PREFACE

This Environmental Statement (ES) has been prepared in support of a planning application for the proposed Mynydd y Betws Wind Farm located east of Ammanford/Rhydaman in the county of Carmarthenshire. The Ordnance Survey (OS) grid reference (GR) for the centre of the site is SN 669 103 and its location is shown in Figure 1 of this Non Technical Summary (NTS), which comprises part of the full three volume ES. The planning application is for sixteen (16) wind turbines, each typically 2.3 megawatts (MW) in capacity; ancillary equipment; a wind monitoring mast; and on site infrastructure for a period of twenty-five years (25) for the purposes of generating renewable energy through wind power.

The wind turbine design detailed in this ES comprises a three bladed rotor with 40 metre blades, supported on a 70m high cylindrical tower to give a maximum tip height of 110m. The planning application also comprises a 70m fixed lattice anemometry mast, to monitor and optimise the performance of Mynydd y Betws Wind Farm. All components of the project are displayed in Figure 2: Wind Farm Site Layout.

This ES has been prepared and compiled by Dulas Ltd, a mid Wales based renewable energy consultancy, on behalf of Cambrian Renewable Energy (CRE) Ltd. Dulas Ltd has over twenty years' experience in renewable energy development and planning, and its combined technical and environmental understanding of wind farm development coupled with a detailed knowledge of impact avoidance and mitigation has led to Dulas' involvement in over fifty (50) renewable energy projects throughout the United Kingdom.

The Environmental Impact Assessment team has been assembled with the intention of conducting a thorough, objective assessment of all the environmental effects likely to arise as a result of the proposed development. The specialist advice and support was delivered by the following external, independent consultancies, all of whom have extensive experience in renewable energy planning and environmental assessments:

Landscape and Visual Assessment (LVA)

Soltys: Brewster Consulting
87 Glebe Street
Penarth
Vale of Glamorgan
CF64 1EF

Noise Assessment

Hayes McKenzie Partnership
Lodge Park
Tre'r ddol
Machynlleth
Powys
SY20 8PL

Ecological Assessment

Ecology Matters
Bronhaul
Pentrebach
Talybont
Ceredigion
SY24 5EH

Archaeological Assessment

Cambrian Archaeological Projects Ltd
Old Chapel
Llanidloes
Montgomeryshire
SY18 6JR

Photomontages and Wireframes

Citrine UK Ltd
4 Woodland Avenue
Nantwich
Cheshire
CW5 6JE

Construction

ESBI Ltd
Stephen Court
18-21 St Stephen's Green
Dublin 2, Ireland

Hydrological Assessment

NA Brown
Engineering Geologist
Tugela
Strawberry Gardens
Penally
Tenby SA70 7QF

Planning Appraisal

Bond Pearce
Oceana House
39-49 Commercial Road
Southampton
SO15 1GA

CF10 2HH

Telephone: 029 2020 4444
Fax: 029 2020 4411
E-mail: CRW@eco2.uk.com

Eighteen (18) copies of the three volume report have been produced for submission with the planning application, along with two (2) pdf copies of the full document on CD. In addition, multiple copies of Volume 1, the Non Technical Summary, have been produced for distribution to the local communities in English and Welsh.

A hard copy of the full ES is on display at the Ammanford public library at 3 Wind Street, Ammanford, and at:

Carmarthenshire County Council
Council Offices
40 Spilman Street
Carmarthen
SA31 1LQ

In addition, an electronic copy of the ES is available on the UK Planning website at www.ukplanning.com and will be available on the Eco2 website at www.eco2.uk.com.

For further hard copies of the Environmental Statement (at a cost of £80) please contact:

Dulas Ltd
Unit 1, Dyfi Eco Parc
Machynlleth
Powys
SY20 8AX

Tel: 01654 705000
Fax: 01654 703000
E-mail: dulas@dulas.org.uk

The contact for CRE Ltd is:

Chris Williams
Eco2 Ltd
c/o Eco2 Ltd
PO Box 300
Churchill House
Cardiff

1 INTRODUCTION

1.1 The Proposal

1.1.1 The Mynydd y Betws Wind Farm proposal is located approximately 5km east of Ammanford / Rhydaman in the county of Carmarthenshire (as shown in Figure 1). The planning application is for a period of twenty five (25) years and comprises:

- sixteen (16) wind turbines and ancillary equipment;
- one (1) wind monitoring mast;
- on site infrastructure, such as access tracks, underground cabling, substation and control building;
- electrical connection line from the substation to the on-site existing electricity pylon.

1.1.2 The proposed layout for the wind turbines, monitoring mast, access tracks, substation and control building, along with the temporary compound and borrow pits necessary during the construction period, are shown in Figure 2.

1.1.3 Each wind turbine would typically have a generating capacity of 2.3 megawatts (MW), making the total installed capacity 36.8MW. Based upon the expected wind regime for the site, this translates to 100,579 megawatt-hours (MWh) per annum, which is equivalent to the annual average energy needs of approximately 23,834 homes (based on an average energy consumption per household of 4.22MWh per year[1]). The Mynydd y Betws Wind Farm would therefore provide energy equivalent to the domestic consumption of approximately 31% of homes in the Carmarthenshire County Council area which is clean, economic and renewable (based on 2001 census figures of 73,112 houses).

1.1.4 This Environmental Statement (ES) that accompanies the planning application is based upon the physical criteria of the Bonus 2.3MW wind turbine, an illustration of which is shown in Figure 3. This three-bladed wind turbine has a tower height of 70 metres, with height to the centre of the nacelle of 68.8 metres, and a rotor diameter of 82.4 metres (with actual blade length of 40 metres), giving an overall height from ground to tip of 110 metres. Ancillary equipment, such as transformers, is housed within the turbine structure to reduce land take and visual impact.

