

Nuon UK Ltd

Rhyd Ddu Wind Farm

Scoping Report

27 February 2009

Entec UK Limited

Report for

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1. Introduction

1.1 Background to this Report

This scoping report is accompanied by a request for a formal view (i.e. the 'scoping opinion') on the information that should be supplied in an Environmental Statement (ES), which will set out the findings of an Environmental Impact Assessment (EIA).

This scoping report is submitted on behalf of Nuon Renewables. Nuon Renewables is a developer of wind farms within England and Wales. It wishes to develop a scheme on land known as Rhyd Ddu which is located to the south east of Llanerfyl in Montgomeryshire, Powys. The site location is shown in Figure 1. Nuon Renewables is a subsidiary of Nuon, a large European power company with experience in sustainable community initiatives coupled with community ownership of wind farms.

In developing the scheme, Nuon Renewables will undertake full consultation with the local community over the nature and development of the wind farm proposal. It will also seek to identify opportunities for the independent cooperative ownership of part of the project and also direct community funding for initiatives that improve quality of life and are sustainable.

The turbine layout of the development is yet to be fully established however in order to begin the process and establish a baseline an indicative 3 MW turbine with a potential height to blade tip of 126.5 metres has been assumed. Other options may exist for example to accommodate a smaller number of larger turbines; these options will be considered within the design, development and assessment process. At this stage however, it is the opinion of Nuon Renewables that the site has the capacity to accommodate a wind farm of 50MW or greater and it is for this reason that the scoping request is made to DECC. If the final proposed wind farm does exceed 50MW in capacity then an application for consent will be submitted to DECC under section 36 of the Electricity Act 1989 together with a request for deemed planning consent.

In addition to the erection of turbines ancillary works will also be required to facilitate the construction and operation of the development. Access tracks will need to be constructed to link the turbines and the control building and link the site to the public highways network. Stone for these tracks maybe won from existing and new borrow pits opened on the site providing that material proves suitable. The application would also include cabling, anemometer mast and sub-station together with hardstandings for construction cranes and a temporary site compound.

The ES will be submitted under *The Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2000* as amended by the *Electricity Works (Environmental Impact Assessment) (England and Wales) (Amendment) Regulations 2007* (referred to in this note as the EIA Regulations), which require that, for certain types of development an EIA should be undertaken before planning permission can be granted. The potential size and nature of the proposed wind farm indicates that the proposed development falls within Schedule 2 of the Regulations, which means that an EIA should be completed prior to the determination of the planning application.

1.2 Environmental Impact Assessment

Formal Government guidance on the EIA Regulations pertaining to the Electricity Act is found within *Circular 14/90 Electricity Generating Stations and Overhead Lines*. More extensive guidance is provided by Circular 02/99 *Environmental Impact Assessment* and by *Environmental Impact Assessment - A Guide to Procedures* (DETR, 2000) and specific information is provided in the BERR guidance on the Electricity Works (Environmental Impact Assessment) (England and Wales) regulations 2000 (URN 01/789 2000) and the Electricity Works (Environmental Impact Assessment) (England and Wales) (Amendment) Regulations 2007 Supplementary Guidance Note.

The ES will be prepared in accordance with these EIA Regulations and good practice and will contain information required by Schedule 4 to the regulations and will include in summary, those topics outlined within Table 1.1 below.

Table 1.1 Environmental Topics Addressed in an Environmental Assessment

| Topics in the EIA Regulations (SI No 293) | Topics in this Report |
|--|--|
| Population | Socio-economic, noise, visual and transportation |
| Fauna | Ecology, Ornithology |
| Flora | Ecology |
| Soil | Ecology |
| Water | Hydrology and Hydrogeology |
| Air | Project description |
| Climatic factors | Hydrology and Hydrogeology |
| Material assets, including the architectural and archaeological heritage | Cultural heritage, landscape and visual |
| Landscape | Landscape and visual |
| The inter-relationship between the above factors | No specific topic but addressed by analysis of the environmental changes associated with the development and the consequent effects. |

As noted above, the focus is on potentially *significant* effects that will be considered in relation to the following key stages of the proposed development:

- Construction: effects may arise from the construction activities themselves and associated changes (e.g. changes in road vehicle traffic) including the temporary occupation of land. These effects tend to be of limited duration of between 9-12 months;
- Operation: the more permanent environmental effects following the completion and commissioning of the wind farm whose lifespan is likely to be 25 years.

Decommissioning effects are considered to be the same as for construction.

The assessment of effects in the ES will be undertaken in the context of baseline environmental conditions. The assessment of significance in the ES will consider:

- The receptors that could be affected by the proposed development;
- The expected magnitude (where known) and other characteristics of the environmental changes that could affect identified receptors;
- The potential to avoid or reduce any potential effects such that they are not likely to be significant.

Cumulative impacts, (that is environmental impacts as a result of other development proposals within the planning system) will be considered also.

The avoidance and reduction of effects is often known as mitigation, but the EIA process can also provide environmental enhancement. Mitigation and enhancement opportunities can be identified at any stage in the evolution of a scheme, as EIA is an iterative 'process' that is used to help refine the project design. Box 1.1 provides definitions of mitigation and enhancement and related terms that will be used in the EIA.

| Box 1.1 | Definitions of Mitigation and Enhancement |
|--|--|
| Mitigation | |
| Mitigation is defined as covering the following. | |
| <ul style="list-style-type: none"> • Avoidance: Measures taken to avoid adverse effects; • Reduction: Measures taken to reduce adverse effects; • Compensation: Measures taken to offset/compensate for significant adverse effects. These usually take the form of attempting to replace what will be lost. | |
| Enhancement | |
| The genuine enhancement of environmental interests, unrelated to any avoidance, reduction or compensation, is not considered to be mitigation. However, it will still be relevant to the ES if it is proposed as part of the development. | |

If, before the assessment of an effect is complete, it becomes clear that the effect is not likely to be significant, no further assessment will be carried out and the effect will be 'scoped out'.

For effects with the potential to be significant, the report sets out the work that is needed to take forward the assessment. As much detail as possible is provided about the scope of work, in order to make it easier for consultees to comment on the proposals and thereby reduce the risk that they will identify new issues or alternative assessment methodologies later in the EIA process.

1.3 Structure of the Report

Following this introduction, Chapter 2 provides a description of the policy and planning context for the development. Chapter 3 outlines for each environmental topic, the potential significant effects that could arise at different stages of the proposed development and the proposed scope of each assessment. Chapter 4 summarises the proposed scope of the ES.

2. Planning Context

The relevant development plan for the area is the Powys Structure Plan and Montgomeryshire Local Plan. These Plans will be replaced by the Powys Unitary Development Plan in due course.

The Powys Unitary Development Plan has been subject to Inquiry and the Proposed Modifications and the list of Inspector's Recommendations not accepted by the County Council were made available for consultation purposes in November 2007. Subsequently a direction has been received from the Welsh Assembly Government which requires the Council to modify parts of the plan relating to mineral extractions. The Draft UDP for Powys should be adopted during the second half of 2009. When adopted, the UDP will replace the former plans as the development plan for the area. Relevant policies contained within these plans will be identified and used to inform the scope of the EIA.

Proposals that are in accordance with the Development Plan should be permitted, unless other material consideration suggest otherwise. Equally other material considerations may point to a planning approval where a proposal is identified as being contrary to a Development Plan. Key material considerations that concern this proposal will be national planning and energy policy.

The site falls within the boundary of Strategic Search Area B (SSA B) as identified within TAN8 in 2005 and within the revised SSA B boundary identified by Arup in 2008. SSA B has one of the largest indicative capacity targets for SSAs in Wales of 290MW. The ability of the proposed wind farm to contribute to the achievement of this target will be provided within the ES together with consideration of the relevant guidance and best practice contained within TAN8.

National Energy Policy in the form of White Papers, together with ministerial pronouncements from the Welsh Assembly Government will also be identified as part of the policy context and rationale for development.

3. EIA Content

The following sections within this chapter detail the proposed scope of assessment relative to the range of environmental topics.

3.1 Landscape and Visual

3.1.1 Context

The Landscape and Visual Assessment (LVA) section of the ES will be prepared with reference to a number of ‘best practice’ documents and in particular, the following publications and guidelines:

- Horner, MacLennan and Envision (July 2005) *Visual Analysis of Wind Farms: Good Practice Guidance: Consultation Draft* prepared for Scottish Natural Heritage;
- Scottish Natural Heritage (2002) *Visual Assessment of Wind Farms: Best Practice*, Report No. F01AA303A University of Newcastle;
- Landscape Institute and Institute of Environmental Management and Assessment (2002) *Guidelines on Landscape and Visual Impact Assessment* (GLVIA) Second Edition;
- Scottish Natural Heritage (April 2005) *Cumulative Effects of Wind Farms: Guidance* Version 2.

The proposed scope includes a comprehensive assessment of residual landscape and visual effects following the inclusion of mitigation within the scheme design.

3.1.2 Assessment of Landscape Effects

The landscape assessment will consider the effects of the proposed wind farm on existing landscape character, patterns and elements within the defined study area (specified to include all areas within 30km of any proposed turbine rather than the site centre). The focus of the assessment will be on the areas closest to the proposal site where effects have the potential to be of the greatest magnitude (a radius of 10km from any proposed turbine – referred to as the detailed study area). Indicative defined and detailed study areas are shown on Figure 2.

