NATIONAL WIND POWER



Proposed Wind Farm

Ffynnon Oer

Environmental Statement

Volume 1
Main Report and Appendices



National Wind Power

Proposed Wind Farm Ffynnon Oer, Neath Port Talbot

Environmental Statement

Volume 1 - Main Report and Appendices

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1. Introduction

1.1 Ffynnon Oer Wind Farm

National Wind Power propose to develop a wind farm at Ffynnon Oer. The site, which covers a total area of some 150 ha is located within Neath and Port Talbot County Borough. The wind farm would comprise 16 three-bladed turbines with associated crane pads, access tracks, substation and infrastructure. The maximum total height of each turbine will be 91 m to vertical blade tip.

The site is located on high ground situated to the southeast of Resolven and to the north of Abercregan. Figure 1.1 provides the location of the proposed development.

The current land use of Ffynnon Oer is agricultural with the site providing what is best described as rough grazing for sheep; the site covers a variety of ecological habitats of varying significance. There is widespread evidence of past industrial activity on the site and of earlier human settlement most notably a Roman encampment which lies outside the site boundary, to the northwest. The area identified for the erection of the turbines is bounded to the east and west by forestry plantations.

1.2 The Environmental Statement

This Environmental Statement (ES) has been prepared to report on the Environmental Impact Assessment (EIA) of the proposed wind farm at Ffynnon Oer. Environmental Impact Assessment is a process that involves collecting information about the existing environment likely to be affected by a project. The nature and scale of the project's effects on the environment are then assessed in an impartial manner and presented in a systematic way. The process is designed to allow environmental concerns and opportunities to be addressed during the planning and design of a project, by incorporating into the proposal measures to mitigate adverse effects or enhance beneficial ones. Also critical to the process is that consultation should be carried out at appropriate stages. The findings of the assessment are designed to assist consultees and, ultimately, decision-makers in coming to a view about whether or not, and how, a project should proceed.

The regulatory route for gaining planning permission for a wind farm depends on its size with larger schemes (>50 MW) being considered under Section 36 of the Electricity Act 1989 by ministers. The proposed Ffynnon Oer scheme (20.8 MW) falls below this threshold and is therefore considered through the normal Town and Country Planning process administered by the Local Planning Authority (LPA). In this case the LPA is Neath Port Talbot County Borough Council. The requirements to consider the environmental consequences of the scheme arise from the Environmental Impact Assessment (England and Wales) Regulations 1999 requiring an Environmental Statement to be submitted in support of the planning application.

This Statement sets out the results of the Environmental Impact Assessment for the proposed wind farm at Ffynnon Oer. It should be noted that this statement covers only the environmental effects associated with the construction, operation and decommissioning of the wind turbines,

access tracks and on-site substations and infrastructure. The statement does not address any overhead transmission lines that may be needed for the grid connection between the wind farm and the national electricity grid which are subject to a separate consenting process.

The document begins by outlining the nature of the proposed development followed by an explanation of the EIA and Scoping processes relevant to this wind farm. This is followed by information on how the site was selected and what alternatives to the development have been considered. The Statement then provides a summary of energy and planning policy relevant to the development followed by a number of sections covering the technical topics agreed for consideration during the scoping exercise. The final section summarises the key environmental effects of the development.

1.3 The Rationale for Renewable Energy

There is a growing awareness and acceptance that the rise in atmospheric levels of carbon dioxide (CO_2) and other greenhouse gases is leading to changes in the global climate. At the international conference on climate change held in Kyoto in 1997, the UK government accepted binding commitments to reduce greenhouse gas emissions and subsequently set a domestic goal of a 20% reduction in such emissions by 2010. In his presentation to the Economic Development Committee of the National Assembly for Wales (NAW) Sir John Houghton, Co-chair of the Scientific Assessment Working Group at the Intergovernmental Panel on Climate Change (IPCC) identified that the Earth's average surface temperature is rising at a faster rate than it has for at least 10 000 years and is projected this century to increase by 0.2 to 0.5 degrees per decade. In its Report for Consultation on Renewable Energy issued in April 2002 the Economic Development Committee noted its opinion, that both humans and ecosystems will find it difficult to adjust to this temperature increase.

The impact of climate change in Wales was also the subject of a recent report, 'Climate Changes Wales - Learning to Live Differently'. The key impacts identified were those associated with the rise in sea levels, increased winter rainfall, increased occurrences of storms and flooding and the changes in agriculture and habitat likely to result. Furthermore there were expected to be a wide range of economic consequences.