1.1.5 However, the developer is bound to adhere to European Union procurement law and a competitive tendering process would be followed for wind turbine supply. Whilst qualifying wind turbines would be required to meet the standards and specifications set out within this ES, qualifying turbines of this capacity have slightly differing dimensions, such as a 67m tower with a 40m blade. The developer is, therefore, applying for planning permission consent for wind turbines with a maximum tip height of 110m, to encompass these minor variances across the wind turbine market.

1.1.6 The planning application also comprises a 70 metre fixed lattice anemometry mast, to monitor and optimise the performance of Mynydd y Betws Wind Farm. Its proposed location is indicated in Figure 2.

1.1.7 The electrical connection line from the proposed substation to the on-site existing electricity pylon will be approximately 25 metres in length. This connection falls under the Overhead Lines (Exemption) Regulations 1990, and hence is included in the planning application and these assessments.

1.1.8 In addition to the planning permission application to Carmarthenshire County Council, the applicant will be applying to the National Assembly for Wales for a Commoners' Consent, as the site is an area of registered Rural Common reference CL34.

[1] Figure derived from the UK Digest of Energy Statistics, DTI, 2002, together with the number of households in the UK from the 2001 Census.

1.2 The Applicant

1.2.1 The Mynydd y Betws Wind Farm proposal is being put forward by Cambrian Renewable Energy (CRE) Ltd, a Specific Project Vehicle between Eco2 Ltd, a Cardiff based renewable energy company, and a local business partnership. The CRE management team has been involved in a range of renewable technologies over the past fifteen years including hydropower, landfill gas and biomass, as well as on shore wind farms. The landowners of Mynydd y Betws (which consist of forty individual commoners) have entered into an agreement with CRE to pursue this wind farm opportunity.

1.2.2 The Mynydd y Betws Wind Farm proposal site was selected in line with national and local guidance on land use planning in Wales, namely to avoid nationally designated landscapes and ecologically sensitive areas. A selection of other factors have been reviewed in the process of establishing this wind farm proposal, including air-safeguarding and electro-magnetic interference issues, connection to the electricity grid network, site access through the local road network, and ensuring the protection of noise amenity to local residents. A feasibility study into the above environmental and technical factors has concluded that a wind farm is viable at the proposed location east of Ammanford/Rhydaman, hence the progressing of the potential site into the formal planning process under the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999.

1.3 Purpose of the Non Technical Summary (NTS) and Environmental Statement (ES)

1.3.1 This NTS has been produced to present a summary of the proposal and its potential environmental impacts, which is less technical and detailed than the ES. Its purpose is to aid public consultation and understanding of the scheme. The ES has been prepared by Dulas Ltd to accompany a planning application to Carmarthenshire County Council to build a wind farm east of Ammanford. This ES presents the information that will enable Carmarthenshire County Council, Statutory Consultees and members of the public to assess the environmental effects and benefits of the Mynydd y Betws Wind Farm proposal. This Non Technical Summary summarises the findings of the ES.

1.3.2 The ES has been prepared in accordance with the requirements of the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 (Statutory Instrument 1999 No. 293).

1.3.3 A formal scoping meeting was held at the Carmarthenshire County Council (CCC) offices on the 17th June 2004, attended by representatives of CCC, Dyfed Archaeology, CRE Ltd and Dulas Ltd. The purpose of this meeting, at the suggestion of CRE Ltd, was to facilitate the formulation of a formal Scoping Opinion by CCC as required under Part IV of Statutory Instrument 1999 No. 293. The formal Scoping Opinion of CCC was subsequently issued in August 2004 and helped to inform the scope of the environmental assessments that were conducted for this ES.

1.3.4 In fulfilment of the Scoping Opinion and the obligation to conduct an Environmental Impact Assessment, the ES sets out to:

- explain the site selection process that has determined the identification of the Mynydd y Betws Wind Farm site, and justify the selection of the site and its components in light of national, regional and local planning policy guidance;
- describe the physical characteristics of the proposed wind turbines, their land use requirements during construction, operation and decommissioning, and the associated ancillary infrastructure required for establishment and operation of the site;
- describe the existing environmental character of the application site and the surrounding area in respect of the environmental attributes likely to be affected by the proposal;
- assess and predict the possible environmental effects of the wind turbines and associated infrastructure;
- describe the measures which will be taken, or have been incorporated at the

design stage, to avoid, offset, reduce or remedy significant adverse environmental effects;

- provide Carmarthenshire County Council and consultees with sufficient information to help them come to a decision on the planning application for the proposed Mynydd y Betws Wind Farm;
- provide the public with detailed information on the proposal and how it will affect their locality, to enable them to formulate their opinion on the proposal and submit their responses to CCC.

1.4 Structure of the Environmental Statement

1.4.1 This ES has been prepared in three main volumes:

Volume 1 – Non Technical Summary

1.4.2 This volume is a summary of the information provided in the main report, in a manner accessible to all members of the community. The Non Technical Summary (NTS) presents the proposed development and the likely environmental effects of Mynydd y Betws Wind Farm, and the proposed impact avoidance and mitigation measures.

Volume 2 – Written Statement

1.4.3 The written statement comprises:

- an introduction and description of the applicant and the consultation process;
- the reasons for site selection and a description of the proposed development.

