird count, direction of flight, estimated height(s) of flight in metres, description of flight behaviour/activity, length of time observed, special notes (e.g., sex of bird observed, mobbing, hunting), and a map reference number. Maps will be drawn of all flight paths observed during each vantage point survey.

### **Phase 1 Survey**

All habitats encountered within the site boundary and a 500m study area will be assessed and coded according to the survey methods outlined in *'The Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit'* (JNCC, 1993).

During the Phase 1 survey, additional target notes will be made to record key habitat features too small to be mapped (<100m<sup>2</sup>) and to provide greater detail on other features of ecological interest. Areas of particular botanical interest will be surveyed in greater detail with species lists prepared and a record made of relative abundance on the DAFOR scale.

### **Badger Survey**

The current status of badger populations within the site and the 500m study area will be established by undertaking a detailed search for field signs including badger setts, badger paths, latrine sites, evidence of foraging and dung pits following methodologies described by Harris et al. (1989).

Where survey results indicate that further information will be required from outside the study area, this boundary will be accordingly increased (e.g. where survey results suggest that a main sett may be located just outside the study area and locating this sett would provide useful information regarding the local distribution of social groups).

### **Water Vole and Otter Surveys**

This will follow guidance from the Water Vole Conservation Handbook, and will cover all areas within 50 metres of all waterbodies located in the Phase 1 survey. Latrines, feeding stations, burrows and other field signs will be recorded.

Otter surveys will be undertaken subject to the findings of the Phase 1 habitat survey. The meadows to the north may be suitable for otters. Subject to a Phase 1 survey, if suitable habitats are found or consultees during scoping give notification of known otter territories in the area then detailed surveys will be undertaken in the spring/summer 2008. Otter surveys would be conducted in accordance with guidance from Natural England: *Monitoring the Otter*, Conserving Natura 2000 Rivers Monitoring Series No 10 2003. In general otter surveys can be carried out at any time of the year, as otters are active throughout the year.

On English rivers otters are generally secretive and nocturnal, and are rarely seen. Their presence is therefore determined by searching for field signs including:

- Spraint
- Footprints

- Feeding remains (usually fish but sometimes frogs as well)
- Holts
- Couches (resting places above ground)

Spraint (faeces) are used by otters as scent markers and are deposited in prominent places within the river corridor and inside lie-up sites and holts. Therefore, surveys will, if required, focus on searching the following for spraints: rocks, headlands, tree stumps, ledges under bridges and any other protruding/prominent natural or manmade features along the riverbanks.

Surveys will also pay close attention to soft substrates at the water margin as this will usually be the most likely place to find footprints.

## **Bat Survey**

Bat survey methods are as detailed below:

### *Spring (mid-April to mid-May):*

- One visit by 2 bat workers to conduct a 2-3 hour transect survey.
- The objectives of the transect survey are to (1) scout the site for areas of high bat activity, (2) characterize any bat use of the site that may be unique to early in the season, and (3) set the transect route.

### *Summer (mid-June to end-August):*

- 2 bat workers conduct a day of roost search and assessment within 500m of the proposal.
- Two separate visits by 2 bat workers to conduct 2-3 hour dusk surveys via transect.
- The objectives of the transect surveys are to (1) identify the suite of species present on the study site, (2) identify areas of high bat activity, (3) to identify linear features being used by commuting bats, (4) quantify the level of bat activity on the site, and (5) investigate emergence from, and returns to, potential bat roosts.
- One visit by 2 bat workers to conduct an all-night survey via transect followed by listening station(s).
- The all-night survey objectives are to (1) sample any bat activity unique to late night and early morning hours, and (2) investigate dawn returns to a potential roost site.

### *Autumn (September to mid-October):*

- Two visits by 2 bat workers to conduct all-night surveys via transect followed by listening station(s).
- The survey objectives are to continue the summer objectives, and to identify any migratory movements across the study site, and any autumn swarming activity.