Whilst global warming is the responsibility of all governments the Economic Development Committee stated its belief that Wales is in a particularly good position to act. Wales was considered to be the ideal location for the development of renewable technologies, especially wind, tide and sea-current and both wind-power and biomass are considered to both be ideally suited for rural areas and offer jobs and investment at a time when diversification is urgently needed. In the longer term industry and business throughout Wales is considered by the Committee to benefit from a reliable supply of electricity from renewables at a competitive price.

In the whole of the UK operational wind farms annually offset the emission of 1.35 million tonnes of carbon dioxide a year. By early 2002 a total capacity of over 499 megawatts (MW) had already been installed in the UK, meeting the average electricity needs of over 250 000 homes and displacing the emission of carbon dioxide into the atmosphere. Within Wales the British Wind Energy Association (BWEA) in their submission to the NAW's Economic Development Committee on 16 January 2002 estimated that 152.7 MW of the UK total was being produced in Wales.

1.4 National Wind Power

National Wind Power Limited has developed a leading position in the UK wind power market. Formed in August 1991, the company is a subsidiary of Innogy plc - an integrated energy business. By early 2002, National Wind Power (NWP) was operating 280 MW and had developed seventeen wind farms worldwide (fourteen in the UK).

2. Description of Proposed Development

2.1 Introduction

This section of the report outlines the activities associated with the construction, operation and decommissioning at the wind farm. It includes details of the construction programme and technical information on the turbines and the associated infrastructure.

2.2 Wind Farm Principles and Design

2.2.1 Wind Farm Principles

Wind turbines are designed to convert the kinetic energy of the wind into electrical energy (Figure 2.1). Air passing over the blades of a wind turbine causes them to rotate. This low speed rotational motion is converted into electrical energy at a voltage of 690 V by a generator located inside the nacelle and is then converted to a high voltage (typically 11 kv) by a unit transformer located at the base of the turbine. Underground cables link all the turbine unit transformers to a dedicated substation on the site where the electricity generated by the wind farm is metered, and if necessary transformed to the same voltage as the electricity grid system to which the wind farm will be connected. The wind farm substation is typically connected to an existing substation on the national electricity grid by a high voltage transmission line in this case 66 kv.

2.2.2 The Role of EIA in the Design of the Proposed Scheme

Entec has been involved throughout the design of the proposed scheme. This ensured that environmental issues have been fully considered and where feasible mitigated. This ES presents the assessment of effects of the final scheme, but it is important to note below (**Table 2.1**) the changes in the final form of development that have been made throughout the design stage in order to mitigate potentially significant environmental effects.

Table 2.1 Mitigation of Potentially Significant Effects Through Design

Iteration	Comment
Initial Layout	Taking account of known information and good design practice
Relocation of Turbine 9	This avoids the landslipped ground and entrances to former mine workings
Relocation of Turbines 1,2 and 12	Moved to an appropriate distance from public rights of way
Relocation of Turbines 15 and 16	This avoid the area identified within the Phase 1 habitat survey as acid flush
Relocation of Turbine 7	The turbine has been moved to the edge of the area identified in the Phase 1 Habitat survey as modified blanket bog
Review of Road layout	Road layout modified to minimise length on modified blanket bog
Relocation of Turbine 6	This has been moved to the edge of the area licensed by the Environment Agency for the deposal of sheep dip and outside the actual site area used by the landowner
Agreement of Operational Access Route	Agreement has been reached with the Forestry Commission to allow for operational (in addition to construction) access to take place through the forestry. There will be no need to use the access track passing through the Roman Camp
Reduction in length of Internal Track	The length of track shortened to reduce loss of habitat and lessen visual impact

2.2.3 Ffynnon Oer Wind Farm

This proposal is to construct and operate a 16 turbine wind farm and associated infrastructure including unit transformers, internal access roads and a substation. The turbines (each 1.3 mw) would have a combined maximum rated output of 20.8 MW of electricity, equivalent to the domestic needs of around 25% of households within Neath Port Talbot County Borough Council. The proposed layout of the turbines is provided at Figure 2.2 together with the access track layout and the new substation. This will be located at the southeastern end of the site closest to turbine No 9. The electricity will then be taken to a sub station located at SS8625 9505, between Croeserw and Caerau on the A4603.