For each environmental issue identified through the Scoping exercise for the Environmental Impact Assessment (EIA) the following is provided:

- a description of the prevailing baseline conditions;
- an assessment of the likely effects of Mynydd y Betws Wind Farm during construction, operation and decommissioning;
- the measures proposed to avoid or mitigate possible adverse environmental effects.

Volume 3 – Figures

1.4.4 Volume 3 comprises the Figures which show the site location, site layout, landscape character maps, the Zone of Visual Influence (ZVI), photomontages and wireframes, sites of ecological and archaeological sensitivity, and mitigation plans. In addition, project plans and schematics relating to the wind turbine types, access roads, hardstandings, substation and other civil engineering construction drawings are supplied.

1.4.5 In addition to the three volume Environmental Statement, a Planning Appraisal has also been undertaken:

The Planning Appraisal

1.4.6 The purpose of the Planning Appraisal is to examine the proposed development in the context of the requirements of the Town and Country Planning Act 1990. The appraisal takes into account:

- local planning policies;
- regional planning policies;
- UK Government energy and environmental policies, including international commitments to reduce greenhouse gas emissions.

1.4.7 On this basis, the appraisal assesses the balance between local effects and the local, national and global benefits of wind energy development. In the context of the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999, the Planning Appraisal does not form part of the ES.

1.5 Scope of the Assessment

1.5.1 The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 (Statutory Instrument No. 293 1999), Part II (1) define an

Environmental Statement as a document:

> *"(a) that includes such of the information referred to in Part I of Schedule 4 as is reasonably required to assess the environmental effects of the development and which the applicant can, having regard in particular to current knowledge and methods of assessment, reasonably required to compile, but*
>
> *(b) that includes at least the information referred to in Part II of Schedule 4."*

1.5.2 In respect of the Scoping exercise and the Parts cited above, the Scope of the ES has been developed in the context of Local, Regional and National planning polices, in consultation with the planning officers of Carmarthenshire County Council planning office, and with respect to the comments received from Statutory Consultees and Non-Statutory Consultees.

1.5.3 On this basis, the main issues considered in the ES are:

- site selection and project evolution;
- construction, operation and decommissioning of the wind farm;
- landscape and visibility;
- noise;
- ecology, including ornithology;
- archaeology;
- hydrology;
- air safeguarding and electro-magnetic interference (EMI);
- public access and amenity;
- socio-economic effects and global environmental benefits;
- impact avoidance and mitigation measures.

1.5.4 The relative importance of each of these issues varies and this is reflected in the level of assessment undertaken in each case. The key issues outlined in the Scoping Opinion, as issued by CCC, were as follows:

1.5.5 Archaeological Assessment: an archaeological desk-top survey and site walkover should be commissioned and an assessment of potential impacts conducted in line with the guidelines provided by the Institute of Field Archaeologists. This assessment should include potential impacts caused by the tracks and monitoring mast.

1.5.6 Habitat: the Ecological Assessment should include a Phase 1 habitat survey and a breeding and wintering birds survey. The assessment should identify opportunities to improve the environment of the project site and/or its surroundings, that is, to enhance its nature conservation value.

1.5.7 Landscape and Visual Effects: a full Landscape and Visual Assessment (LVA) should be commissioned taking into consideration landscape character, landscape designations and main visual receptors. An assessment of the effects to landscape character and visibility, the latter in regard to the main visual receptors, should be undertaken. The landscape and visual assessment should be conducted by an accredited Landscape Architect in accordance with the Landscape Institute and Institute of Environmental Management and Assessment (IEMA) Guidelines for Landscape and Visual Impact Assessment (2002).

1.5.8 Public Access: an assessment of the impact of the project on any right of access should be considered. Mynydd y Betws has a number of public rights of way crossing it, is a designated common, and will be registered under the CRoW Act 2000.

1.5.9 Movement Assessment: a movement assessment of vehicles linked to the development, in particular the suitability of routes for the turbine structures, should be undertaken.

1.6 Consultations

1.6.1 Statutory and Non-Statutory Consultations:

1.6.1.1 The following consultees have been approached for information and guidance in the course of the preparation of this Environmental Statement:

- Carmarthenshire County Council;
- Neath and Port Talbot County Borough Council;
- City and County of Swansea;
- Environment Agency (EA);
- Countryside Council for Wales (CCW);
- Cadw;
- Dyfed Archaeological Trust;
- Royal Society for the Protection of Birds (RSPB);
- Brecon Beacons National Park.

1.6.1.2 In addition, air safeguarding and electro-magnetic interference consultations were undertaken with the following bodies:

- Ministry of Defence (MOD);
- Civil Aviation Authority (CAA);
- Swansea Airport;
- National Air Traffic Services (NATS);
- BBC;
- BT wholesale;
- Cable & Wireless;
- CCS Spectrum Planning;
- Crown Castle UK Ltd;
- Joint Radio Company (JRC);
- Maritime and Coastguard Agency;
- MLL Telecom;
- Ntl;
- O2;
- Ofcom;
- Orange;
- T-mobile;
- Western Power Distribution.

1.6.2 Public Consultation:

1.6.2.1 In addition to the consultations with the planning authority and the Statutory Consultees, the developer, CRE Ltd, has liaised with the Betws Community Council, Betws Commoners' Association and the local press, and organised two public exhibitions held in Ammanford on 9 and 10 May 2005.

1.7 Community Benefits

1.7.1.1 It is now common place in the wind industry for the wind farm owners to provide a proportion of the proceeds from the project to the local community. The DTI has acknowledged that this is a practicable approach enhancing the local benefit from a project and has established draft guidelines and policies on such community benefit in order to ensure that the benefits are realised and well directed. The community benefit should be designed to suit the local community and specifically promote environmental and social sustainability of the local area.