## **Evaluation and Impact Assessment**

Species have been evaluated against recognised Conservation Criteria as set out below:

- Annex 1 species listed in the Birds Directive;
- Migratory species (for which SPA can be selected); population thresholds for SPA selection are given;
- Species listed under Schedule 1 of the Wildlife and Countryside Act – birds and nests protected by special penalties at all times;
- Species of Conservation Concern as identified by BTO/JNCC/RSPB (2002). These are

- categorised as red-listed (high conservation concern), amber listed (medium concern) and green-listed (lower concern). Only red and amber listed species are given here; and
- Species listed under national or local Biodiversity Action Plans.

The criteria used for defining the ecological value of populations found within the study area follow those recommended in the IEEM Guidelines for Ecological Impact Assessment (2006). These are:

- International;
- UK;
- National (i.e. England/Northern Ireland/Scotland/Wales);
- Regional;
- County (or Metropolitan - e.g. in London);
- District (or Unitary Authority, City, or Borough);
- Local or Parish; and
- Within zone of influence only (which might be the project site or a larger area).

For the purposes of this assessment, and not part of generic guidance, the population threshold at which a species is considered to be important at a geographic level is 10%. For example, one territory of Cetti's warbler is considered to be important at County level because it exceeds 10% of the county population (6-8 pairs), but it is not considered important at regional level because the population is less than 10% of the regional population (202 singing males). Sometimes figures for populations are not available; in this case a judgement has to be made based on the extent of available habitats within the geographic area.

The assessment methodology for this chapter follows the "*Guideline for Ecological Impact Assessment*" developed by the IEEM whereby in order to determine the ecological effects and the significance of impacts, a standard process is followed. This involves the steps listed below:

- Evaluate features to geographical scale;
- Define conservation objectives for each feature;
- Identify ecological impacts;
- Determine confidence in ecological impacts;
- Determine significance of impacts; and
- Determine confidence in significance assessment.

An ecologically significant impact is defined as an impact (negative or positive) on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area (IEEM, 2006).

Impacts on valued ecological receptors together with the degree of certainty to which the assessment is made will be outlined. Based on the fact that a 5% confidence level is conventionally chosen as the lowest limit for acceptable statistical significance in common scientific practice, the following four-point scale is used to describe the level of certainty in the assessment of predicted impacts:

- Certain/near-Certain: probability estimated at 95% chance or higher;
- Probable: probability estimated above 50% but below 95%;
- Unlikely: probability estimated above 5% but less than 50%; or
- Extremely Unlikely: probability estimated at less than 5%.

The assessment of whether an impact is significant or not is based on the geographical level at which the receptor is valued, but may be applied also to lower levels of ecological value. So impacts not significant on a receptor of national value may be significant at a more local level.

## Hydrology/Hydrogeology

Based on our understanding of the site following a review of OS mapping the following scope of works will be undertaken:

1. Desk top study of information collected from the Local Authority Private Water Supplies register, the Environment Agency (EA) public register and other published sources of information;
2. Walkover survey of the site and surrounding area up to 250 metres from the site boundary where access is permitted, including consultation with landowners to identify the hydrological baseline environment and water features/water supplies;
3. Identification of existing surface water features, hydrological features, geological and geomorphological features which may be affected by the respective proposed developments;
4. Preparation of a water features survey/hydrological baseline review, together with a risk assessment and mitigation strategy in the form of an Environmental Statement chapter, to address the potential effects of the development on groundwater and surface water hydrology.

### Assessment Methodology and Significance Criteria

The hydrology assessment methodology is based on the collection of a wide range of data and information from published material, plus consultation with statutory bodies (e.g. EA) relating to the local and wider environment. Data sources referred to within the assessment will include those outlined within the following table.