Given that the defined study area will be overwhelmingly (~98%) within Wales, landscape character information will be taken from the LANDMAP database for Powys (Montgomeryshire & Radnorshire), Ceredigion and the Snowdonia National Park. LANDMAP is organised in five aspects and, whilst information pertaining to landscape character is held principally in the Visual and Sensory Aspect, CCW will require that the ES makes due reference to the data that is held in the other four aspects. As LANDMAP data and its component Visual and Sensory Aspect Areas will cover almost the entire study area, it is not anticipated that there will be any extant local landscape designations that will need to be included within the

assessment. A detailed assessment of the potential indirect landscape effects upon the Snowdonia National Park will be included.

The landscape assessment will also cover the potential for indirect landscape effects upon the setting of historic parks and gardens, whilst, in line with emerging wind farm EIA best practice, potential effects upon locations with a heritage designation such as listed buildings, scheduled monuments and conservation areas will be assessed in the cultural heritage chapter. Similarly, the effects upon any Outstanding or Special Landscapes of Historic Interest in Wales will be assessed in the cultural heritage chapter although the landscape assessor will liaise with the cultural heritage assessor in compiling these assessments. The landscape assessment will be logically set out to maximise its transparency and ensure that conclusions are readily traceable. The text will be supported by concise tables and clear illustrations.

3.1.3 Assessment of Visual Effects

The visual assessment will consider the effects of the proposed Rhyd Ddu Wind Farm on the views and the overall effect on visual amenity within the defined study area. Based upon experience of undertaking visual assessments for other wind farms in Wales, it is proposed that, with the exception of major settlements, national trails and key tourist designations, the visual assessment concentrates upon potential visual receptors located within the detailed study area, as these are more likely to sustain higher magnitudes of visual change. In order to help ensure that visual receptors most likely to sustain higher magnitudes of visual change are identified, visits will be made to all residential properties within 2.5 km of any proposed turbine prior to the detailed visual assessment being undertaken.

Key to the detailed visual assessment will be the production of visualisations in the form of photomontage and wireframe views. These visualisations should illustrate the magnitude of visual change likely to be associated with a range of viewpoint locations. Ideally they will illustrate views from those locations likely to experience the highest magnitudes of visual change, the likely visual change at particularly sensitive receptors and a range of locations representative of different distances and directions from the site. Entec appreciates the contribution to be made by consultees in drawing up a schedule of such viewpoint locations.

To facilitate the drawing up of such a list, Entec has employed an indicative turbine layout to produce preliminary maps of the ZTV of the proposed wind farm at both blade tip (126.5m) and hub height (80m) within the defined study area. The ZTVs are included as Figures 3 and 4. To the same end, Entec has also identified a preliminary list of potential viewpoint locations based upon an initial review of the defined study area. This review drew upon a desk-based study, the preliminary ZTV, local knowledge and an initial site survey.

The review identified 20 potential viewpoint locations for inclusion in the subsequent Environmental Statement (ES) as photomontage and/or wireframe visualisations. It also indicated that, whilst the immediate surrounding area has a low resident population, there are a number of potential visual receptors with middle or long-distance views. The appropriateness of the viewpoint locations identified will be tested against preliminary wireframe views and assessed in the field.

Preliminary viewpoints are as follows:

1. A location on the closest section of Glyndwr's Way long distance footpath that is not screened by forestry, such as in the vicinity of Dolau-ceinion;

2. The view from the minor road immediately south-west of the proposal site;
3. Views from the isolated properties to the west of Cefn-llys Isaf and to the immediate north-east of the proposal site, in the vicinity of Belan Hall;
4. A location on a relatively open and elevated section of Glyndwr's Way long distance footpath to the west of the proposal site, such as Bryn Gwyn;
5. A view from one of the isolated properties located along the minor road to the immediate north-west of the proposal site such as Dolwen or Neinthirion;
6. A view from one of the more elevated ridges to the south-east of the proposal site such as the junction of bridleway and footpath near the 432m high-point on Mynydd Garnedd-wen.
7. A viewpoint at Talerddig, the nearest settlement of to the south-west of the proposal site;
8. Tynyreithin near Carno – representative of middle distance views from the south-west and also be useful for the cumulative assessment due to other existing wind farms in this area;
9. A location representative of views from residential properties in the upper reaches of the Rhiw Valley to the east of the proposal site in the vicinity of Cefn Coch;
10. A location in the vicinity of the village of Llangadfan as one of the closest settlements to the north;
11. A location near Llanfair Caereinion, the largest settlement in the Banwy Valley, the centre of which is a conservation area. Given that much of the village is topographically enclosed, this viewpoint is likely to be an elevated location, for example, above Bryntirion to the south of the settlement or Pentre Isaf to the north-west;
12. In the vicinity of Llidiardu at the 298m high point predicted to have the most extensive views from the east;
13. A more distant elevated location to the north of the proposal site, such as on the Pererindod Melangell above Lake Vyrnwy;
14. A summit in the part of the Snowdonia National Park south of the A470 between Dinas Mawddwy and Dolgellau such as Maen Du;
15. Summit of Aran Fawddwy - this popular summit, located within both the Snowdonia National Park and the study area, is a good example of longer distance views available from similar hilltops and ridgelines on north-western and western fringes of the study area;
16. The summit of Pumlumon - representative of long distance views from the south-west and also be useful for the cumulative assessment due to other existing wind farms in this area;
17. A location on Kerry Hill south of Newtown – The Kerry Ridgeway is a popular PRoW and will be representative of middle and long distance views from the south-

east. Will also be useful for the cumulative assessment due to other existing wind farms in this area;

18. A summit to the west of the A487 such as Cadair Idris – representative of potential long distance views from the southern-most part of Snowdonia National Park, plus this location is useful for cumulative assessment as there are already at least four wind farms are visible in views from these summits;
19. Beacon Ring Camp on Long Mountain – an elevated location on the Offa’s Dyke long distance footpath and indicative of the type of views that could be available from elevated locations on the eastern fringe of the study area;
20. A summit in the northern edge of the study area such as Moel Sych in the Berwyn Mountains.

These provisional locations are shown on Figures 3 and 4.

Other viewpoints within the detailed study area will be identified as the baseline study is undertaken and will relate to individual properties or small groups of properties.

Previous experience has shown that photomontages best illustrate the changes to views from viewpoints relatively close to the proposal site, whilst wireframe views are better suited to highlighting the smaller-scale changes associated with more distant views. On the basis of the preliminary list of viewpoint locations given above, Entec would anticipate that viewpoints 1 to 12 would be illustrated by photomontages and the remainder with wireframe views.

The visual assessment will also be presented in logical stages allowing the evaluation of significance to be clearly understood. The scope for using illustrative material to support the visual assessment is even greater than for the landscape assessment and maximum use will be made of maps, wireframes and photographs as well as the photomontages.

3.1.4 Cumulative Assessment

Rhyd Ddu falls within Strategic Search Area B (SSA B) as identified within TAN8 in 2005 and within the revised SSA B boundary identified by Arup in 2008. As such, any assessment of landscape and visual impact must include an assessment of any cumulative effects generated by the interaction of Rhyd Ddu and other wind farms.

Entec proposes that the cumulative study area, within which cumulative landscape or visual effects will be assessed should be 60km (i.e. including all points which could be within 30km of both the proposed Rhyd Ddu Wind Farm and any another wind farm site). Sites to be considered within the assessment are proposed to be those that are already built or under construction, those consented but not yet built and those for which a detailed planning application has been submitted but not yet determined. Sites which may be at screening and scoping stages are proposed to be excluded on the basis that they may not progress to full applications and do not have sufficient detail available (on location and size of turbines) to allow intervisibility or sequential visibility to be assessed with any degree of certainty.

Based upon experience gained undertaking similar cumulative assessments for proposed wind farms elsewhere within SSA B, Entec proposes that wind farms associated with SSA A, are excluded from this cumulative assessment. Wind farms within, or in the immediate vicinity of SSA A are at least 50 km to the north of Rhyd Ddu and are potentially seen in cumulative view from a very limited number of elevated locations in the Berwyn Mountains. In these locations

turbines at Rhyd Ddu and the SSA A wind farms would be at least 20 km away and always seen in opposite directions. In these circumstances, previous cumulative assessments have demonstrated that the distant presence of turbines at Rhyd Ddu would be highly unlikely to generate an incremental magnitude of visual change that would be sufficient to change the cumulative visual effects sustained by receptors at these locations from previously insignificant to significant.

ZTVs for the cumulative assessment will be calculated for relevant wind farms within the cumulative study area and a map produced showing locations within the study area where more than one wind farm would be theoretically visible in a 360° view. Wireframes and if appropriate photomontages, will be produced for key intervisibility locations to illustrate potential cumulative visual effects.

3.1.5 Summary of Landscape and Visual Assessment

Table 3.1 Summary of Landscape and Visual Assessment

| Environmental Topic | Construction | Operation |
|----------------------|---|--|
| Landscape and Visual | <ul style="list-style-type: none"> • Wind farm design and layout including access roads and ancillary structures. • Short term landscape and visual impacts during the construction period. | <ul style="list-style-type: none"> • Effects on the landscape resource. • Visual effects concentrating on areas indicated within the ZVT and likely to include: <ul style="list-style-type: none"> • dwellings and settlements; • designated areas such as historic gardens and designed landscapes; • hills, hill summits; walking routes; • tourist destinations / recreation areas; • major transport routes roads and footpaths; • local key road routes; • cumulative impact. |

3.2 Ornithology

3.2.1 Context

In addition to Landscape and Visual Impact Assessment for wind farms, ornithological impact assessment commonly forms one of the key components of the EIA and this has led to the publication of a number of bird/ wind farm guidance documents. The ornithological impact assessment will be prepared in accordance with such 'best practice' documents and in particular, the following publications and guidelines:

- Scottish Natural Heritage (November 2005). Survey methods for use in assessment of the impacts of proposed onshore wind farms on bird communities;
- Scottish Natural Heritage (July 2006). Assessing significance of impacts from onshore windfarms on birds outwith designated areas;
- Band, W., Madders, M. & Whitfield, D.P. (2007). Developing field and analytical methods to assess avian collision risk at windfarms. In: *Birds and Windfarms*. de Lucas, M, Janss, G. and Ferrer, M. (eds). Lynx Edicions, Barcelona.