1.7.1.2 The developer, Cambrian Renewable Energy Limited (CRE Ltd.) is committed to ensure that the local community benefits from this project. CRE Ltd. will establish a Community Trust Fund and on commercial operation of the wind farm will contribute a significant annual financial contribution directly from the proceeds of the wind farm to the amount of £200,000 per annum.

1.7.1.3 The fund is to be used for the benefit of the community in the direct locality of the wind farm including Ammanford and the villages of Betws, Gwaun-Cae-Gurwen, Glanaman and Cwmgors.

1.7.1.4 With the help of local community councils CRE Ltd. will seek to establish a specific Trust Fund committee to manage distribution of the fund and to select suitable projects and initiatives. It is intended that local organisations, clubs and individuals can make a request to the committee to apply for funding.

1.7.1.5 It is envisaged that the trust fund committee consist of a minimum of 5 members including a representative of CRE Ltd., local community councils and Carmarthenshire County Council.

1.7.1.6 CRE Ltd. would to enter into a legal agreement to meet these commitments once the project has achieved planning permission and any other necessary consents and permissions.

This could be done by way of a Section 106 agreement with the Local Planning Authority in accordance with the Town and Country Planning Act.

2 ENVIRONMENTAL ASSESSMENT

2.1 Site Selection

2.1.1 The Mynydd y Betws Wind Farm site was identified through an extensive site selection exercise undertaken by the developer, CRE Ltd., which analysed the technical, planning and environmental issues pertaining to the project. This site was chosen over four other short listed sites because it has the following merits:

- the agreement of the landowners and Commoners with grazing rights of the land for the construction of a wind turbine project;
- a good, viable wind resource;
- a localised grid connection point;
- it does not lie in an area designated for ecological protection;
- it does not lie in any nationally designated areas for landscape;
- it lies in an area used for industrial activity, particularly quarrying, opencast and underground mining;
- it is not on Cadw's Register of Landscapes of Historic Interest in Wales.

2.2 Project Evolution

2.2.1 It is the belief of the developer that mitigation should be undertaken iteratively through the design and scaling of the proposal rather than as a back-end response. Consequently, the proposal being put forward has sought to avoid or mitigate environmental impacts at the design and layout stages. The Mynydd y Betws Wind Farm proposal has therefore resolved any significant problems associated with its development in advance of its implementation, should planning consent be awarded. A summary of the issues that have influenced the design and layout of the proposal follows:

Telecommunications and Utility Services

2.2.1.1 Consultations with the telecoms' operators identified no microwave links crossing the site. However, radio communications were identified from the existing mast on Mynydd y Betws from various locations and at various angles. These links are owned and operated by Western Power Distribution and are used for the purpose of controlling their remote substation facilities. The radio communications operators requested buffer zone from the centre of the base station together with an exclusion corridor around the directional signal to ensure that there would be no interference caused by the structures. These links have been accommodated within the layout.

2.2.1.2 Existing overhead 132 KV electricity lines run on pylons east west across the southern extent of the site. The wind farm is to be connected to this line and hence the control building and substation have been located as close as possible to it to minimise the impact of overhead connection lines.

Highways and Public Rights of Way

2.2.1.3 The site is traversed by one unclassified public road and several public rights of way, including one national trail, St Illtyd's Walk, which crosses the site in two places and which forms part of a bridleway. On 28 May 2005, Mynydd y Betws will also be registered under the Countryside and Rights of Way Act 2000 (CRoW Act 2000), which will allow the public greater access to walk on the common.

2.2.1.4 Turbine 4 was originally located very close to Footpath No. 3/30 and it looked likely that the turbine blades would oversail this right of way. In the weeks prior to submission of the planning application it became apparent that the turbine could be micro-sited to avoid oversail of the footpath. There is now 42 metre clearance from Footpath No. 3/30.

Visuals

2.2.2 The scope for mitigating the visual impact of wind farms is greatly restricted by the functional siting requirements, the scale of the turbines and the characteristic movement of the blades. Mitigation is largely restricted to:

- evaluation of alternative site layouts, numbers and sizes of turbines during the design evolution process to afford optimum positioning of turbines in the landscape;
- placing the turbine unit transformers within the turbine towers;
- placing the electrical cables between the turbines and substation underground;
- locating the substation close to existing grid power lines. In this instance, this has reduced the amount of overhead cable required for the grid connection to just 25m;
- reinstating areas after construction. This includes the re-vegetation of all temporary works, areas surrounding the turbine towers, crane hardstandings and narrowing the site access tracks and placing turfs down the centre of them after construction.

2.2.2.1 Evaluation of alternative site layouts using computer generated images (wire frames) has enabled visual intrusion to be reduced at a number of close by properties. Additionally, the turbines were moved to the south of the site to avoid the Western Power Distribution radio system exclusion zone: and this has had the benefit of reducing the visibility of the wind farm in the towns of Ammanford, Betws and Glanaman.

2.2.2.2 Throughout the environmental assessment process the number of turbines has been reduced from a maximum of 24 turbines at one stage to the final proposed 16 turbines and this has further minimized visual impact.