#### Data Sources

Topic	Source of data and information
Climate	Flood Estimation Handbook (Centre of Ecology and Hydrology, NERC, 1999); Environment Agency; CEH Hydrometric Register
Rainfall	
Topography	
Elevation, relief	Ordnance Survey Explorer 1:25,000 mapping
Surface Water	Environment Agency ( <a href="http://www.environment-agency.gov.uk">www.environment-agency.gov.uk</a> ) – Consultation and published sources on their website
Flooding	
Water Quality	
Fisheries	Environment Agency consultation and data collection (e.g., water levels, quality and use Source Protection Zones Groundwater Vulnerability Mapping of England and Wales (scale 1:1,000,000), Environment Agency
Groundwater	
Aquifer	
Geology	BGS Solid & Drift Geology Mapping and relevant memoir BGS Borehole Logs Soil Survey of England Mapping (Scale 1:250,000)
Solid and drift	
Soils	
Soil type	
Water resources	Environmental Health Department
Abstractions	Environment Agency
Discharges	Local property door to door surveys

Site walkover surveys will be undertaken. This will enable the status and location of water features to be identified prior to the survey. The survey will obtain photographic evidence of important water features where access is permitted.

The assessment will have regard for statutory and general guidance. Such guidance includes the following documentation:

- Planning Policy Statement PPS25 – Development and Flood Risk (DCLG 2006);
- Development and Flood Risk: A Practice Guide Companion to PPS25 'Living Draft' (DCLG 2007);
- Environment Agency Pollution Prevention Guidance Notes (PPG):
- PPG 1 General guide to the prevention of water pollution;
- PPG 2 Above ground oil storage tanks;
- PPG 5 Works in, near or liable to affect water courses;
- PPG 6 Working at construction and demolition sites;
- PPG 7 Refuelling facilities;
- PPG 21 Pollution incident response planning;
- PPG 23 Maintenance of structures over water;
- CIRIA Report C532 Control of water pollution from construction sites (2001);
- CIRIA Report C650 Environmental good practice on site;
- CIRIA Report C502 Environmental good practice on site;
- EA Groundwater protection: policy and practice (GP3) (October 2007);
- EA Policy regarding culverts; and
- DEFRA Good practice guide for handling soils (MAFF 2000).

In addition to the general guidance, there is a range of environmental legislation that any development must adhere to throughout its life. Key legislative drivers relating to the water environment considered within the assessment will include:

- Groundwater Regulations 1998;
- The Water Supply (Water Quality) Regulations 2000 (Amendment) Regulations 2007;
- Private Water Supplies Regulations 1991;
- EC Fisheries Directive (78/659/EEC); and
- Environment Act 1995.

### Assessment Criteria

There are no published guidelines or criteria for assessing and evaluating effects on hydrology, hydrogeology or soils within the context of an EIA. The assessment will be based on a methodology derived from Institute of Environmental Management and Assessment (IEMA) guidance. The evaluation will also be based on Environment Agency guidance within their recently revised Pollution Prevention Guidance documentation. The methodology sets a list of criteria for evaluating the environmental effects, as follows:

- The type of effect (i.e. whether it is positive, negative, neutral or uncertain);
- The probability of the effect occurring based on the scale of certain, likely, or unlikely;
- The policy importance or sensitivity of the resource under consideration in a geographical context (i.e. international, national, regional or local); and
- The magnitude of the effect in relation to the resource that has been evaluated, quantified using the scale high, medium or low.

### Definitions of Policy Importance and Sensitivity: Water and Soils

<i>Importance and Sensitivity Context</i>	<i>Water and soils definition</i>
International and /or High	Important on a European or global level e.g. Coastal locations, Habitat Directive Sites
National and/or High	Important in England (e.g. SSSIs.Agricultural resources, strategic water resources)  Local water supplies, including private water supplies, where

Regional and /or Medium	<p>there is no alternative to private supplies</p> <p>Important in the context of the region; eg Sites of Special Scientific Interest (e.g. SSSI) Local Nature Reserves, catchment scale issues</p> <p>Private water supplies, located within vicinity of mains water supply. Private water supplies used only for agricultural purposes and not drinking water.</p>
District and/or Medium	<p>Important in the context of the local district eg. minor aquifer, important private water supplies</p>
Local and/or Low	<p>Important within watersheds to which the site may drain; within the site and immediate vicinity e.g. non-aquifer, minor watercourses up to 2 km from the site</p>