3.2.2 Baseline Overview

Bird surveys have been undertaken following SNH guidance as no equivalent guidance is available from CCW, RSPB or Natural England and indeed our experience is that CCW and RSPB defer to SNH's guidance on survey methods and assessment for wind farms.

To this end, vantage-point watches based upon the method statement prepared by Mike Madders for SNH were carried out between August 2007 and July 2008 inclusive. These surveys focus on identifying whether 'target' species such as highly protected raptors or migratory geese are present on, or fly over the site. Any regularly used flight lines can be identified and hence turbines can be located where they will reduce collision risk to birds. Where necessary, data generated during vantage-point watches can also be used to estimate the risk of collision with turbines by incorporation into a suitable model, such as that developed by SNH (the Band Model).

The Madders methodology guidance is that vantage-points should be chosen parsimoniously to achieve maximum site visibility from the minimum number of locations such that all parts of the survey area are within 2km of a vantage-point. Given the size and shape of the site, vantage-point watches were carried out from three locations. During the course of the surveys it was discovered that some areas of the site may not have been adequately covered and so a fourth survey point was used in later surveys. All four vantage points are shown on Figure 5.

With regards to the level of survey effort 48 hours per vantage-point was undertaken during late summer and winter 2007/08 (August 2007 to March 2008) and a further 36 hours per vantage-point during the breeding season (a minimum of 36 hours being recommended in SNH bird/wind farm guidance for each relevant season). Surveys have been timed to include dawn and dusk observations in order to increase the chances of recording barn owl and any evidence of hen harrier roosting on site. The results of the 2007-8 winter vantage-point surveys comprised flights of hen harrier (13 flights between August and March inclusive) and occasional flights of red kite. The timing of the hen harrier flights did not indicate that birds were roosting on or near to the site. During the breeding season target species activity was also low with occasional hen harrier flights in the early and late part of the season, plus occasional red kite and curlew flights and two flights of peregrine. Barn owl has not been recorded from vantage point surveys but is known to be breeding nearby (see below).

In addition to these surveys, walkover surveys on the open ground and point counts in the plantation woodland were conducted on a monthly basis over winter to record species that may not necessarily be detected by vantage point work (e.g. flocks of feeding passerines or waders loafing in fields). These surveys found a range of common passerines typical of the habitats present. During the breeding season a 'territory mapping' survey was conducted on open

ground along with point counts in the woodland blocks and species specific surveys for the following species: goshawk, tree-nesting merlin, nightjar, barn owl and snipe.

The 'territory mapping' breeding bird survey was based on the Common Bird Census (CBC) and O'Brien and Smith methodology. While up to ten visits are the norm for CBC, three visits are generally sufficient for EIA purposes and this approach is recommended for survey of farmland sites in SNH bird/ wind farm guidance. During the survey visits, which were undertaken between April and June 2008 inclusive, all parts of the open ground of the application site were approached to within 100m and all birds encountered, either visually or audibly, were recorded. The number of breeding pairs present for each species recorded was estimated from the data collected. In addition to this, surveys specifically designed to detect breeding snipe were carried out. This involved evening visits to suitable habitat to listen for drumming snipe once per month during April to June 2008 inclusive. The results of the CBC survey show a breeding community typical of the habitats present with skylark and meadow pipit being the most numerous species. Curlew and snipe were both recorded but did not exhibit behaviour indicative of breeding. No snipe were recorded during additional snipe surveys.

Goshawk surveys were carried out in the main woodland block on site. These involved additional vantage point watches in February and March 2008 to look for displaying birds and, during April to late July inclusive, four visits were made and surveys carried out using a combination of standard methodology and a call broadcast methodology which is based on methodology used in North America for goshawk surveys. This work was undertaken under a Schedule 1 licence.

During the goshawk surveys, suitable habitat for tree-nesting merlin was surveyed (plantation edges and rides to within 100m of the plantation edge). The combination of the goshawk, merlin and other bird surveys was also suitable to allow detection of any red kites nesting on site.

No goshawk, merlin or nesting red kite were recorded during these or any other surveys

Barn owl surveys, following the methodology outlined in Hardey et al (2006), were conducted in June and July 2008 in the vicinity of a building with potential for nesting, located adjacent to the northern part of the site. This involved watching from a suitable vantage point to see if adults returned with food. This was observed on 3 July, strongly indicating that birds are breeding here.

Nightjar surveys were carried out in suitable habitat on four occasions in late June/early July 2008 following standard methodology which involved walkover surveys between the hours of 2200 and 0000 and 0200 and 0400. No nightjars were seen or heard during these or any other surveys.

Further details of the bird surveys will be included in baseline ornithology reports that will be made available to the relevant consultees as part of the consultation process.

3.2.3 Information Gaps

With reference to Figure 5 it can be seen that there was a small area of the site, in which turbines are proposed, which was not visible at collision risk height within 2km of a VP. However, this is not considered to be a significant gap for the following reasons:

- It is a small area of the site and therefore its contribution to the overall activity of target species is likely to be small;
- Areas of the site adjacent to here were covered by VPs meaning that target species flying across this area either from or to the site are likely to have been detected before or after entering this area;
- Target species such as male hen harrier and red kite are highly visible birds and are likely to have been detected flying over this area despite it being just beyond 2km from VPs.

Notwithstanding this a fourth survey point was used in later surveys as shown in Figure 5 to assess the missing areas of woodland.

Nuon has chosen to collect data over a second winter in accordance with best practice to determine if there has been any change in use of the site by target species. Full results of these surveys are not available since the surveys have not yet been completed.

Due to changes in the site boundary subsequent to the breeding bird season there are some areas of the site that were not covered by the CBC survey. However, these areas are adjacent to the area covered and comprise similar habitats, thus it is not anticipated that they would support any different species to those recorded from the area covered. Notwithstanding this, additional CBC surveys will be undertaken during April, May and June 2009 to cover these areas.

Due to access restrictions, the first three goshawk and merlin survey visits were not able to cover all suitable habitat for these species on site. However, due to the lack of sightings of these species from all survey work on site to date it is unlikely that any were nesting here.

3.2.4 Assessment of Effects

The key issues when considering the interaction of birds with wind farms are as follows:

- The effects of direct habitat loss due to land take by wind turbine bases, tracks and ancillary structures;
- The effects of indirect habitat loss, i.e. the displacement of birds from the proximity of wind turbines. Such disturbance may occur as a consequence of construction work, or due to the presence of the wind farm close to nest or feeding sites or on habitual flight routes; and
- The effects of collision with rotating turbine blades, power cables, guy lines and fencing (i.e. killing or injury of birds), which is of particular relevance for sites located in areas known to support raptors or large concentrations of waterfowl.

In order to assess the potential impacts of a wind farm, both the value of the site itself and of the zone of potential influence around the site to birds and the level of flight activity within the site should be determined. SNH guidance (SNH, 2005) suggests that assessment should concentrate on target species, for example those specially protected or those which occur at a site in regionally or nationally important numbers. From the survey work undertaken at Rhyd Ddu the target species on which the assessment will focus are hen harrier, red kite, peregrine, barn owl, curlew and snipe.

3.2.5 Effects to be Scoped Out

It is the intention to fully assess the above potential impacts during the EIA with none being scoped out.

3.2.6 Summary of Ornithological Assessment

Table 3.2 provides a summary of the proposed scope of the ornithological assessment.

Table 3.2 Summary of Ornithological Assessment

| Environmental Topic | Construction | Operation |
|---------------------|---|--|
| Ornithology | <ul style="list-style-type: none"> Potential impact of direct habitat loss and disturbance to bird species during construction | <ul style="list-style-type: none"> Potential for displacement of bird population and collision. |

3.3 Ecology and Nature Conservation

3.3.1 Biodiversity Context

This section considers the potential effects of the proposed development on the biodiversity of the Application Area and surrounding land and identifies the scope of any further surveys and assessment required. It is based upon the following:

- The identification of statutorily designated sites of nature conservation interest within 2km through reviewing the Multi Agency Geographical Information Centre (MAGIC) <http://www.magic.gov.uk> and information supplied by the Countryside Council for Wales; for sites that may be designated for bat populations the search was extended to 5km;
- Data on species and non-statutory designated sites within 2km received from the Biodiversity Information Service for Powys and the Brecon Beacons;
- Phase 1 Habitat Surveys undertaken by Entec ecologists in April, August and October 2008 covering the Application Area and surrounds where landowner access was agreed. This survey has incorporated *ad-hoc* peat depth measurements within bog habitats;
- National Vegetation Classification (NVC) survey of selected areas in mid-September 2008;
- Surveys for great crested newts undertaken in May and June 2008 to ponds within the Application Area and those within 250m of the Area where landowner access was agreed;
- Surveys for red squirrel in mid-October 2008 to selected woodland areas within the Application Area where landowner access was agreed;

- Bat surveys undertaken between early July 2008 and mid October 2008 within the Application Area and surrounds where landowner access was agreed. The surveys involved manual walked/ driven transects and use of automated Anabat detectors;
- Consideration of nature conservation constraints identified during the EIA for the adjacent Mynydd Waun Fawr wind farm application and which may therefore be present at the Rhyd Ddu site.