Ecology

2.2.2.3 Although the ecological assessment identified that there were no absolute constraints on site, it recommended that the turbines and access tracks try to avoid wherever possible the blanket bog and dry and wet heath areas (identified as habitat types E.1.6.1, D1 and D2 respectively on Figure 19, Volume 3). This has been done for all but a short section of track north of turbine 9 (approximately 40 metres length) where it crosses the edge of blanket bog. The track has been placed here to avoid passing across a wider expanse of blanket bog and two streams. This route is considered the best environmental option to join the western and eastern halves of the site together. To mitigate impacts this section of track would be constructed using a 'floating' technique.

2.2.2.4 The wind farm layout has also sought to avoid valleys and approaches to valleys. This has been done for a number of reasons including construction and energy output considerations and also to minimise bird collision risk. As migrating birds tend to be most vulnerable when funnelled through valleys rather than when migrating on a broad front, the collision risk is minimised when turbines are not in, or on approaches to, valleys.

Hydrology

2.2.2.5 The design of the wind farm has sought to avoid the crossing of surface water courses, and the on-site access track route has been particularly influenced by hydrological considerations. Where possible access tracks and turbines have also been placed away from blanket bog, wet heath and marsh areas. The exception being a short length of track that is discussed in the Ecology sub-Section above.

Archaeology

2.2.2.6 There are 105 archaeological sites of interest on the Mynydd y Betws site and the wind turbines and new access tracks have been located to avoid these and, where possible, leave a buffer zone of 100 metres surrounding them.

2.2.2.7 The existing tracks on site that run through the Scheduled Ancient Monument (SAM) areas of Bancbryn cairn cemetry, Bancbryn platform cairn, and Bancbryn cairn cemetery (east), have been avoided and new track would be constructed around these areas. However, the existing track north of turbine 14, which runs through the buffer zone of three sites, will be used to avoid additional impact elsewhere. The track may have to be widened by a metre or so during construction and care will be taken to do this to the western side of the track away from the archaeological areas of interest. The buffer zone of an archaeological site close to the potential south eastern entrance would also be entered during construction and care would be taken to protect this site.

Site Selection and Project Evolution Conclusion

2.2.3 Hence, the developer has sought to avoid or mitigate impacts where possible, firstly through a proper approach to site selection and secondly through iterative design and layout changes to the wind farm proposal. The result is a proposal that accords with planning policy at the national and local level, as well as a site in which the principal mitigation measures are inherent within the project design.

2.3 The Environmental Assessment of the Mynydd y Betws Wind Farm

2.3.1 Construction, Operation and Decommissioning

2.3.2 The construction of the Mynydd y Betws Wind Farm will take eleven months. During this time 16 wind turbines and a meteorological mast will be erected, an electrical substation will be constructed, the site access tracks will be installed and the relevant sections of the site will be reinstated. The construction activity would result in local employment and local supply of construction materials giving support to the local economy.

2.3.3 The construction phase will require a variety of goods and services to be transported to site. The larger wind turbine components are likely to be delivered via the M4 motorway and trunk road system which are designed to host large Heavy Goods Vehicles. Two possible routes have been identified to transport these larger components to site that will require minimal disturbance to traffic movements and road systems in the area and avoid passing through Ammanford and Betws. Routing through Ammanford and Betws has been avoided to minimise potential disturbance.

2.3.4 Operation of the wind farm would be for 25 years. The wind turbines proposed will start to generate when the wind speeds at the nacelle reach 4m/s, attaining their maximum output at around 15m/s. At wind speeds above 25m/s the turbines will automatically shut down to protect the blades, gearing, shaft and generator. Based on the wind regime at the site, it is expected that the turbines will be operation for approximately 85% of the time. Each turbine will have a computer control system that regulates every aspect of the turbines performance. Any problems which the computer control system cannot resolve itself are referred to the operator via the computer's modem link. After commissioning, it is anticipated that approximately one to two visits a week by a light van will be sufficient to provide scheduled maintenance cover for the wind farm.

2.3.5 When the wind farm is de-commissioned the area can be reinstated so there is no visual sign of the wind farm. Decommissioning would follow environmental best practice at that time, however, it is likely that the only components that would not be removed from the site would be the underground cables and foundation blocks which would remain in situ. This is because it would create a greater disturbance to the environmental, agricultural, and recreational locality to remove them than to leave them where they are. The majority of the turbine components can be recycled or re-used and all other materials would be disposed of to suitable licenced disposal sites.

2.3.5.1 To avoid and mitigate environmental impacts during construction a Construction Environmental Control Plan will be produced and strictly enforced. This would include measures to:

- avoid and mitigate the impacts from construction traffic, noise, run-off, waste, dust and contaminants;
- avoid and mitigate the impacts to ecology, hydrology and archaeology from construction of the site access tracks, turbine foundations and hardstanding areas;
- reinstate the temporary works, areas around the turbine bases, and partially reinstate the crane hardstandings and site access tracks.

2.3.6 CRE Ltd. has endeavoured to avoid and mitigate environmental impacts during operation of the wind farm by incorporating the advice and recommendations received throughout the environmental impact assessment process into the wind farm design and layout.

2.3.7 Overall, the developer has incorporated a civils design and layout for the wind farm that would be technically viable; in addition, construction and operational requirements will be undertaken in accordance with relevant legislation and guidance and in consultation with the planning authority and other relevant consultees.

2.3.8 Landscape and Visual Assessment

Significance of Effects on the Physical Landscape

2.3.8.1 The construction of the Mynydd y Betws Wind Farm is expected to result in only minor and localised changes to the existing land cover. Replacement of stripped vegetation and topsoil around the turbines, construction compound, borrow pits, track sides and centre and crane hardstandings would reduce impact to the physical landscape. Farming (that is, grazing) and leisure activities would be able to continue during construction with only the actual construction areas themselves being excluded for safety reasons. After completion of the construction works, activities can continue right up to the base of the turbines. Long-term management of the physical landscape would not need to change as a consequence of wind farm construction and operation.