2.2.4 Wind Farm Design Criteria

Once a site has been identified, the design of the wind farm is refined in order to produce a design which seeks to maximise wind power generation within the constraints of the site and potential environmental impacts. The optimal layout of a wind farm depends on a range of technical, economic and environmental criteria including:

- Ground conditions – to be suitable for the installation of wind turbines, access tracks and cables e.g. avoidance of former landslip or geologically unstable ground.
- The feedback from a range of consultation activities are also taken into account including views of the local planning authority, statutory and non-statutory consultees, the local community and landowners.

- Energy yield – the site and immediate environs are computer modelled to establish the windflow on and around the site to provide guidance on the best locations for the wind turbines, taking account of the turbulent interaction between wind turbines.
- Proximity to occupied dwellings – sufficient stand off to occupied houses to protect local noise amenity.
- Environmental constraints – features and areas that are environmentally sensitive are identified and their implications considered.
- Existing land use –the existing use of the land is considered in the layout of tracks and turbines. For example, existing track lines are used where practicable.
- Site access – for movement of materials and personnel to and from the site bearing in mind that turbine blades are over 30 m long.

2.2.5 Selection of Turbines

The wind turbines selected for this site are of the horizontal axis type, with a rotor consisting of three blades, each 29 m in length and affixed to the tower by means of a hub or nacelle which itself adds a further 2 m to the overall blade length. These are then mounted at a height to the wind turbine hub of 60 m and with a maximum rated power generation capacity of 1.3 MW. This gives a turbine with a maximum height to vertical blade tip of 91 m. The final selection of turbine will be subject to competitive tendering within these design parameters.

2.3 Construction

Construction of the wind farm at Ffynnon Oer will consist of the following main operations:

- Create and upgrade the access route from the forest into the site and install the site accommodation and compounds;
- Construct on-site access tracks including operational access road, and excavate the wind turbine foundations;
- Construct the wind turbine foundations (the grid connection is the subject of a separate consenting process);
- Construct the site substation and install grid connection;
- Excavate cable trenches and lay the power and instrumentation cables;
- Erect and commission the wind turbines;
- Carry out reinstatement works, remove temporary accommodation and clear the site.

An indicative construction programme is shown below. It is anticipated that the construction process will take seven months. Weather in particular has a strong influence on the timing of these activities. During the construction period strong wind conditions are avoided for obvious safety reasons, and during cold conditions concrete pouring for turbine bases can be halted. For

these and other reasons summer months are favoured. Current expectations are that construction work would start in August 2003.

ID	Task Name	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7
1	Access to site							
2	Site preparatory work							
3	Field access work							
4	Establish Compound							
5	Set out access tracks							
6	Site access tracks							
7	WTG foundations							
8	Sub-station building							
9	Crane hardstandings							
10	Cable laying							
11	Transformer delivery							
12	HV cable terminations							
13	LV cable terminations							
14	WTG deliveries							
15	WTG assembly and erection							
16	WTG startup							
17	WTG commissioning							
18	Re-instatement							

2.3.1 Site Access and On-site Access Tracks

Site Access

One access route is proposed to the site. Existing forest tracks to the northeast of the site joining onto the A4061 will be used during construction and decommissioning to facilitate the movement of the large turbine components and concrete lorries to and from site. They will also be used for operational access.

Layout

The layout of the access tracks has been developed from the following criteria:

- Track length should be kept to a minimum to reduce construction time, roadstone requirement and environmental impact;
- Gradients must be kept low 1:8 to allow construction plant to move safely round the site (typically less than 1:8);
- Track layout reflects contours and avoids cross slopes and deep cuts into existing terrain;
- Tracks should be routed to avoid sensitive ecological and archaeological features.

An estimated 6.2 km of track will be required to link the turbines and control compound. Of this approximately 3.2 km is new, the remainder is the existing farm track that will be upgraded. The anticipated track layout is provided at Figure 2.4.

Construction Methodology

The tracks will primarily be of a reinforced geogrid type where crushed store and geogrid membrane are laid in multiple layers. This is established practice on wind farm sites and tracks are required to cross soft peatland soils by avoiding disturbance to hydrological flows.

Within the site the access track specifications will be varied to suit the conditions. At this stage, prior to intrusive geo-technical investigations, it is expected that there will be a need to employ up to three types of track construction and details are provided at Figure 2.3. The tracks will be designed to permit access within the site by normal road-going cranes and heavy goods vehicles. The tracks will normally be 4 m wide with 0.5 m shoulders, giving a total excavated width of 5m. In some places the bends will be widened to up to 14 m to permit the turning of long vehicles. Where tracks are required over areas of softer ground, the width may also need to be increased to provide appropriate load bearing, up to approximately 7 m wide.