Full details of these surveys are set out in the Ecological Baseline Report.

It should be noted that the Extended Phase 1 surveys does not include all of the land within the scoping boundary. Some areas of the north-west, west and southwest of the site were excluded. It was also not possible to survey two ponds within the Application Area within the amphibian survey season last year as land access had not been agreed at that stage. The unpredictable and inclement weather throughout much of May and June 2008 also hampered efforts to commence formal bat surveys.

3.3.2 Nature Conservation Designations

There is one designated site within 2 km of the application area; Gweunydd Dolwen SSSI which is situated around 1.5km north of the Application Area. The site is 2.3 ha in area and was notified in 2000 for acid and neutral dry grassland and for dense gorse scrub.

A former lake, Llyn Lort, is located approximately 1.2km to the east of the site boundary. It is known that the site was until recently designated as a non-statutory Wildlife Site (Llyn Lort Wildlife Site) for being a former lake supporting a floating mat of vegetation. However based on the information provided by the local records centre in January 2008 it no longer appears to be designated.

There are no sites which are designated for bats within 5km.

3.3.3 Habitats and Species

Habitats and Flora

The application area comprises eighteen different habitat types and a number of watercourses and waterbodies. The predominant habitats are coniferous woodland, marshy grassland and wet modified bog. It is apparent that the upland landscape in the area of Rhyd Ddu, including the Application Area, has an established history of anthropogenic modification from activities including drainage, agricultural improvement, intensive grazing, planting of forestry and formation of access tracks. Within the Application Area, this modification in combination with topographical and hydrological conditions has given rise to the existence of a complex mosaic of habitats and habitats which are very variable in extent, structure and floristic composition. The boundaries between these habitats are often not particularly clear and the habitats are often in a transitional state which do not readily sit within established classification categories. There are localised areas of less-modified bog which contain a greater occurrence of bog vegetation than more degraded/modified examples. The woodland blocks off-site to the north near Nant yr Eira, on-site in the east at Mynydd Pantyceiliagwydd and on-site in the west of the Application Area are variable in structure and composition with access tracks, rides, recently clear-felled areas and areas in a transitional state following clearance a number of years previously.

One notable plant, the nationally scarce bog sedge has been recorded within mire habitat in the Cors yr Ebolion woodland in the Application Area. Seven plant communities, 65 different species of vascular plant, 37 bryophytes and one lichen were recorded during the NVC survey. Other less notable species with a limited national distribution but fairly typical of the wet upland habitats present include bog stitchwort (*Stellaria uliginosa*) and common butterwort (*Pinguicula vulgaris*). All other species recorded during the surveys were considered to be generally common and widespread species typical of the area and habitats surveyed

Species

The proposed application area and adjacent land is potentially suitable for a range of protected species, as described in more detail below.

Great crested newt (*Triturus cristatus*): There are no historical records of the species within 2km. There are nine waterbodies identified to date during the Extended Phase 1 Habitat Survey; six waterbodies within the Application Area, one adjacent to the eastern boundary and two located some distance to the north off-site. However great crested newt surveys undertaken in early May and early June 2008 reveal that great crested newt are not present in five of the six waterbodies surveyed within the Application Area, to which access was possible. Nor are great crested newts present in the two off-site ponds to the north. Access to one waterbody within the western woodland on-site and one adjacent to the eastern boundary was not possible due to access restrictions during the 2008 survey season.

Bats: There are no historical records of the species within 2km but common and soprano pipistrelle (*Pipistrellus pipistrellus* and *Pipistrellus pygmaeus* respectively) and Daubenton's (*Myotis daubentoni*) bats have been recorded from Mynydd Waun Fawr.

There are numerous rides and large clear-felled areas within the woodland habitats, woodland edges, watercourse corridors and at least 7 waterbodies which are potentially suitable foraging habitats for bats. A total of 23 structures were identified during the Extended Phase 1 Habitats survey as containing features with varying degrees of suitability for roosting bats. There are four structures that are considered to have 'high' potential to support roosting bats within/adjacent to the Application Area and one with 'medium' potential within the Application Area. A further three potential roosts with medium potential are located to the north of the Application Area.

Common pipistrelle, soprano pipistrelle, a *Myotis* species (believed to be natterer's *Nyctalus nattereri*) and noctule (*Nyctalus noctula*) have been recorded throughout the Application Area and immediate surrounds. Leisler's bat (*Nyctalus leisleri*) was briefly encountered off-site to the north on one occasion. The vast majority of the bat contacts recorded are pipistrelle bats. The most important areas for noctule seem to be off-site to the north around Nant yr Eira and in the eastern section of the Application Area between the Mynydd Pantyceiliagwydd woodland and Cringoe Bach. No roosts were confirmed.

Water vole, otter and white-clawed crayfish: There are historical records of otters within 2km. There are no historical records of the other species within 2km. There are at least seven water bodies and a number of watercourses throughout the Application Area which may be suitable for these species and otter spraints have been found at two waterbodies, one off-site to the north and one in the centre of the site. However there is insufficient information available at this stage to determine whether water vole or white clawed crayfish are present.

Badger (*Meles meles*): Badger setts and badger activity have been recorded at the adjacent Mynydd Waun Fawr site. The woodland areas and embanked areas within the Application Area and surrounding land are potentially suitable for badgers for constructing setts and there are ample foraging opportunities present also. Two confirmed badger setts have been recorded in the centre of the Application Area and one off-site to the south. A potential sett was also recorded on the eastern boundary of the Application Area.

Dormouse (*Muscardinus avellanarius*): There are no historical records of dormouse within 2km. Dormouse is associated with extensive networks of hedgerow, larger areas of generally broadleaved semi-natural woodland or coniferous woodland with a well-developed scrub/shrub layer in open areas and scrub. Fragmented, localised and generally poor examples of these habitats are present within the Application Area and its peripheries and therefore it is considered unlikely that dormouse is present.

Red squirrel (*Sciurus vulgaris*): The coniferous plantation areas are potentially suitable for red squirrel and there are historical records of the species within 2km, albeit these are from the 1960s. Red squirrel was not recorded during the red squirrel surveys undertaken and it is considered that the species is probably absent from the Application Area.

Reptiles: There are a variety of habitats suitable for reptiles on site including tussocky grassland and woodland rides. Common lizard (*Zootoca vivipara*) has been seen during the Extended Phase 1 Habitat survey and there are records of slow worm (*Anguis fragilis*) within 2km.

Marsh fritillary (*Euphydryas aurinia*), high brown fritillary (*Argynnis adippe*) and large heath (*Coenonympha tullia*) butterflies: There are historical records of high brown fritillary and large heath within 2km. Marsh fritillary is a local BAP species.

Concentrations of the foodplants for marsh fritillary and large heath occurred at only a small number of discrete locations. It was considered that the habitat suitability for high-brown fritillary was poor and the species was unlikely to be present.

3.3.4 Scope of the Assessment

Table 3.3 sets out the potential environmental changes and potential effects that will be included within the scope of the assessment (depending upon the outcome of further survey work).

Table 3.3 Biodiversity: Environmental Changes and Potential Effects

| Receptor | Changes and Potential Effects |
|--|---|
| Enabling Works and Construction Phase | |
| Habitats within the Application Area | <ul style="list-style-type: none"> Direct temporary loss of habitat resulting from temporary land-take accompanying construction activities. Indirect effects such as alterations to hydrology from nearby activities. |
| Great crested newts | <ul style="list-style-type: none"> Potential harm or injury to great crested newts and loss of foraging/refugia/hibernacula habitat, if the species is proved present, depending upon construction locations/activities |
| Foraging and roosting bats | <ul style="list-style-type: none"> Potential harm or injury to bats and loss of foraging and roosting habitat, if the species is proved to roost on site, depending upon construction locations/activities |
| Water voles/otter/white clawed crayfish | <ul style="list-style-type: none"> Potential harm or injury to species and loss of foraging and burrowing/refugia habitat for water vole/white clawed crayfish, or holt/den/couch habitat for otter, if these species are proved present, depending upon construction locations/activities |
| Operational Phase | |
| Bats | <ul style="list-style-type: none"> Potential effects of wind farm operation on foraging and/or communing bats |
| Habitats within the Application Area | <ul style="list-style-type: none"> Permanent loss of habitat resulting from permanent land use change Indirect permanent changes from fragmentation and alterations to hydrological regime. |

The rationale behind Table 3.3 and the potential effects for which further investigation is considered to be/or not to be required is described below with an outline of the work required where relevant.

Designated Sites:

- The Gweunydd Dolwen SSSI is located ~1.5km to the north of the Application Area and the former Llyn Lort Wildlife Site approximately 1.2 km from the Application Area to the east;
- It is therefore considered that, due to reasons of distance there will be no effects on these sites. No detailed assessment is therefore proposed.

Habitats:

- An Extended Phase 1 Habitat Survey of the small area in the northwest corner of the Application Area will be undertaken once landowner access is negotiated and will in turn complete the baseline that informs the impact assessment for habitats;
- A detailed assessment of nature conservation value of the habitats present will be undertaken. Areas of habitat to be affected by proposed works will be quantified and the loss put into context with the rest of the Application Area and surrounding

areas. It is envisaged that appropriate site design will be important in reducing potential effects.