Significance of Effects on Visual Amenity

2.3.8.2 The visual amenity of the landscape from within the immediate surrounding area of the proposed wind farm would be affected by its development. This would be most notable around areas such as Penlle'r Castell and St. Illtyds Way, where the landscape would change from one where open moorland with overhead cables is dominant, to one where wind turbines within an open moorland becomes dominant.

2.3.8.3 From viewpoints within the Brecon Beacons National Park where receptor sensitivity is high, there would be a high/moderate effect on visual amenity from the specific viewpoints considered at the western edge of the National Park. However, these effects on visual amenity would be restricted to a relatively small zone on the south western margin of the Park. Topography would prevent views of the wind farm extending eastwards beyond the south western marginal slopes of the Brecon Beacons.

2.3.8.4 From viewpoints within the more populated areas, such as Ammanford, which are relatively close to the proposed wind farm, the effect on visual amenity is reduced. This is due to a number of factors, including localised landform and existing vegetation screening views, existing built elements and other structures and features such as overhead power lines that in themselves detract from the view.

2.3.8.5 Visual amenity is unlikely to be affected from more distant viewpoints. Views from these locations are restricted, for example by built form, or vegetation. Where views are permitted, they would only be during clear visibility and the scale of the development would be insignificant when viewed as part of the wider landscape. Views from main transport routes are not prevalent due to the roads running in valleys or boarded by hedgerow, trees or buildings. Any views of the turbines would be intermittent, thus reducing the apparent scale and prominence of the turbines in the landscape.

Significance of Effects on Landscape Character

2.3.8.6 The only significant effect on the landscape character resulting from the proposed wind farm would be on localised landscape character. This would be predominately restricted to the immediate vicinity of the turbines. Consequently the magnitude of change in landscape character is low.

2.3.8.7 The presence of the Mynydd y Betws Wind Farm within the landscape, from the majority of the study area, would not be of sufficient magnitude to result in a fundamental shift in character of the landscape.

2.3.8.8 Beyond the immediate area of the wind farm, the topography and large scale of the receiving landscape would assist in minimising the effect of the wind farm on landscape character. The effect on the landscape character of the Brecon Beacons would be restricted to a very small area within the National Park. This effect would be insufficient to result in a significant change in character of the National Park landscape.

2.3.8.9 In balancing the landscape and visual effects of the wind farm against the need for renewable energy development, the Mynydd y Betws proposal is an acceptable development in

terms of its affect on landscape character and visual amenity. All of the factors summarised above, including the location, scale, layout and juxtaposition with other landscape features confirms this conclusion.

2.3.9 Archaeological Assessment

2.3.9.1 An archaeological desk-based assessment and site field walk over were undertaken on the proposed Mynydd y Betws Wind Farm. The desk-based assessment involved a study of all readily available primary and secondary documentary, cartographic, pictorial, aerial/ground photographic and oral sources in order to provide an historical framework for the surviving archaeological remains within the area of the proposed development. The site walkover was undertaken in order to assess the area designated for development to record and identify previously unknown archaeological features.

2.3.9.2 The archaeological desk-based assessment has identified a total of 105 significant archaeological sites within the area of the proposed development. These range from Prehistoric to Post-medieval remains, and include one current Scheduled Ancient Monument (SAM), and six recommened SAMs.

2.3.9.3 The proposed development will not directly affect any of the known archaeological sites but it is recommended that an archaeological watching brief be undertaken during the course of construction so that any previously unidentified archaeological remains can be recorded. Although there is no direct impact on the monuments, the track from the south eastern site entrance passes through the 100m buffer zone of one archaeological site and the existing track north of turbine 14 passes through the buffer zones of three sites. Care should be taken in this area; this is especially important given that the area is rich in Bronze Age activity and isolated finds of a ritual nature could be located within the peat deposits.

2.3.9.4 No archaeological activity was recorded in the areas of the proposed turbines, tracks, borrow pits, substation and construction compound during the field walkover.

2.3.9.5 Given the richness of archaeological features within the general area of the proposed development, especially of Bronze Age activity, the proposed mitigation would be to undertake an archaeological watching brief during the course of the development's construction. In addition, good construction practices would be enforced such as restricting vehicles to designated areas, not storing top soil and arisings in archaeological buffer zones, and using temporary fencing where necessary.

2.3.10 Ecological Assessment

2.3.11 A full ecological evaluation of the Mynydd y Betws Wind Farm site has been conducted in accordance with standard methodologies for ecological surveying. The purpose of this evaluation was to assess the potential impacts of the proposed development on the main ecological features of the site identified during the scoping process.

2.3.12 The surveys show that the site is typical of much of upland Wales. It has been subject to heavy grazing in the past, and supports a fairly limited diversity of breeding birds. However, the presence of some breeding birds classified as of conservation concern, such as skylark, and wintering species such as golden plover and hen harrier, means the site is considered as of Regional importance for its birds. The presence of viable areas of Biodiversity Action Plan priority habitats such as upland heath and blanket bog means the site is considered of County importance for its habitats.

2.3.13 Possible impacts of the proposed development have been assessed. It is not considered that there will be an impact on breeding birds. There is a slight possibility of disturbance to wintering golden plover and a slight danger of collision to some species. There will also be some loss of habitats. Overall the impacts are assessed as of a minor negative level and there should be no long term impact on the viability of the habitats concerned or the integrity of bird populations.