<b><i>Magnitude of effect</i></b>	<b><i>Runoff regime</i></b>	<b><i>Surface water quality</i></b>	<b><i>Water Supply</i></b>	<b><i>Riverine flow regime</i></b>	<b><i>Riverine morphology</i></b>	<b><i>Groundwater levels</i></b>	<b><i>Groundwater quality</i></b>	<b><i>Geological changes</i></b>
High	Change (>50%) in proportion of site rainfall immediately running off, changing surface water flows, flood risk or erosion potential	Change in water quality, changing water quality status with respect to EQS <sup>[4]</sup> for more than one month	Change in the quality of the supply with respect to DWS; Change in the flow of supply leading to reduction in water pressure and loss of supply	Change in flows of >5% resulting in a measurable change in dilution capacity or flood risk	Changes in erosion and deposition, with conservation interests put at risk	Change in groundwater levels leading to an identifiable change in groundwater flow regime and artesian flow, affecting water supplies	Change in groundwater quality, changing site quality with respect to DWS <sup>[5]</sup> for more than 1% of samples	Disturbance or loss of cited features of geological Sites of Special Scientific Interest (SSSI) such that the integrity of the designation is harmed
Medium	Change (10-50%) in proportion of site rainfall immediately running off, changing flood risk or erosion potential	Change in water quality, changing site status with respect to EQS for less than one month	Measureable change in the quality of the supply for less than 1% of samples with respect to DWS; Temporary discolouration and elevated sediment content.	Change in flows between 2-5% resulting in a measurable change in dilution capacity and flood risk	Some change in deposition and erosion regimes	Change in groundwater levels leading to an identifiable change in groundwater flow regime. Measurable change in flow to water supplies and base flows	Change in groundwater quality, changing site quality with respect to DWS for less than 1% of samples	Some disturbance or loss to cited geological features of SSSIs but no harm to the integrity of the designation
Low	Change (<10%) in proportion of site rainfall	Measurable change in water quality	Measurable change in water quality,	Measurable change in river flows of	Slight change in bed morphology	Measurable change in groundwater levels, though no	Measurable change in groundwater	No disturbance or loss to

<sup>4</sup> EQS – Environmental Quality Standard, as laid down in relevant EU Directives and national legislation

<sup>5</sup> DWS – Drinking Water Standards

	immediately running off, but no change to flood risk or erosion potential	but no change with respect to EQS	but no change with respect to DWS. No change in pressure or flow	<2%, but no change in flood risk	and sedimentation pattern. Minor rates of erosion	appreciable change in groundwater flow regime	quality, but not changing status with regards to DWS	SSSIs
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Professional judgement is used to assess the findings in relation to each of these criteria to give an assessment of significance for each effect. In order to determine the significance of effects, reference is made to the guidance material referred to within the assessment. Effects are considered to be of major, minor, or negligible significance. As a guide a significance table has been developed whereby the combination of sensitivity and magnitude give the significance of the effect. In some circumstances it is not possible to apply a simple sensitivity and magnitude level to an effect as there may be many variables that influence the significance of the effect. In such cases a full description of the reasoning behind the evaluation is given. Where an effect is deemed to be Major, this is defined as significant in EIA terms.