In constructing the tracks the vegetation and approximately 50-100 mm of topsoil will be scraped off and stored on a layer of geotextile near to the tracks for partial reinstatement alongside the completed track Geotextile will be laid directly onto the exposed subsoil and the track will then be constructed on the geotextile by laying and compacting crushed stone. Where depth to subsoil is small crushed rock up to a depth of 300 mm will typically be used. In softer ground the number of layers or geogrid membrane is increased as is total depth of stone. Areas of soft ground will be avoided where possible.

Where required, provision for surface draining will be incorporated within the track structure to maintain existing surface water run off. Similarly, running surfaces will be suitably cambered to direct surface drainage flows.

In addition to the access track, crane hardstanding areas and turning bays will be constructed adjacent to wind turbine bases. Figure 2.5 represents a typical arrangement however the precise layout required to accommodate the crane will depend upon the turbines used. The laydown areas will accommodate components ready for assembly and erection and provide a firm base for cranes used to erect the turbines. Crane pads will be left in place to allow similar plant use in case of component failure and for decommissioning.

Stone Requirement

Conventional practice on wind farm sites is to open burrow pits to win stone for track construction. This creates some additional impact but offsets significant numbers of lorry movements. At Ffynnon Oer however agreement has been reached to use the stone from the existing Bwlch Ffos Open Cast Site which is located within the forestry area to the Northeast of the site. The operator of this site has recently received planning permission to extend the operation and the stone excavated to access the coal will be used in the development of the wind farm. Borrow pits are therefore unnecessary. The location of the open cast site avoids any requirement for vehicles to use the public highway with forestry tracks providing the route. Stone will be crushed and graded at Bwlch Ffos prior to its delivery on site.

2.3.2 Site Accommodation and Temporary Works

During construction a temporary fenced off compound area of about 5000 m^2 will be situated on the southern and lower plateau as indicated in Figure 2.4. It will enclose the following:

- Temporary portacabin to be used for site offices and welfare facilities including one portacabin toilet with provision for sealed waste and storage;

- Parking for up to 30 cars and 10 construction vehicles;
- Containerised storage for tools and small parts.

The compound will be stripped of topsoil, which will be stored separately on site for eventual restorations upon completion of works and surfaced in crushed stone. Temporary fencing will be erected to prevent personnel or livestock from straying into excavations, or to prevent the public from straying into the path of vehicles close to rights of way. It will be placed around each turbine base and it will be of a post and wire construction. Fencing will also be used to protect archaeological or environmental features where appropriate.

2.3.3 Turbine Foundations

A schematic design for the proposed wind turbine foundations is shown at Figure 2.6. Each foundation will be formed from reinforced concrete, typically to a diameter of 14.5 m and a depth of approximately 3 m. The base will initially be excavated to about 1 m oversize to allow for shuttering access, and the shuttering positioned and supported. The foundation will then be filled with 100 mm of blinding and 750 mm of reinforced concrete.

An upstand of 4.5 m diameter to a depth of about 2 m is then formed and wind turbine tower fixing bolts integrated with this. Once set the remaining cavity is backfilled with compacted excavation material. Prior to the commencement of these operations the area to be used for the foundations will be stripped of topsoil and subsoil, the topsoil will be stored separately for later use.

2.3.4 Site Substation and Grid Connection

The grid connection for the wind farm will be via a new substation building to be located on the southern lower platteau of the site. Metering and switch gear will be contained within this building which will be of a local vernacular appearance. The plan and typical elevations of the substation is provided at Figure 2.6.

A transformer will also be required due to the need to step up the voltage from the wind farm to the 66 kv required for the grid connection. This will be adjacent to the substation on a concrete pad of approximately 15 x 8 m.

2.3.5 Cabling

Between the wind turbines and the substation, all the power and control cabling will be laid in trenches approximately 500 mm wide by 750 mm deep excavated directly adjacent to access tracks. These will then be back-filled with compacted fill, which will have been selected to remove large or sharp stones. In pure peat areas the peat will be replaced directly around the cables. The vegetation and top 50-100 mm of soil will be stripped and laid beside the trench and replaced to the existing ground level immediately after the cables have been installed. Clay plugs will be installed where appropriate (approximately every 50-100 m) to restrict water flow through the trench.