2.3.14 Mitigation measures to minimise impacts have been proposed, and include implementation of a habitat management plan and post construction ornithological monitoring/surveys to assess impact predictions. The habitat management plan recommends keeping grazing levels in line with the current Tir Gofal agri-environment scheme guidelines

and adjusting as necessary if monitoring shows unwanted trends. It also outlines good practice, such as mixed grazing, no controlled burning and lists the vegetation species to be encouraged and discouraged.

2.3.15 Noise Assessment

2.3.16 An assessment of the potential noise impact from the proposed Mynydd y Betws Wind Farm has been performed. This assessment has followed the guidance contained within the report by the DTI Working Group on Noise from Wind Turbines and which is detailed in ETSU-R-97.

2.3.17 Background noise measurements were made at six noise sensitive dwellings neighbouring the proposed development. These locations were identified through preliminary noise predictions.

2.3.18 Analysis of the measured data has been performed to determine the pre-existing background noise environment at the measurement locations, in accordance with the guidance contained within ETSU-R-97.

2.3.19 Predictions of wind turbine noise have been made, based upon a Generic Sound Power Level and a calculation procedure which is considered to be worst-case.

2.3.20 The predicted wind turbine noise and measured background noise levels indicate that for the majority of dwellings neighbouring the proposed development, wind turbine noise will meet the Lower Absolute Noise Criteria proposed within ETSU-R-97 during the Daytime Amenity Period. For Fullmoon, Lletty'r crydd, Blaen-y-cwm, Bryn Mawr and the property south of Ty'n domen, predicted wind turbine noise will meet the Upper Absolute Noise Criteria for Amenity Hours and exceed the Lower Absolute Noise Criterion by no more than 3 dB. Henrhyd meets the requirements of ETSU-R-97 as it is commercially involved with the development being a landowner of the site.

2.3.21 Predicted internal noise levels will be below recognised sleep disturbance levels at all except one property. Henrhyd will experience noise levels close to 35 dB L_{Aeq}, during a wind speed of 12 metres per second with windows wide open. With windows closed, internal noise levels due to turbine operation are unlikely to exceed 30 dB L_{Aeq} at a wind speed of 12 metres per second. It should be noted that windows are unlikely to be open when there are periods of high wind speeds.

2.3.22 Hydrological Assessment

2.3.22.1 The results of the hydrological survey and searches have shown that there are a number of surface water courses within the site boundary and a large number of watercourses rise within or close to the site boundary. There are also large areas of peat bog and other wetland areas which act as sources for a number of the watercourses.

2.3.22.2 The design of the wind farm has sought to avoid the crossing of surface water courses, and where possible access tracks and turbines have been placed away from blanket bog, wet heath and marsh areas. The exception being a short length of track to the north of turbine 9 (see Figure 2) that would necessarily have to cross along the edge of blanket bog which acts as a stream source. A floating track will be used for this section to mitigate impacts.

2.3.22.3 There may be an increase in local surface water flows near the structures, but given the low to medium permeability of the soil and rock strata the regional groundwater flow patterns should not be affected.

2.3.22.4 There are a number of groundwater abstractors within or in close proximity to the site, including well and spring supplies for potable water and spring and streams feeding livestock. The locations of the groundwater abstraction is sufficiently remote from the proposed development that it is considered highly unlikely that groundwater flow patterns or water quality to these water supplies will be affected by the proposed development.

2.3.22.5 It is concluded that there is unlikely to be any detrimental effects on ground and surface water resources. The significance of effects is Slight to No Change.

2.3.23 Electromagnetic Interference and Air Safeguards

2.3.23.1 A wide range of operators of

microwave and other communication links have been consulted. Ofcom have raised concern regarding six microwave links, two operated by Surf Telecom and four operated by Orange. Neither of the link operators had objections to the proposal. Following an objection by JRC, a study into scanning telemetry was commissioned. This resulted in an exclusion zone of 500 metres around the mast located on site and 50 metres round the link. No turbines have been located in this exclusion zone.

2.3.24 The MoD, CAA and NATS have been consulted. The MoD have no objection, and the CAA recommended consultation with Swansea Airport, who have no objection to the proposal. Assessment of the map provided by NATS indicates that the proposal should have no impact on NATS services.

2.3.25 Land Use, Access, Amenity, and Safety Assessment

2.3.25.1 All the factors that could compromise private and public use, amenity (from shadowing and reflective light) and safety have been assessed in respect of the Mynydd y Betws Wind Farm proposal.

2.3.25.2 Public use of the land for open access and grazing will continue unabated. There may be some temporary inconvenience caused during the construction period but this will be limited in the duration of effect and is essential to ensure public safety whilst vehicles are moving around the site.

2.3.25.3 In respect of reflective light, the colour of the turbine towers, blades and nacelle will be subject to agreement with the planning authority. However, there is an expectation that they will have a semi-matt, light grey surface finish, which will ensure that the potential to reflect light is minimised. No lights are proposed for erection on the turbines.

2.3.25.4 An assessment of the potential for shadowing, an effect that can potentially happen if the sun passes behind a moving blade and casts a shadow on the window of a neighbouring property, has been conduced for properties within 825 metres (10 times the rotor diameter) of the locations of the turbines. This has been assessed under worst case conditions, that is, assuming there is no screening from buildings or vegetation, full sun from sunrise to sunset, the turbine rotor plane is always perpendicular to the line from the turbine to the sun, and the turbine is always operating.