#### *Evaluation of Effect Significance*

<b>Sensitivity of Impact</b>	<b>Magnitude of effect</b>		
	<b>Low</b>	<b>Medium</b>	<b>High</b>
<b>International/High</b>	Minor / Major	Major	Major
<b>National/High</b>	Minor / Major	Major	Major
<b>Regional/Medium</b>	Minor	Minor / Major	Major
<b>District/Medium</b>	Not significant / Minor	Minor / Major	Minor / Major
<b>Local/Low</b>	Not significant	Minor	Minor / Major

## **Reporting**

Preparation of hydrological assessment reports will consider the risks to surface water, groundwater and water used for drinking and other uses. This will include a qualitative risk assessment of these water uses together with a risk assessment during the construction and operation of the wind farm development. Where risks are identified a mitigation strategy will be developed. Mitigation will be based on the specific industry guidance, such as the requirements of PPS25, the EA Pollution Prevention Guidance (PPG) notes and guidance provided by CIRIA. Additionally, measures will be recommended based on ScottishPower's experience of developing such strategies for wind farm sites. Preparation of a single hydrological features drawing for each site will be undertaken, assuming that digital mapping data can be provided in AutoCAD or ArcGIS format. Draft and final reports will be provided in electronic format in accordance with Dulas format.

It is anticipated that there will be the need for discussions with the Ecology Consultant and the Civils Consultant. An amount of time has been set aside for this element of the project.

A flood risk assessment (FRA) is required for all developments over one hectare in size even if they are outwith a floodplain. It is ScottishPower's experience that for wind farm developments in England the EA will only require an independent FRA if the built aspect of the wind farm (access roads, turbine bases, substation compounds, etc.) totals more than one hectare in plan area. For Queniborough wind farm development it is likely that built environment will total more than one hectare due to the scale of the site. As such ScottishPower have anticipated the need for an independent FRA report and have included for this within overall costs.

## **Archaeology and Historic Landscape:**

The scope of this assessment will meet the requirements of current planning regulations set out in PPG16 (HMSO 1990), PPG15 (HMSO 1994) and the Planning (Listed Buildings and Conservation Areas) Act 1990 (HMSO 1990).

## Baseline Conditions

The cultural heritage and archaeological assessment of the proposed wind farm will aim to identify the presence or absence of any archaeological features in the proposed site areas and assess the likely impact of the developments upon them. The study will collate known archaeological information on the proposed areas; identify any previously unknown archaeological sites or monuments through walkover surveys, inspection of aerial photographic records and cartographic records. The study area is defined as the area within the proposed development boundary for physical, direct effects, and for an area of up to 10km from the boundary of the site for cultural heritage setting effects.

Data will be gathered from the following main sources or archives:

- The National Monuments Record (of England)
- Local Authority Historic Environment Records
- Lists of Scheduled Ancient Monuments and Listed Buildings
- Readily available written sources held in local and national archives

Other sources of data (e.g. local libraries and archives) will also be consulted if considered applicable during the assessments. The type of data that will be assessed will include archived descriptions, historical maps and plans, historical photographs and depictions, aerial photography (various dates from the 1940s to the present), historical references, various publications and unpublished reports of archaeological fieldwork. The baseline data section of each report will include a general discussion of the history and archaeology of the area around each wind farm.

All sites and monuments of cultural heritage interest, Listed Buildings, Conservation Areas and Listed Parks and Gardens within a distance of up to 5 km from the edge of the proposed wind farm development area will be identified in the relevant assessment. We will additionally identify Scheduled Ancient Monuments no more than 10 km away, and identify any of those that might be subject to visual effects on their archaeological settings through the use of Zone of Theoretical Visibility analysis.

An archaeological walkover survey of each proposed wind farm development area will be undertaken with the aim of identifying any previously unknown remains. All archaeological sites and monuments will be assessed in the field for their survival extent, significance and relationship to other sites. A systematic approach will be undertaken in which total and even coverage of the proposed development areas will be ensured. Weather and any other conditions affecting the surveys will also be recorded. All individual features will be recorded, photographed and sketched. All features will be marked on plans, at a relevant scale keyed by means of Grid References to the Ordnance Survey mapping.