2.3.6 Erect and Commission Wind Turbines

Wind Turbines components will be transported to site on articulated trailers with the blades arriving via low bed trailers with rear steering. Erection will be undertaken using two mobile

road going cranes of approximately 100 and 500 tonnes IFt capacity. The maximum axle weight of the larger crane will normally be limited to 14.25 tonnes.

2.4 Wind Farm Operation

2.4.1 Wind Turbine Characteristics & Meteorological Effects

The power output from wind turbines begins when wind speed exceeds 5 m/s and it reaches a maximum output at around 15 m/s. At wind speeds above 25 m/s(60 mph), the turbine automatically shuts down. Generation output is also seasonally dependent with around two thirds of the output generated between October and March.

Although wind farms require wind for electricity generation, at high wind speeds (>25 m/s or 60 mph) they shut themselves down to avoid excessive wear on the components, and the rotor is both aerodynamically and mechanically braked. Modern wind turbines are however designed to withstand much higher windspeed, and are normally warranted against structural failure for windspeeds up to 150 mph. Lightning generally has no effect on turbines, though as with all structures there is a risk of damage if hit directly by lightning. Turbines are fitted with a lightning protection system as part of their design.

Snow and ice do not generally pose problems other than with access to the site. Occasionally very heavy snow and ice may affect the anemometer or aerodynamics of the turbine blades resulting in temporary automatic shutdown. The wind turbine would restart automatically after accumulations have naturally thawed.

2.4.2 Wind Turbine Servicing and Emergency Operations

The wind farm would be visited once a month for general checks. Routine maintenance or servicing of turbines is required and generally carried out twice a year, with a main service at 12 monthly intervals and a minor service at 6 months. In the first year there is also an initial 3 month service after commissioning. The turbine being serviced is switched off for the duration of its service.

Site maintenance personnel would use off-road vehicles to access the wind turbines via the forest access track.

2.4.3 Habitat Management

Enhanced management of the modified bog area is proposed for the operational life of the wind farm. It is intended that following the grant of consent an outline habitat management and monitoring plan will be prepared and agreed with the local planning authority.

2.5 Decommissioning

The predicted operational lifespan of the Wind Farm is 20 years. At the end of this period the site will be decommissioned or, alternatively, a planning application maybe submitted to retain the existing turbines or replace them with new turbines. The decommissioning of this wind farm is expected to take three months to complete. It will involve the following operations.

2.5.1 Wind Turbines

These will be removed from the site entirely and their foundations broken out to below ground level. All materials arising from demolition will be disposed of in accordance with relevant waste management regulations. Foundations will be covered in topsoil and seeded with an appropriate local mix.

2.5.2 Cables

Wind turbine interconnecting cables will be de-energised and left in place at their placement depth of 750 mm. This is considered less damaging than their complete removal. Cable marker signs will be removed.

2.5.3 Substation

The demolition of the substation will involve the removal of equipment and then complete demolition of the building and compound including breakout of the foundations to below ground level. Foundations will be covered in topsoil and seeded with an appropriate local mix.

2.5.4 Access Tracks

Although removal of the site access tracks is feasible the process of track removal may cause more environmental damage than will the result of leaving them *in situ.* It is proposed that decisions on their removal be undertaken at the time of decommissioning in conjunction with the landowner and local planning authority.

2.5.5 Habitat Management

Habitat management following decommissioning is subject to discussions with the landowners. Given current policy trends it is anticipated that the land use would continue to be agricultural, but with emphasis on maintaining nature conservation and bio-diversity value.

3. The Environmental Impact Assessment

3.1 The EIA Process

EIA is a process, the key characteristics of which are that it is:

- systematic, comprising a sequence of tasks defined both by regulation and by practice;
- analytical, requiring the application of specialist skills from the environmental sciences;
- impartial, its aim being to inform the decision-maker rather than to promote the project;
- consultative, with provision being made for obtaining feedback from interested parties including local authorities and statutory agencies;
- interactive, allowing opportunities for environmental concerns to be addressed during the planning, design and implementation of a project (see Table 2.2 for how the EIA has altered the scheme design).

The interactive nature of the process relates to one of the purposes of EIA, namely the need progressively to refine the design of a proposed scheme in order to reduce its potential adverse effects (i.e. to mitigate potential effects so that they are reduced or eliminated). Where possible, measures should be taken to compensate for any significant adverse effects that it is predicted will occur and to increase the environmental benefits through environmental enhancements.

A further purpose of EIA is to evaluate the significance of the environmental effects that have been assessed. Information about the significance of the effects, and the underpinning data and assessments, are then presented in the ES.