Species:

- **Great Crested Newt:** Additional ponds will be searched for during the forthcoming Extended Phase 1 Habitat Survey of the small area to the northwest corner of the Application Area areas not yet surveyed where access negotiations are ongoing. Great crested newt surveys will be undertaken at the two ponds which were not surveyed last year and indeed to any additional ponds encountered during the forthcoming Extended Phase 1 Habitat Survey. Given the discrete nature of potential construction impacts and with appropriate site design it is likely that effects will be minimal. Nonetheless if great crested newts are recorded then an appropriate mitigation strategy will be described.
- **Foraging and Roosting Bats:** Potential roost sites and numerous foraging areas have been identified during the Extended Phase 1 Habitat Survey. Bat surveys have recorded generally low numbers of six species of bats, predominantly pipistrelles. Nonetheless, the issue of bats and windfarms is a complex and emerging issue and it is envisaged that detailed assessment will be required. Also, noctule, a species deemed to be at 'high' risk from windfarms has been consistently recorded across the Application Area. It is envisaged that appropriate site design incorporating a stand-off distance from potential bat foraging features and avoiding key areas for noctule will be crucial to reducing potential impacts.

Further bat surveys and potential roost surveys are proposed in 2009 to inform the assessment, in particular to establish the usage of the Application Area by noctule in greater detail.

- **Water vole/ otter/ white-clawed crayfish:** Waterbodies and watercourses are present which may support these species. However, given the discrete nature of potential construction impacts (access track crossing points) it is envisaged that effects will be minimal. Nonetheless the location(s) for installation of infrastructure are currently not known. Once these have been determined, a survey will be undertaken of relevant waterbodies/ watercourses to determine the status of the species and an assessment will be made as to whether they would be at risk of significant effect. If any of the species are recorded then an appropriate mitigation strategy will be described.

Surveys for these species are usually undertaken between April and October when the species are most active and would comprise one survey to relevant habitats.

- **Badger:** Badgers are present in the Application Area. However the species is common and widespread and construction impacts tend to be discrete. As a result effects on badgers are expected to be minimal. However once areas to be affected have been confirmed, an appropriate mitigation strategy will be described where necessary. It is not considered necessary at this time to undertake detailed monitoring of the badger population nonetheless the status of one existing sett along the eastern boundary will be confirmed.
- **Red squirrel:** The surveys undertaken indicate that the species is probably absent from the Application Area and a detailed assessment will not be required.

- **Common lizard:** There are a variety of habitats suitable for common lizard and the species is present. By consideration of the landtake associated with the development in the context of available habitat and with appropriate measures in place during construction, it is unlikely that the species will be significantly affected and therefore it is considered that a detailed assessment will not be required. Nonetheless an appropriate mitigation strategy will be described.
- **Marsh fritillary/ high brown fritillary/large heath:** Concentrations of the foodplants for marsh fritillary and large heath occurred at only a small number of discrete locations. The potential presence of these species is not considered to represent a significant constraint given the discrete locations which could readily be avoided by site design. It was considered that the habitat suitability for high-brown fritillary was poor and the species was unlikely to be present. It is therefore considered that a detailed assessment will not be required.

3.4 Noise

The methodology used for the assessment of operational noise from wind farms in the UK is found in 'ETSU-R-97: The Assessment and Rating of Noise from Wind Farms' (1996).

3.4.1 Assessment of Effects

The assessment of wind farm noise is undertaken in two phases. Initially the background noise levels resulting from the operation of the wind farm (at a windspeed of 10ms^{-1} measured at 10m height) are predicted using noise propagation software using the model defined in ISO 9613-2 Attenuation of Sound During Propagation Outdoors (1992) for the closest residential receptors. Should these predictions show that noise levels experienced at the closest receptor are below LA90 35dB, there is no requirement to take the noise assessment further.

However, it is anticipated that operational noise levels would be above 35 dB(A) at the surrounding receptors; therefore in accordance with ETSU-R-97 a full noise assessment following the Noise Working Group guidelines is required as part of the EIA process.

The aim of the full assessment is to identify suitable noise limits for the wind farm. In order to achieve this, it is necessary to determine the change in background noise levels at the identified receptors as a result of the variation in wind speed. This is achieved by simultaneously monitoring background noise levels at the receptors and wind speeds at a single location near to the location of the proposed turbines. These are taken as a series of ten-minute averaged measurements, over a period of at least two weeks. Data collected during periods of rainfall is removed prior to further analysis. Regression analysis is used to determine the average background noise level at particular wind speeds and from this derive suitable noise limits for the wind farm. Specific periods of the day/ night (as specified in ETSU-R-97) are used to undertake this analysis.

The noise assessment will also consider a number of representative receptors located between the Rhyd Ddu scheme and wind farms currently within the planning system, located within around 4-5km of the site which include Mynydd Waun Fawr, Carnedd Wen and Tirgwynt.

Given the large number of residential receptors around the proposed wind farm, it is not proposed to measure background noise levels at all locations; instead receptors which represent the effects on a group of properties will be used.

A list of suggested receptors is set out in Table 3.4. These include some locations published in the environmental statements of the two neighbouring schemes and some indicative properties which have not been previously surveyed. Property owners have not yet been contacted so it may be necessary to change the list below. The Environmental Health Officer would be consulted should this be necessary.

Table 3.4 Suggested Background Measurement Locations (working Clockwise from East of Site, Grouped according to Measurements)

| Receptor | Location | Measurement Source |
|--------------------|--|---|
| Carreg-y-big | East of site, south of Mynydd Waun Fawr site (MWF) | Noise levels taken from noise data published in Tirgwynt ES |
| Gwaenydd | East of Carreg-y-big | Noise data published in MWF ES |
| Mynydd Bryngwyn | Southeast of Carreg-y-big | Noise data published in Tirgwynt ES |
| Blaen-y-cwm | South of site | To be measured at property |
| Ty-newydd | South of Blaen-y-Cwn | Noise data published in Tirgwynt ES |
| Llechwedd-du | Southwest of Ty-newedd | Noise data published in Tirgwynt ES for Ty-Newedd |
| Fawnog Fawr | Southwest of site | To be measured at property |
| Nant-yr-esgair-wen | Southwest of site, northwest of Farnog Fawr | Noise data to be measured at Fawnog Fawr |
| Ffridd Fawr | West of site | To be measured at property |
| Cwnderwen | Northwest of site | To be measured at property |
| Dolau-celmion | North of site | Noise data to be measured at Cwnderwen |
| Neinthirion | North of site and Dolau-celmion | Noise data to be measured at Dolau |
| Dolau | North of site | To be measured at property |
| Dolwen | North of site, north east of Neinthirion | Noise data to be measured at Dolau |
| Cringoed-Isaf | Northeast of site | Noise data published in MWF ES for Penringoed |
| Penringoed | Northeast of site, east of Cringoed-Isaf | Noise data published in MWF ES |
| Cringoed-Bach | Northeast of site, south of Penringoed | Noise data published in MWF ES for Penringoed |

3.4.2 Effects to be Scoped Out

Noise resulting from increased traffic flows on the surrounding road network during the construction of the wind farm would be integrated with the traffic and transport section of the EIA and assessed using the Calculation of Road Traffic Noise. Operational changes in traffic

noise levels are not expected to be significant and therefore not to be included in the EIA. Construction noise would be assessed using the methodology of BS5228-1:1997 Noise and Vibration Control on Construction and Open Sites.

3.4.3 Summary of Noise Assessment

Table 3.5 provides a summary of the proposed scope of the noise assessment.

Table 3.5 Summary of Noise Assessment

| Environmental Topic | Construction | Operation |
|---------------------|--|---|
| Noise | <ul style="list-style-type: none"> Construction traffic | <ul style="list-style-type: none"> Potential noise effects on surrounding residential properties |

3.5 Cultural Heritage

3.5.1 Background

Cultural heritage encompasses all features and remains which are the product of human activity. This includes standing buildings, earthwork monuments, industrial features, sub-surface archaeological remains and artefact scatters. It also includes landscapes and their constituent features which have been shaped by human occupation, from planned features such as historic parks and gardens, field boundaries and plantations to changes in flora and fauna as a result of human activity. A broad definition of cultural heritage also encompasses less tangible cultural aspects, such as traditions, customs, beliefs and language.

On-site Features

An initial appraisal has been undertaken of sources including registers of designated features (scheduled monuments and listed buildings) and the Sites and Monuments Record (SMR), maintained by Clwyd Powys Archaeological Trust (CPAT).

A scheduled monument –the Root Store at Bon-y-Maen 800m north west of Blaen y Cwm (SM MG218) –lies outside the southern boundary of the site. No further scheduled monuments have currently been identified within the immediate vicinity of the site, although there are several within the wider area.

Features recorded within the site mostly relate to the remains of domestic and agricultural activity, and small scale quarrying. These features are mostly identified as being of post medieval date, although three –a farmstead (HER 48255), an oval earthwork enclosure (HER 37348) and a sheepfold (HER 65508) –have been recorded as medieval in date. Few if any of these features have been studied in detail and activity of an earlier date could therefore be represented. The recorded baseline may also reflect a lack of previous investigation and there is some potential for further unrecorded features to exist.

Off-site Features

In addition to the above scheduled monument, Moel Ddolwen Camp hillfort (SM MG149) lies some 2.4 km from the site boundary. A further 10 scheduled monuments lie within 5 km of the site.

The Grade II listed Belan Hall lies some 1.2 km from the site boundary. A further 19 listed buildings lie within 5 km of the site.

The nearest registered park and garden is Gregynog (PO33), which lies some 10 km to the south east of the site.