## Impact Assessment Method

International heritage charters (e.g. the Burra Charter) and National Legislation, Guidance and regulation all define cultural value in terms of the extent to which a given monument can inform this and future generations. Thus the yardstick by which cultural value is measured is that of information content. An adverse impact on cultural value can therefore be measured in the extent to which it reduces the information content of the monument. Based on the baseline conditions thus identified, the reports will identify areas where the proposed developments may impact on the archaeology identified or elements of the historic landscape. The assessments will also consider the potential visual impacts of the proposed wind farm upon the archaeological setting of statutory protected and nationally important monuments within

the wider areas of the proposed wind farm. Given baseline conditions the ES will also comment upon the potential of encountering hitherto unknown/unrecorded cultural heritage remains within the proposed development area. Please note that for the purposes of this assessment a site is a physical object, or arrangement, not now visible at ground surface made, caused or installed by human activity, that by its survival holds the potential to inform us and future generations about persons, actions, periods, or events. A monument is defined as any physical object visible at ground level that by its survival holds the potential to inform us and future generations about persons, actions, periods, or events in the past

#### *Cultural heritage sensitivity*

Our method of classifying cultural heritage sensitivity will be guided by the classification criteria used nationally by English Heritage in designating Scheduled Ancient Monuments and Listed Buildings. This will involve consideration of whether the sites/monuments/buildings are of local, regional or national cultural heritage significance, and will include consideration of such factors as their type, age, rarity, group value, site context, historical associations (i.e. with well-known persons or historical events), quality, character and style of construction and condition.

The criteria used to rate archaeological and architectural heritage sensitivity in the proposed development area are presented in the Table below:

<b>CRITERIA FOR ESTABLISHING RELATIVE CULTURAL VALUE</b>	
<b>Cultural Value</b>	<b>Criteria</b>
International and National	World Heritage Sites or Iconic Sites and Monuments; or Scheduled Ancient Monuments (Actual and Potential); or Grade I and II* Listed Buildings; or Remains of national or international importance, or fine, little-altered examples of some particular period, style or type
Regional	Grade II Listed Buildings; or Remains of regional or more than local importance, or major examples of some period, style or type, which may have been altered; Remains of national importance that have been partially damaged.
Local	Remains of local importance, lesser examples of any period, style or type, as originally constructed or altered, and simple, traditional sites, which group well with other important remains, or are part of a planned group such as an estate or an industrial complex; Cropmarks of indeterminate origin; Remains of regional importance that have been partially damaged or remains of national importance that have been largely damaged.
Negligible	Relatively numerous types of remains, of some local importance;

	Findspots of artefacts that have no definite archaeological remains known in their context; Remains of local importance that have been largely damaged; Isolated findspots; Undesignated structures
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### Magnitude of impact

Our classification of the magnitude of impact on cultural heritage sites will be rigorous and based on consistent criteria. This will take account of such factors as the physical scale and type of disturbance to them and whether features or evidence would be lost that are fundamental to their historic character and integrity. We will consider both direct and indirect (e.g. visual) impacts on cultural heritage remains.

The magnitude of the physical impact upon monuments caused by the developments will be rated using the classifications and criteria outlined in the Table below.

<b>CRITERIA FOR CLASSIFYING MAGNITUDE OF PHYSICAL IMPACT</b>	
<b>Physical impact</b>	<b>Criteria</b>
High	Major loss of information content resulting from total or large-scale removal of deposits from a site whether or not the site is associated with a monument; Major alteration of a monument's baseline condition; Any physical alteration to a Scheduled Ancient Monument; Any alteration to a Grade I Listed Building, massive alterations to a Grade II* or Grade II Listed Building
Medium	Moderate loss of information content resulting from material alteration of the baseline conditions by removal of part of a site, whether or not the site is associated with a monument. Moderate alteration of a monument's baseline condition Moderate alterations to a Grade II* or Grade II Listed Building
Low	Minor detectable impacts leading to the loss of information content. Minor alterations to the baseline condition of a monument. Minor alterations to a Grade II* or Grade II Listed Building
Negligible	Very slight or barely measurable loss of information content; Loss of a small percentage of the area of a site's peripheral deposits. Very slight and reversible alterations to a monument.
None	No physical impact anticipated