3.2 The Steps in the EIA Process

3.2.1 Key Steps

The key steps that have been undertaken as part of this EIA process are summarised in **Table 3.1** (these are based on the EIA Regulations, Government guidance and good practice).

Table 3.1 Key Steps in the EIA Process

Key Steps in the EIA Process
• Defining the project
• Considering the need for the project and alternatives for meeting this need
• Deciding on the potentially significant effects that need to be assessed and how this assessment will be carried out (i.e. scoping)
• Consultation over the scope of the EIA and refining the scope in response to the comments that are received
• Describing the baseline environment that is relevant to the potentially significant effects (i.e. that existing before commencement of the project and assumed to develop in its absence) and establishing the sensitivity of identified receptors/resources within that environment
• Identifying measures to mitigate significant effects and liaising with the project design team to incorporate these (where possible) into the proposals
• Ongoing consultation with statutory consultees and other interested parties
• Assessing the magnitude of predicted environmental effects
• Evaluating the significance of the predicted effects
• Collating the findings in an ES and summarising the findings in a non-technical summary
• Subsequently ongoing environmental monitoring, assessment and other work, as required following the production of the ES

3.2.2 The Scoping Process

One of earliest steps in the process is to define those environmental effects that need to be assessed as part of the EIA. This focusing exercise is part of the process known as scoping. The context for this focusing exercise is provided in the EIA regulations and in DETR Circular 02/99 *Environmental Impact Assessment*. Schedule 4 of the Regulations states that the ES should include "*a description of the likely significant effects of the development on the environment...*". The Circular states that "*In many cases, only a few of the effects will be significant and will need to be discussed in the ES in any depth. Other impacts may be of little or no significance for the particular development in question and will need only very brief treatment to indicate that their possible relevance has been considered*". The focusing exercise is the means by which the likely significant effects are identified.

Against this background, the scoping process therefore uses the best available data to identify those effects that are likely to be of significant concern, which can then be taken forward for more detailed analysis. These effects should include those that are:

- known or likely to be significant;
- sufficiently uncertain that it cannot be determined this stage whether or not they are likely to be significant.

Other effects are not considered in any further detail in the EIA on the grounds that they are known to be irrelevant or that they will give rise to effects of little or no significance. This ES identifies such aspects that have been scoped out.

3.3 Terminology

The terms 'impact' and 'effect' are often used synonymously and this can lead to confusion. For this assessment they have been defined as follows:

- **Impacts** are any changes attributable to the proposed development that have the potential to have environmental effects (i.e. they are the cause of the effects).
- **Effects** are the results of the changes for specific environmental resources or receptors.
- **Mitigation** is categorised as follows:
  - **Avoidance**: measures taken to avoid impacts which could have adverse effects, such as locating the main development and its working areas and access routes away from areas of high nature conservation interest, fencing off sensitive areas during the construction period, or timing works to avoid sensitive periods.
  - **Reduction**: measures taken to reduce impacts that could have adverse effects e.g. modifications or additions to the design of the development, such as the creation of reedbed silt traps to prevent polluted water from running directly into important watercourses.
- **Compensation**: measures taken to offset/compensate for residual adverse effects that cannot be entirely mitigated. These usually take the form of replacing what will be lost e.g. the translocation of existing vegetation to another site, the restoration of damaged or badly managed habitats, or the creation of new habitats.
- **Enhancement**: the genuine enhancement of environmental interest e.g. improved management of established habitats, or the creation of new habitats over and above what is required for mitigation and compensation.

Through the iterative EIA process that has been adopted the proposed scheme has been revised and various mitigation incorporated. The residual effects are then evaluated to assess their significance and this forms the basis for decision making on whether the scheme should proceed.

For this assessment the evaluation of significance generally takes account of the following criteria:

- the type of effect – i.e. whether it is positive negative or unknown;
- the probability of the effect occurring – i.e. certain, likely or unlikely. If there is uncertainty this will be noted;
- the policy importance (or sensitivity) – i.e. international, national, regional county, district or local/parish importance.

The findings in relation to all of these are brought together to form an assessment of significance for each effect, based on professional judgement. Effects are assessed as being either unknown, not significant or minor or major significance.

Some disciplines adopt slightly different terminology and/or definitions e.g. landscape assessment, and where this departs from that given above this is noted in the relevant technical section, along with any specific definitions of policy importance etc.