The historic landscapes of the Caersws Basin and Clywedog Valley lie some 9 and 11 km to the south of the site respectively.

3.5.2 Legislation and Policy Guidance

The importance of cultural heritage remains is recognised in legislation as well as national and local policy. Certain features that are deemed to be of particular importance are given legal protection through legislation. The Ancient Monuments and Archaeological Areas Act (AMAAA) 1979 provides for a schedule of monuments which are protected. Similarly, the Planning (Listed Buildings and Conservation Areas) Act 1990 provides for the definition and protection of listed buildings and conservation areas.

Policy guidance on how cultural heritage should be treated in Wales is given in Chapter 6 of Planning Policy Wales (PPW) (2002). This states the Welsh Assembly's objectives to

'...preserve and enhance the historic environment...' to '...protect archaeological remains, which are a finite and non-renewable resource...'

and to ensure the protection of historic buildings and conservation areas.

Further advice on planning and the historic environment is given in W.O. Circular 61/96: Planning and The Historic Environment: Historic Buildings and Conservation Areas (and amendment Circular 1/98).

TAN8 identifies the key issues to be assessed and taken into account with respect to wind farm proposals. It also sets out strategic areas for wind farms and the methodology adopted for identifying them. The strategic locations avoid a number of constraints and paragraph 26 states that considerations taken into account include:

'scheduled ancient monuments and other important archaeological features, registered historic parks and gardens and the settings of all the foregoing sites'.

The preservation of cultural heritage features and their setting is also covered by regional and local policy.

The presence of cultural heritage features is therefore a material consideration in determining planning applications.

3.5.3 Assessment of Effects

Direct Effects

The small footprint of the built development associated with a wind farm significantly lessens the potential for direct effects on cultural heritage features. Nevertheless there is some potential for such effects to occur given the apparent archaeological potential of the site. The EIA process will identify known and recorded features and attempt to establish the potential for further unrecorded features. Where necessary, this information will be used to inform the wind farm design in order to avoid or reduce effects on identified features.

To this end, the following additional sources of information would be consulted during the EIA:

- Detailed SMR records and other relevant sources held by CPAT SMR;
- Relevant cartographic and published sources held by the Royal Commission on the Ancient and Historic Monuments of Wales (RCAHMW), Powys County Archives (Llandrindod Wells) and the National Library of Wales;
- Relevant aerial photography held by RCAHMW and the Central Register of Air Photography for Wales; and
- Entec's Library and internet sources.

A study area extending up to 500m from the site will be used.

A detailed site walkover will also be undertaken by transect within all parts of the site not under commercial forestry. The aim of the walkover survey will be to identify any visible cultural heritage features within the site, check available records and note general ground conditions. Open areas within commercial forestry (such as forest rides) will be visited and recorded cultural heritage features or those identified during desk-based research will be visited where possible. The need for any additional survey work will be considered, based on the findings of the desk-based assessment and site walkover.

It is anticipated that the appropriate micro-siting of turbines during the process of finalising the wind farm layout design will be used to avoid direct effects on cultural heritage features identified during the EIA. However, where this is not possible, measures will be adopted to identify and preserve by record any features which have not previously been recorded. This mitigation is subject to further discussion with relevant consultees.

Effects on Setting

Effects on the setting of designated cultural heritage features and the wider historic landscape will also be considered as part of the EIA. These are normally changes to the setting of a feature, whether permanent or temporary. According to national policy guidance such effects are normally considered more relevant to designated features of national importance, such as scheduled monuments and listed buildings.

The proposed scope for the assessment of effects on the setting of designated features is to identify those features within 5km of turbines and establish which of those features fall within the ZTV of the proposed wind farm or where setting might otherwise be affected through changes in views from other locations. A combination of documentary study, site visits (from publicly accessible areas) and wireframe illustrations will then be used to establish the current setting of the feature and how this might be affected, in consideration of factors such as

distance, topography and available screening from vegetation and built development. Where there is the potential for a significant effect on setting, photomontage viewpoints may also be prepared.

The assessment of effects on the setting of cultural heritage features will be carried out in close consultation with the landscape and visual assessment, with the latter particularly considering the visual amenity aspect of cultural heritage receptors.

Owing to the distances between the site and the nearest historic landscape areas (more than 9 km) it is not expected that ASIDOHL (Assessment of the Significance of the Impact of Development on Historic Landscape areas) will be required. However, ASIDOHL guidance will be used as part of the assessment of effects on the setting of other designated features discussed above.

Confirmation of the proposed scope, particularly in respect of effects on setting, is requested.

3.5.4 Summary of Cultural Heritage Assessment

Table 3.6 provides a summary of the proposed scope of the cultural heritage assessment.

Table 3.6 Summary of Cultural Heritage Assessment

| Environmental Topic | Construction | Operation |
|---------------------|--|--|
| Cultural Heritage | <ul style="list-style-type: none"> • Potential direct impacts on known cultural heritage/ archaeological features to be assessed in more detail following desk-based research and detailed site walkover (by transect). • Potential direct impacts on hitherto unrecorded (buried) archaeology. • Appropriate mitigation. • Compensation and/or enhancement measures where effects are identified which cannot be avoided. | <ul style="list-style-type: none"> • Potential impacts on the setting of scheduled monuments and listed buildings within 5km of turbines. |

3.6 Traffic and Transport

3.6.1 Baseline Overview

The site is located approximately 3km to the west of Mynydd Waun Fawr proposed wind farm. The site lies between the A458 (T) to the north and the A470 (T) to the south. Much of the information collected to date is derived from the planning application and ES for Mynydd Waun Fawr since the routing is likely to be the same.

Discussions have been held with Powys County Council and the Welsh Assembly Government concerning the routing options for Mynydd Waun Fawr wind farm. The exact haulage routes for abnormal loads carrying turbine equipment are still to be confirmed, however, it is assumed

that they would travel from the A483 (T) to Welshpool then continue west on the A458 (T) before turning south onto an unnamed Road at Llanerfyl. Normal construction traffic associated with the wind farm, including heavy goods vehicles will have the option to not travel through Welshpool along the proposed abnormal load delivery route unless otherwise agreed with the Local Planning Authority.

Baseline traffic data was obtained for the Llanerfyl route as part of the EIA submission for Mynydd Waun Fawr wind farm and is presented below. Annual Average Daily Traffic (AADT) flows have been obtained for three locations on the assumed route. Details of these are shown in Table 3.7.

Table 3.7 Existing Weekday Two-way Traffic Flows

| Survey Site | Location | Year | Base Total Traffic Flows | HGVs |
|-------------|--|------|--------------------------|------|
| 1 | A458, Llanerfyl | 2003 | 3,001 | 429 |
| 2 | A458, Neuadd Bridge | 2005 | 2,032 | 626 |
| 3 | Unnamed Road (near Llanerfyl Primary School) | 2007 | 397 | 16 |

3.6.2 Scope of the Assessment

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

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

3.6.3 Assessment of Effects

The 2007 Department for Communities and Local Government (DCLG)/Department for Transport (DfT) publication Guidance on Transport Assessment refers to Circular 02/99: Environmental Impact Assessment (Circular 02/99) published by the Department of the Environment, Transport and the Regions (DETR), for details on environmental assessment. However, Circular 02/99 does not provide specific guidance on the approach to traffic and transport related assessment.

Therefore, the assessment is undertaken in accordance with the guidance provided in the 1993 Institute of Environmental Assessment (IEA) (now IEMA) publication Guidance Notes No. 1: Guidelines for the Environmental Assessment of Road Traffic. This guidance is the only document available which sets out a methodology for assessing potentially significant

environmental impacts where a proposed development is likely to give rise to changes in traffic flows.

The methodology used in the assessment would adhere to that set out in that document and would therefore focus on:

- Potential impacts on local roads and the users of those roads; and
- Potential impacts on land uses and environmental resources fronting those roads, including the relevant occupiers and users.

The following rules, taken from the IEA's guidelines, would be used as a screening process to define the scale and extent of the assessment:

- Rule 1: Include highway links where traffic flows are predicted to increase by more than 30% (or where the number of heavy goods vehicles is predicted to increase by more than 30%);
- Rule 2: Include any other specifically sensitive areas where traffic flows are predicted to increase by 10% or more.

Increases below 10% are generally considered to be insignificant given that daily variations in background traffic flow may fluctuate by this amount. Changes in traffic flow below this level are therefore assumed to result in no discernible environmental impact.

The likely percentage increases in traffic would be determined by comparing estimates of traffic generated by the site, with existing levels of traffic on both of the routes which could be affected the A458 (T) and the A495. Cumulative effects resulting from the construction of other wind farms within the area will be assessed.

3.6.4 Potential Effects requiring further Consideration

The potential affects of construction traffic on access roads to the trunk road network remains to be assessed. Should the results of the percentage impact exceed the thresholds identified by the IEA guidelines, consideration will need to be given to the following potential effects:

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

Criteria such as those below would then be used in evaluating the significance of the environmental effects arising in those areas where the increase in traffic is deemed to be significant:

- The probability of the effect occurring based on the scale of Certain, Likely or Unlikely;

- The magnitude of the effect in relation to the frequency of the disturbance, using the scale High (e.g. hourly), Medium (e.g. daily) or Low (e.g. weekly).

In some cases, professional judgement is used to assess the findings in relation to each of these criteria to give an assessment of significance for each effect.

3.6.5 Summary of Traffic and Transport Assessment

Table 3.8 provides a summary of the proposed scope of the traffic and transport assessment.