The potential for the proposed wind farm to visually impact upon the setting of statutory and nationally important cultural heritage sites within 10 km of the wind farm boundary will be

determined, in the first instance through Zone of Theoretical Visibility (ZTV) analysis. Each potentially impacted monument will be visited. The state of survival and the extent of the monument will be noted. The orientation of particularly sensitive views from the monument site will be recorded, as will any existing impacts upon the setting of the monument. A distinction will be made between monuments for which a relationship with their settings is predicated by their design or function and those with no ‘pre-programmed’ relationship with place. For the former, impacts can be severe, on purely functional grounds. However, in the light of recent PLI outturns, there is a need to consider the aesthetics of the monument in its setting, almost as a piece of art in its context. Based on the information thus gathered, the magnitude of impact upon each site will be determined. In determining visual impacts upon cultural heritage receptors the key issue will be the degree to which impacts upon a monument’s setting will result in the loss of information content, essentially a functional matter, and the degree to which the aesthetics of the monument are altered, essentially an amenity impact issue.

<b>CRITERIA FOR CLASSIFYING MAGNITUDE OF VISUAL IMPACT</b>	
<b>Physical impact</b>	<b>Criteria</b>
High	Substantial visual impact on a designed-in sightline to or from a ritual monument or prominent fort; Major alteration to the penumbral or close settings of a Scheduled Ancient Monument; Substantial visual impact within a Cultural Landscape as defined by <i>The Operational Guidelines to UNESCO’s World Heritage Convention (2008)</i> ; Substantial visual impact within or affecting an Iconic Site or Monument
Medium	Oblique visual impact on an axis adjacent to a designed-in sightline to or from a ritual monument but where the designed-in sightline of the monument is not obscured. Interruption of views to or from the glacis of a prominent fort (based on the proportion of the glacis that would be obscured). Alteration to the setting of a SAM outwith its penumbral setting or alteration to the setting of a Grade I, II* or II Listed Building beyond its curtilage. Appreciable but not major visual imposition within a Cultural Landscape.
Low	Peripheral visual impact on a designed-in sightline to or from a ritual monument. Alteration to the setting of a SAM outwith its penumbral setting or alteration to the setting of a Grade I or II* Listed Building beyond its curtilage. Minor visual imposition with a Cultural Landscape
Negligible	All other visual impacts
None	No intervisibility

### **Significance of impact**

Our method for rating the significance of direct impacts on each cultural heritage receptor incurring a potential impact will be based on a matrix that is a function of both the cultural heritage sensitivity and magnitude of impact at each receptor. Our classifications of significance of effect generally include None, Negligible, Minor, Minor-to-Moderate,

Moderate, Moderate-to-Major, Major and in some very rare cases Extreme. This matrix is presented below in the Table below.

<b>METHOD OF RATING SIGNIFICANCE OF IMPACT ON ARCHAEOLOGICAL / ARCHITECTURAL HERITAGE RECEPTORS BY THE PROPOSED DEVELOPMENT</b>					
	<b>Archaeological sensitivity</b>				
<b>Magnitude of Impact</b>	<b>Negligible</b>	<b>Local</b>	<b>Regional</b>	<b>National</b>	<b>International</b>
<b>High</b>	Minor-moderate	Moderate	Moderate-major	Major	Extreme
<b>Moderate</b>	Minor	Minor-moderate	Moderate	Moderate-major	Major
<b>Low</b>	Negligible	Minor	Minor-moderate	Moderate	Moderate-major
<b>Marginal</b>	Negligible	Negligible	Minor	Minor-moderate	Moderate
<b>None</b>	None	None	None	None	None

The predicted significance of visual impact upon Scheduled Ancient Monuments, Listed Buildings, Conservation Areas and Historic Parks and Gardens will be determined by considering their relative visual sensitivity in conjunction with the magnitude of visual impact predicted on them. The factors to be considered in determining the significance of the visual impacts will include, the scale and proximity of the wind farm;; issues of putative intervisibility of specific types of monuments; vistas and sightlines to and from monuments where these were designed-in elements of the monuments, the integrity of the setting i.e. is it in an unaltered state relative to a major phase of the biography of the monument? These factors are integrated in an evaluation of the significance of impact, treating each monument as a potential ‘art-historical’ entity in its immediate and larger landscape setting. This is a standard approach to assessing aesthetics in art and architectural history.