3.4 The Assessment Methodology

3.4.1 The Stages of The Development

Potential environmental effects have been considered in relation to the following stages of development:

- Construction: this covers preliminary site establishment, the construction of the internal access track, foundations and erection of turbines, associated facilities and infrastructure;
- Operation of the scheme: i.e. when construction work is complete and the wind farm is operational;
- Decommissioning where it is relevant.

3.4.2 Approach to the Assessment of Environmental Topics

Each of the separate assessments dealing with the environmental topics has been undertaken in relation to a 'baseline'. This relates to the existing environmental situation and how this would change if the proposed development were not to go ahead (i.e. the 'do nothing' scenario). All of the topic assessments have been undertaken on the basis of a common understanding of the nature of the proposed development (as described in Section 2).

Different methodologies are required to assess the effects relating to each of the environmental topics that have been investigated as part of the EIA. Individual methodologies are outlined at the start of each topic section and are based upon recognised good practice such as the guidelines prepared by the Institute of Environmental Assessment.

Each environmental topic follows a common format, as outlined below:

- methodology;
- description of the baseline conditions;
- description of the mitigation measures that have been proposed for inclusion in the scheme;
- identification of the predicted impacts generated during the construction and operation phases (allowing for the agreed mitigation) and an assessment of the environmental effects that these are expected to cause;
- an evaluation of the significance of the predicted effects in which these are defined as being of major, minor and no significance;
- opportunities for mitigation additional to that which it is proposed to incorporate into the development.

Again where individual disciplines may vary from this, it is noted in the relevant technical section.

3.4.3 Structure of the Environmental Statement

The environmental statement (ES) consists of a Non Technical Summary, the text (Volume 1) and the Figures (Volume 2). The text is divided into eighteen sections, as described below:

- Section 1 provides a introduction to proposed Ffynnon Oer Wind Farm and describes the role of windpower in meeting renewable energy needs. It briefly describes the EIA process and identifies the statutory duty of NWP to mitigate the environmental effects of its proposals.
- Section 2 describes the nature of the development proposed, the methodology behind its construction and operations and the changes that have been made to the development in response to the findings of the EIA.
- Section 3 provides a more detailed review of the EIA process and an outline of the impact assessment methodology used to ensure a consistent and transparent approach to assessment across topics. It outlines the structure of the ES and provides brief details of the team that has completed the EIA and compiled the ES.
- Section 4 explains the scoping process undertaken to inform the topics considered and methodologies employed in the development of the EIA.
- Section 5 reviews energy policy associated with wind farm development. It also identifies the relevant planning policy guidance including development plans and policies appropriate to the consideration of the development.
- Section 6 provides the background to the site selection exercise undertaken by NWP. It includes a review of alternatives to the production of renewable energy by wind.
- Section 7 to 15 provide the main technical body of the report considering the impact of the constructional operational and decommissioning phases of the development against the topics identified within the scoping report and agreed with the Local Planning Authority and statutory consultees.
- Section 16 assesses the likely implications of the development upon existing infrastructure, communication networks, aviation, safety and television.
- The ES concludes with a section summarising the major positive, cumulative and negative effects identified during the preceding sections.
- Section 18 forms the conclusion to the ES.

3.4.4 The Project Team

The project team that has carried out the Environmental Impact Assessment was:

National Wind Power

NWP provided the design of the development. They provided details of the construction methodology and information regarding site selection and the investigation of alternatives.

Entec UK Ltd

Entec is one of the UK's leading environmental and engineering consultancies. Consultants with the company undertook the assessment of socio-economic and community, the cultural history, landscape and visual, Public Rights of Way, Traffic and Transportation, Noise, Hydrology and hydrogeology, geology, Ecology and Nature Conservation and Infrastructural issues associated with the development. The input also included the preparation and submission of the scoping report and production of the ES and Non Technical Summary.

4. Scoping of the Proposed Development

4.1 Proposed Scope

A scoping opinion was sought from Neath Port Talbot County Borough Council (the Local Planning Authority) in order that this ES contains the information required for them to identify the environmental effects of the proposed development. To assist them in reaching their opinion, and to allow broader consultation with bodies that may be unfamiliar with the proposals, the following information was provided:

- an outline description of the proposed development;
- the site location and description;
- the purpose of the proposal;
- the proposed basis of the Environmental Statement.