Table 3.8 Summary of Traffic and Transport Assessment

| Environmental Topic | Construction | Operation |
|---------------------|--|-----------|
| Traffic & Transport | <ul style="list-style-type: none"> • Potential impacts of construction traffic on access roads from the trunk road network. | |

3.7 Hydrology, Hydrogeology and Geology

The scope of the assessment of effects on the Water Environment will be defined with reference to the baseline conditions at the site. The current understanding of the baseline environment is presented in Section 3.7.1 and the proposed scope of assessment is presented in Sections 3.7.2 and 1.8.3.

3.7.1 Baseline Overview

Climate

Climatic information from The Hydrometric Register of Statistics indicates that the closest riverflow gauge with co-located raingauge is approximately 15 km north of the site at Vyrnwy Reservoir (National Grid Reference SJ 019 191). The mean annual rainfall recorded between 1920 and 1999 at this site is 1909mm, 74% of which contributed to flow at the riverflow gauge, with the remainder lost either to groundwater recharge or evapotranspiration. The baseflow index is estimated at 0.37, indicating that the majority of riverflow gauged at the site originates as surface run-off.

The climatic conditions at Rhyd Ddu wind farm will be very similar to Vyrnwy Reservoir. This suggests that Rhyd Ddu will experience high rainfall, the majority of which will leave the site as surface or shallow run-off. Groundwater recharge and evapotranspiration will be less dominant processes.

Topography and Hydrology

The site lies in the catchment of the River Severn and is drained by one of its headwater tributaries, the Afon Gam. The southern and western boundaries of the site extend to the catchment divide between the River Severn and the River Dovey, although the site does not cross in to the Dovey catchment.

Ordnance Survey (OS) mapping shows the highest recorded elevation within the site boundary to be 439 m AOD, on the southwest corner of the site (grid reference SH 962 023, named Twmpath Melyn). The lowest elevation occurs on the northern boundary where the site abuts the River Cledan, a tributary of the Gam at grid reference SH 994 056.

The western part of the site drains to small tributaries including Waun Rhyd-Ddu, Cwm Blawd-ceirch and other un-named tributaries, which join Afon Gam between SH 956 049 and SH 969 066. The majority of the south and east parts of the site drain to the Nant Wythan (known as the River Cledan in its lower reaches), which joins Afon Gam at Tynewydd Gosen (SJ 002 078).

Flood Risk

The site boundary abuts the Afon Gam around Cwmdrwen between SH 950 045 and SH 959 054 and around Dolwen between SH 974 070 and SH 982 074. The TAN 15 flood mapping indicates that there is a narrow band of Flood Zone C2 associated with the Afon Gam at the point where it abuts the site. Zone C2 corresponds to an area without significant flood defence infrastructure at risk of flooding from a 1 in 1000 year flood event. The flood zone does not correlate well with the underlying Ordnance Survey basemap, but indicates that the flood zone could be up to approximately 200 m wide in these reaches.

Surface Water Quality

The Environment Agency holds water quality information for the Afon Gam on a 9 km stretch between SH 958 052 (Cwm Derwen Ford, towards the western end of the site) and SJ 017 103 (confluence with the Afon Banwy, approximately 6km downstream of the site).

The point is monitored under the General Quality Assessment scheme (GQA) for chemical quality, biological quality, orthophosphate and nitrate nutrient levels. Chemical and biological quality are classified from A to F, with A being very good and F being bad. Nutrient levels (including both orthophosphate and nitrate) are graded between 1-6, where grade 1 indicates a very low presence of nutrients and grade 6 indicates a very high presence of nutrients. The nutrient grades are not classified using the “good” or “bad” grades because rivers across the country naturally have different levels of nutrients and these are not necessarily detrimental to the environment.

The most recent GQA data for the Afon Gam are shown in Table 3.9 below. River quality targets are set by the Environment Agency as a part of their River Quality Objective scheme and compliance is measured against these targets. The Environment Agency has assessed the sampling location on the Afon Gam as being compliant for levels of those substances for which there have been river water quality targets set.

Table 3.9 Surface Water Quality Data for the Afon Gam and Afon Rhiw

| Property | River | Class | Date | Explanation |
|------------|-------|-------|------|---|
| Chemistry | Gam | A | 2006 | Very Good – suitable for all abstractions, very good salmonid fisheries and cyprinid fisheries and ecosystems are natural |
| Biology | Gam | B | 2005 | Good - Biology is a little short of an unpolluted river |
| Nitrates | Gam | 1 | 2006 | Very low <5 mg NO ₃ /l (average) |
| Phosphates | Gam | 2 | 2006 | Low <0.06 mgP/l (average) |

Soils and Landuse

The National Soil Resources Institute (NSRI) website shows that the site is covered by very acid, peaty soils. These soils are likely to be permanently wet and have impeded drainage.

Areas of vegetative cover have recently been mapped as a part of the Phase 1 Habitat Survey (see Section 3.3). The west part of the site and the majority of the northern arm are covered by forestry. The tip of the northern arm and the east and south parts of the site are covered by grassland and bog. The areas of wet grassland and wet bog are concentrated in the southern part of the site close to Nant Wythan and in a strip extending between Nant Wythan and Bryn Castell.

Geology

There is little detailed geological information for this area. Information about the solid geology has been obtained from the recent BGS 1:250,000 scale map and a 1 inch map from 1851. These show that the south-eastern part of the site is underlain by Silurian Wenlock-Ludlow sedimentary strata, while the western part of the site is underlain by Sheinwoodian greywacke. The greywacke also extends from the west in a narrow band along the ridge between the Afon Gam and the Nant Wythan.

The geological maps available show only the solid geology. Information about drift geology has been obtained from the BGS website, which shows that drift deposits are scarce across the area. This indicates that there are some patches of Till in the vicinity of the site, although the map scale is too coarse to locate the patches exactly.

Groundwater

The groundwater vulnerability map for the site shows that the eastern part of the site is classified as being underlain by a minor aquifer, while the western part is underlain by a non-

aquifer. These are presumed to correspond to the Wenlock-Ludlow and Sheinwoodian strata respectively.

The map shows that the areas of minor aquifer are overlain by soils of low leaching potential and the key describes this as “soils in which pollutants are unlikely to penetrate the soil layer because either water movement is largely horizontal, or they have the ability to attenuate diffuse pollutants”.

Abstractions and Discharges

It is expected that there will be some private water supplies associated with farms and private houses in the vicinity of the site. The locations of these supplies will be requested from Powys County Council.

Information will also be requested from the Environment Agency regarding any licensed abstractions or discharges.

Designated Sites

The CCW website shows one SSSI in the vicinity of the site. The SSSI is Gweunydd Dolwen, a 2.3 ha site which the CCW website shows to be located on the northern bank of Afon Gam at approximately grid reference SH 974 072.

There is one Montgomery SINC (Site of Importance for Nature Conservation¹) within 2 km of the site, which is Llyn Lort.

Hydrological Regime

The wet climate, soil conditions and topography form the principal controls on the hydrological regime at Rhyd Ddu. The soil and habitat types on site indicate that there is likely to be a high, near-surface water table in the peaty soils overlying the solid deposits. The soils are permanently wet and have impeded drainage (at least half of the site is underlain by a non-aquifer). The consequences of this are clearly seen in the Phase 1 Habitat survey, which identified large areas of bog, particularly in the southern part of the site. On steeper slopes, high levels of rapid runoff can be expected.

Land use at the site is a combination of sheep farming and forestry. Although forestry activities may have some influence on water quality, the Environment Agency monitoring data for the Afon Gam (Table 3.9) suggest that the surface water quality is very good.

Predicted Trends

Hydrological systems are in a state of constant flux and do not remain constant with time. The main future influences on the hydrology of the Rhyd Ddu site are expected to be land use and climate change.

The nature of the land type and elevations within this site mean that the land use is unlikely to change substantially during the lifetime of the wind farm. However, land management practices such as gripping can influence the wetness of peat soils and also the potential for sediment and dissolved organic carbon input to drainage.

¹ Non-statutory locally valued wildlife sites. Generally administered by local authorities in partnership with conservation organisations.

Future changes in global climate are predicted, due to a combination of both natural and human causes. The main human influence on global climate is increasing emissions of greenhouse gases such as carbon dioxide and methane. For Wales, the latest climate change predictions indicate decreases in summer rainfall of up to 3% by the 2020s or 15% by the 2050s. This is predicted to be accompanied by increases in winter rainfall of 10% and 15% respectively.

3.7.2 Information Gaps

Consultation with external stakeholders including the Environment Agency, Countryside Council for Wales and the local council will be necessary to obtain detail of abstractions and discharges in the surrounding area. A full assessment of private water supplies cannot be carried out until the council and EA have been consulted. Consultation with these stakeholders can also be expected to improve the site characterisation with increased local knowledge and may identify further constraints to development.

A site visit will be undertaken as soon as is practicable to complete the site characterisation, particularly where the desk study has provided scarce information.

There is very little information about the hydrogeological and geological characteristics of the site due to the scarcity of recent large-scale mapping. Field observations during the site visit will provide adequate information to complete the conceptual picture needed for the establishment of baseline conditions. Further geo-technical work will however be needed post consent for the micro-siting of turbines to ensure ground conditions are suitable for construction.

3.7.3 Potential Effects requiring further Consideration

From the baseline information presented above, it is considered that the following receptors could be affected by the construction or operational phase of the development:

Minor Aquifer Underlying Site

Potential effects to the minor aquifer underlying the site could occur during the construction phase due to contaminant spills, leaching of concrete and the increased vulnerability of shallow groundwater bodies as surface layers are extracted.