2.3.25.5 It should be noted that potential disturbance from shadow flicker only occurs at frequencies between 2.5Hz and 40Hz (or cycles per second). The proposed turbines are variable speed and the blades would rotate at between 13 and 19rpm, giving blade passing frequencies of less than 1Hz, well below the frequencies of concern. This means that shadowing is not a potential concern to persons with a predisposition to epilepsy.

2.3.25.6 Several properties have been identified that may be affected by shadowing from the turbines as the wind turbine blades intercede between the property and the sun's rays. Most properties have either screening already in place through earth banks and hedgerows, that would prevent such effect, or they do not have windows orientated in such a direction as to cause a concern. For any remaining properties where shadow flicker does occur, the developer will enter into a legally binding agreement with the local planning authority to rectify such problems, usually through programming the wind turbine control systems to shut down during critical periods.

2.3.25.7 In respect of public safety and icing on the blades, the local climate and operational requirements will prevent the displacement of the ice from affecting public safety on the public footpath. Sensors would prevent the turbines from working should unusual events occur, such as the build up of ice on the blades, because an imbalance in the rotor is detected by the sensors. This prevents ice from being thrown from a rotating turbine. There have been no accounts of public injury through ice displacement from turbine blades, nor any incidents of public injury through damage to turbines blades as a result of damage through high winds or lightning. Usually, in the event of poor weather conditions, the turbines are shut down (over wind speeds of 25 metres per second / 55 miles per hour) in order to protect them and the public from damage.

2.3.25.8 There is no evidence to date in the history of wind farm development of distraction impacts to vehicle drivers despite a large

number of UK wind farms being clearly visible from major roads. This provides a high level of confidence that safety on the local roads would not be compromised.

2.3.25.9 In conclusion, it has been established that land use, access, amenity (from shadowing and reflected light) and safety would not be significantly affected by the Mynydd y Betws Wind Farm proposal.

2.3.26 Socio-Economic Effects and Environmental Benefits

2.3.26.1 The Mynydd y Betws Wind Farm proposal would provide substantial benefits, both financially and environmentally. Suitably qualified local contractors will have the opportunity to bid for the civil and electrical works and the provision of site services; a potential investment of up to £7 million. In addition UK based manufacturers will be invited to bid for the £20 million turbine supply contract. The proposal would also provide permanent employment for a site manager and fitter for Operation and Maintenance services during the project lifetime.

2.3.26.2 The developer, CRE Ltd., is committed to ensure that the local community benefits from this project. The proposal would provide a reliable income stream for the landowners and commoners, a significant community fund for local projects, and an educational resource for local schools and colleges.

2.3.26.3 CRE Ltd. will establish a Community Trust Fund and on commercial operation of the wind farm will contribute a significant annual financial contribution directly from the proceeds of the wind farm to the amount of £200,000 per annum. The fund would be used for the benefit of the community in the direct locality of the wind farm (possibly 3 miles) including Ammanford and the villages of Betws, Gwaun-Cae-Gurwen, Glanaman and Cwmgors.

2.3.26.4 Studies conducted at existing wind farms suggest that the Mynydd y Betws Wind Farm is unlikely to have either a detrimental or beneficial effect on local tourism and house prices.

2.3.26.5 The Mynydd y Betws Wind Farm would make a significant contribution to the reduction of emissions that are known to cause global warming and acid rain. Based conservatively, these would amount to:

CO_2	86,498 tonnes p.a.
SO_2	1,006 tonnes p.a
NO_x	302 tonnes p.a

2.3.26.6 Over a 25 year lifetime it will displace:

CO_2	2,162,450 tonnes
SO_2	25,145 tonnes
NO_x	7,543 tonnes

2.3.26.7 In addition, wind turbines are recognised as having a positive energy balance. Over their lifetime they can repay over 30 times the energy used in their manufacture and installation, and up to 90% of materials (excluding foundations) can be recycled.

2.3.26.8 It has been argued by some that wind energy projects, particularly smaller proposals, would produce an insignificant amount of electricity and only a fraction of the total electricity needs of the UK. However, previous public inquiry decisions do not support this claim. The Mynydd y Betws Wind Farm proposal will produce sufficient electricity to provide for the equivalent needs of over 23,834 households (based on predicted wind speeds and an average annual household consumption of 4.22MWh). This is equivalent to approximately 31% of Carmarthenshire County's total domestic needs.

2.3.27 Overall Conclusions

2.3.28 In pursuance of ensuring conformity with planning policy guidance at the national, regional and local level guidance and in compliance with statutory regulations for the assessment of impacts likely to arise from the proposal, namely Environmental Impact Assessment (EIA), the developer has accorded with all regulatory and guidance criteria in the formulation of this proposal. EIA provides for a systematic procedure for the assessment of a

project's likely significant environmental effects, thereby ensuring that that the importance of the predicted effects, and the scope for reducing them, are properly understood by the public and relevant statutory bodies.

2.3.29 CRE Ltd. has conformed to EIA requirements and has been openly consultative on this project from its inception. The local planning authority and statutory undertakers were consulted at the early stages of the project and their views on the proposal were incorporated into establishing the scope of assessments required for a planning application. In addition, CRE Ltd. has undertaken local public consultation and exhibition on the proposals.

2.3.30 During the undertaking of the EIA, the advice of the assessment consultants has been factored into the design of the wind farm so that sensitive environmental media are well protected. Numerous wind farm layouts were considered and the final layout is the culmination of this approach. In this way, the developer has sought to balance the potential global objectives of wind energy development and local community benefits against the potential environmental impacts.