The method of classifying the magnitude of visual impact is shown in the Table below.

<b>SIGNIFICANCE OF VISUAL IMPACTS ON THE CULTURAL VALUE OF MONUMENTS</b>				
Importance of site or monument				
<b>Impact magnitude</b>	Negligible	Local	Regional	International or National
High	Minor	Minor	Moderate	Major
Medium	Negligible	Minor	Minor	Moderate
Low	None/Negligible	Negligible	Minor	Minor
Negligible	None	None	Negligible	Minor
The impacts recorded in highlighted cells are ‘significant’ in terms of the Environmental Impact Assessment (England) Regulations 1999				

## Mitigation

Once the potential impacts upon cultural heritage have been identified, and with the advance approval of the client, we will consult with the relevant local authority archaeologists and

English Heritage in devising any draft mitigation strategies. A brief review of local planning policy guidance will also be undertaken on relevant planning controls.

The draft mitigation strategies will take account of the impact assessment classifications and will aim to minimise adverse effects on cultural heritage. It will address impacts on both the known and the unknown/unrecorded cultural heritage remains.

The mitigation recommended in the assessments will aim to comply with the national planning policies that pertain to heritage, as expressed in PPG15 and PPG16. We will also be guided by English Heritage's guidelines relating to the treatment of Scheduled Ancient Monuments and Listed Buildings.

## **Reporting**

A report for the wind farm, in the form of cultural heritage and archaeology chapters, will be produced as a result of the environmental impact assessments, summarising findings and where appropriate, avoidance and mitigation measures. The reports will be written up in accordance with a format agreed with ScottishPower Renewables.

A series of figures (including modern and historic maps and photographic plates) would be supplied as part of each report. Tables would also be included to summarise the ratings of cultural heritage sensitivity, and the magnitude and significance of impacts.

All cultural heritage sites and monuments identified during the assessments will be given unique numbers. The known extent of each of these will be plotted onto location maps and tied into the national grid co-ordinates. We will also plot the proposed development areas onto the map base to show its extent in relation to cultural heritage sites and monuments. Graphics will be supplied in a format agreed with ScottishPower Renewables.

The appendices will include a cultural heritage site gazetteer (ordered by site no.) containing information about each site including the site name, site type, period/date of origin, grid reference, NMR/SMR no., protective designations and other descriptive information, where known or applicable.

## Scoping Consultees

<b>Organisation</b>	
Charnwood Borough Council	National Grid
Leicestershire County Council: Environment, Highways and Archaeology Teams	Civil aerodromes at Desford, Leicester, Kibworth, Saltby, Battleflats
	Defence Estates, MoD
Natural England	HM Inspector of Health and Safety
English Heritage	Civil Aviation Authority
Highways Agency	Leicestershire and Rutland Bat Group
National Grid	Joint Radio Company
Environment Agency	East Midlands Airport
Leicestershire and Rutland Wildlife Trust	NATS
RSPB	Ofcom
British Horse Society	O2 UK Ltd
Ramblers Association	Orange
National Trust	T Mobile
CPRE	Central Networks
Arquiva	CSS Spectrum Management
MLL Telecom	Met Office
National Grid Wireless	Melton District Council
Vodafone Ltd	Queniborough Parish Council
BBC	Syston Parish Council
BT Network Radio	Leicester City Council
Cable and Wireless	Harborough District Council
Stephen Dorrell, MP	

**Figure 1: Proposed Queniborough Wind Farm Site Location**

**Figure 2: Proposed Queniborough Wind Farm Site Boundary**