Private Water Supplies

The location of water supplies are currently unknown, however, previous experience at Mynydd Waun Fawr has indicated that private water supplies may be abstracted from the minor aquifer underlying the site, surface watercourses or seepages from the peat. Potential effects to private water supplies could occur during the construction phase due to disturbance and excavation of the peat and underlying strata, as well as potential for contamination entering the water supply. Localised effects, most likely to be seen in supplies taken from peat seepages, may continue through the operational phase if the peat is unable to recover from disturbance. A Private Water Supply Risk Assessment will be produced to establish the nature of the risk to any supplies and the degree of mitigation required for the protection of the supplies.

Surface Watercourses, including the Afon Gam and Associated Tributaries

Potential effects during the construction phase include pollution of surface watercourses and an increase in sediment loading. There is also some potential for increased runoff during both the construction and operational phase due to increased areas of hardstanding on the site. There is

an area of Flood Zone C2 associated with the Afon Gam as it flows past the site and the scope of any required Flood Consequences Assessment will be discussed with the Environment Agency.

Sensitive Hydro-ecological Environment in the Peaty Soils

Potential effects may occur during the construction phase due to disturbance, dewatering and excavation of peat. There is also the potential for ongoing effects throughout the operational phase due to continued degradation of peat once it has been initiated.

Mitigation measures for the protection of the Water Environment will need to be developed for the protection of these receptors. These measures will incorporate best practise guidance for pollution prevention and sediment control, such as that contained within Environment Agency Pollution Prevention Guidance notes, CIRIA guidance and other current industry best practise for the establishment of wind farms on upland environments. Consultation will be held with the Environment Agency concerning the design of suitable mitigation measures. Mitigation measures for the protection of the near surface hydroecological environment in the peat will be developed in conjunction with those in the Ecological Assessment.

3.7.4 Effects to be Scoped Out

On the basis of the baseline information so far obtained, it is not possible to scope out any potential environmental effects.

3.7.5 Summary of Hydrological Assessment

Table 3.10 provides a summary of the proposed scope of the hydrological assessment.

Table 3.10 Summary of Likely Hydrological Effects

| Environmental Topic | Construction | Operation |
|-------------------------------------|--|---|
| Hydrology, Hydrogeology and Geology | <ul style="list-style-type: none"> • Potential impacts upon site hydrology and surface / groundwater resources; • Potential for damage to soils; • Potential for particular construction methods due to geology. • Potential impacts upon private water supplies | Potential impacts upon private water supplies |

3.8 Socio-economics, Landuse and Public Attitude

The development of the wind farm may give rise to a number of socio-economic and community impacts which require assessment. These potential impacts may principally affect the villages and towns closest to the proposed site.

TAN8 recognises that developers may offer benefits to local communities, not directly related to the planning process, as a result of a proposed wind farm development. It states that Local planning authorities should facilitate and encourage such proposals and provides case studies within Annex B. Nuon Renewables recognises the important role that local communities should play in the design of a wind farm proposal and the opportunities for community benefits that renewable energy generation can bring.

Nuon Renewables is committed to holding public consultation events prior to the submission of the planning application and the results of this will be reported within this section of the ES. Opportunities to support independent cooperative ownership of part of the wind farm will also be identified and assessed for their likely impacts.

The implications of the wind farm on the perceptions of visitors to the area, particularly those intending to visit existing and proposed attractions, will also be considered. This will be based upon an identification of these visitor attractions and the nature of their offer. This assessment will include public rights of way within the development area which could be directly affected by the scheme.

Socio-economic effects will include direct effects such as temporary job creation and possible indirect effects such as increased spending in the local economy by those employed on site.

Published baseline information available from the Welsh Assembly Government and Powys County Council will be used to provide a socio-economic and visitor profile of the area within which the wind farm would be located. The potential impacts of the proposed development on this baseline will then be assessed against information commissioned by a range of organisations into the public perception of wind turbines in respect of the communities surrounding this proposal.

Effects will be considered against:

- An economic profile of the area;
- Tourism and recreation in the area;
- Land use and ownership; and
- Public attitudes to wind farms.

3.8.1 Summary of Socio-economic Assessment

Table 3.11 provides a summary of the proposed scope of the socio-economic assessment.

Table 3.11 Summary of Likely Socio-economic Effects

| Environmental Topic | Construction | Operation |
|----------------------------|--|--|
| Socio-Economics | <ul style="list-style-type: none"> • Potential impacts on the economy of the area; • Potential impacts on land use and ownership in the area. • Impacts upon PROWs. | <ul style="list-style-type: none"> • Potential impacts on Tourism and Recreation in the area. • Potential impacts on public attitudes to wind farms in the area. • Potential impacts on land use and ownership in the area. |

3.9 Existing Infrastructure, Television, Aviation and Electromagnetic Safety and Shadow Flicker

During the preparation of the ES the responses of consultees will be collated and reported to the design team. The consultees will be identified from the contact details provided within TAN 8. Should infrastructural constraints be identified, revision to the turbine layout may be necessary to avoid electronic interference or disruption to services. Technical solutions to any infrastructural constraint will be sought during this process to minimise effects upon it.

Part of the site constitutes open access land under the Countryside Rights of Way Act 2000 and much of the rest is crossed by footpaths. All necessary measures would be taken to ensure that public safety across the site and around the turbines is ensured.

Shadow flicker is considered to have the potential to affect houses located within ten rotor diameters of a turbine. Subject to the final siting of the turbines in relation to existing residential properties, an assessment for shadow flicker will be undertaken.

3.9.1 Summary of Assessment of Other Effects

Table 3.12 provides a summary of the proposed scope of the assessments for Existing Infrastructure, Television, Aviation and Electromagnetic Safety and Shadow Flicker.

Table 3.12 Summary of Assessment of Other Effects

| Environmental Topic | Construction | Operation |
|--|--|--|
| Existing Infrastructure, Telecommunications, Television, Aviation and Electromagnetic Safety | <ul style="list-style-type: none"> • Impacts on potential disruption to services will continue to be identified and solutions sought. | <ul style="list-style-type: none"> • Impacts on disruption to services or interference to signals will continue to be identified and solutions sought. • Potential shadow flicker. |

4. Summary of ES Scope

Table 4.1 summarises those issues that will be considered within the ES. The ES will consider those significant issues in more detail and will report on further investigations. However for completeness, the ES will also report on the analysis and assessment undertaken during the scoping exercise of those non-significant areas that could be scoped-out of the main assessment. Table 4.1 indicates those subjects which will be considered further in the ES.

Table 4.1 Issues to be considered further within the ES

| Environmental Topic | Construction | Operation |
|---------------------------------|---|--|
| Landscape and Visual | <ul style="list-style-type: none"> • Wind farm design and layout including access roads and ancillary structures. • Short term landscape and visual impacts during the construction period. | <ul style="list-style-type: none"> • Effects on the landscape resource. • Visual effects concentrating on areas indicated within the ZVI and likely to include: <ul style="list-style-type: none"> • dwellings and settlements; • designated areas such as historic gardens and designed landscapes; • hills, hill summits; walking routes; • tourist destinations / recreation areas; • major transport routes roads and footpaths; • local key road routes; • cumulative impact. |
| Ecology and Nature Conservation | <ul style="list-style-type: none"> • Potential impacts on designated sites of nature conservation interest. • Potential impacts on habitats within the Application Area. • Potential impacts on the following species: <ul style="list-style-type: none"> • Great crested newts; • Foraging and roosting bats; • Water voles/otter; • Badger. | <ul style="list-style-type: none"> • Potential opportunities for habitat enhancements to be investigated. • Effects of habitat lost. • Potential for displacement of bat population and collision. |
| Ornithology | <ul style="list-style-type: none"> • Potential impacts on migratory and breeding bird species to be assessed following agreement on methodology for assessment. | <ul style="list-style-type: none"> • Potential for displacement of bird population and collision. |

Table 4.1 (continued) Issues to be considered further within the ES

| Environmental Topic | Construction | Operation |
|--|--|--|
| Noise | | <ul style="list-style-type: none"> Potential noise effects on surrounding residential properties |
| Cultural Heritage | <ul style="list-style-type: none"> Potential direct impacts on archaeological features to be assessed in more detail following desk-based research and site walkover. | <ul style="list-style-type: none"> Potential impacts on the setting of ancient monuments and listed buildings, historic landscapes. |
| Traffic & Transport | <ul style="list-style-type: none"> Potential impacts of construction traffic on access roads from the trunk road network. | |
| Hydrology, Hydrogeology and Geology | <ul style="list-style-type: none"> Potential impacts upon site hydrology and surface / groundwater resources; Potential for damage to soils; Potential for particular construction methods due to geology. Potential impacts upon private water supplies | <ul style="list-style-type: none"> Potential impacts upon private water supplies |
| Socio-Economics | <ul style="list-style-type: none"> Potential impacts on the economy of the area; Potential impacts on land use and ownership in the area. Impacts upon PROWs. | <ul style="list-style-type: none"> Potential impacts on Tourism and Recreation in the area. Potential impacts on public attitudes to wind farms in the area. Potential impacts on land use and ownership in the area. |
| Existing Infrastructure, Telecommunications, Television, Aviation and Electromagnetic Safety | <ul style="list-style-type: none"> Impacts on potential disruption to services will continue to be identified and solutions sought. | <ul style="list-style-type: none"> Impacts on disruption to services or interference to signals will continue to be identified and solutions sought. Potential shadow flicker. |

Figures