The report identified a series of effects that the development was likely to have on the environment and which were proposed to be considered in more detail within the EIA. These were:

- Landscape;
- Nature Conservation;
- Noise;
- Traffic and Transport;
- Cultural Heritage;
- Geology;
- Hydrology;
- Public Access;
- Sustainability (covered within Sections 1 and 6);
- Socio-economic;
- Health and safety, including telecommunications and television and air safety.

Effects on air quality and soil were proposed to be scoped out, the former being addressed through appropriate construction practices.

A copy of the scoping report was also sent to key consultees including the Countryside Council for Wales, The Glamorgan Archaeological Trust; the Environment Agency; the Royal Society for the Protection of Birds; The Glamorgan Wildlife Trust; the National Assembly for Wales and CADW.

In addition to the formal consultation undertaken at the scoping stage National Wind Power has completed an extensive programme of public consultation. This consultation process resulted in the following highlights:

- Extensive dialogue with public representatives prior to any actions;
- The direct mailing of 10,747 residents of aged 16 or over (5451 homes) detailing the project and inviting them to two public exhibitions;
- Widespread advertising via media and posters.

Which resulted in the following results:

- 1% of those informed by the leaflet drop directly attending the exhibition;
- 0.3% of those directly informed by the leaflet drop submitting their views in writing;
- 17% of those attending submitting in writing their support compared to 7% in opposition.

Temporal Scope

The temporal scope of the EIA covered the period from commencement of construction, through the operational phase, to completion of operations, decommissioning and restoration, as appropriate.

Spatial Scope

In its broadest sense, the spatial scope of the EIA is the area over which changes to the environment would occur as a consequence of the development. In practice, the EIA focuses on those areas where these effects are likely to be significant.

The spatial scope will potentially be different within each specialist area of study. For example, the effect of the proposed development upon the landscape is likely to require a greater spatial scope than, for example, the study of cultural heritage. This is discussed in each technical section.

4.2 Agreed Scope

Neath Port Talbot responded to the submission of the Scoping Report by letter on 2 May inviting Entec and National Wind Power to a meeting to discuss the proposal. A meeting was held at the Neath Port Talbot Planning Offices on 21 May with the Local Planning Authority (LPA).

Discussion were held on to the nature of the proposed development. Contact names for consultees were also provided. The LPA. were of the opinion that those matters covered within the scoping report were sufficient to enable them to assess the proposal.

Subsequent to the meeting consultation responses have been received from the Environment Agency, the Countryside Council for Wales, the Glamorgan Archaeological Trust and the RSPB. Discussions with Highways officers at Neath Port Talbot have also confirmed that Traffic and Transport effects on the highway network can be scoped out although it has been

necessary to consider traffic implications for that section of the route which runs through Rhondda Cynon Taff.

4.2.1 Topics to be Addressed in The EIA

Schedule 4 of the EIA Regulations specify that the EIA should address *"...direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects..."*

Furthermore having identified the nature of the effects the evaluation should seek to establish the probability and magnitude of the effect taking place.

Schedule 4 also specifies that the ES should describe those "*aspects of the environment likely to be significantly affected by the development, including, in particular population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the inter-relationship between the above factors.*"

In this report, these topics are dealt with under the headings set out in **Table 4.1**.

Table 4.1 Environmental Topics Addressed in EIA

Topics in the EIA Regulations (SI No 293)	Section(s) Incorporating This Topic in This Report
Population	Socio-economic Issues (Section 7), Noise (Section 12), Traffic and Transportation (Section 11), Landscape and Visibility (Section 9), Public Access (Section 10), Infrastructure (Section 16)
Fauna	Hydrology and Hydrogeology (Section 13), Ecology (Section 15)
Flora	Landscape and Visibility (Section 9), Ecology (Section 15)
Soil	Scoped out
Water	Hydrology and Hydrogeology (Section 13)
Air	Scoped out
Climatic factors	Hydrology and Hydrogeology (Section 13), Energy and Planning Policy (Section 5)
Material assets, including the architectural and archaeological heritage	Landscape and Visibility (Section 9), Cultural Heritage (Section 8)
Landscape	Landscape and Visibility (Section 9)
The inter-relationship between the above factors	This are discussed within each Section as relevant

5. Energy Policy and Planning Policy

5.1 About this Section

This section presents a brief review of the main policies against which the proposed development should be considered.

It identifies those policies which are serving as driving influences for renewable energy developments. The translation of these into planning policies that provide context for the Ffynnon Oer proposal is discussed as are policies that provide constraints to the nature and location of renewable energy developments.

5.2 Energy Policy

5.2.1 UK Renewable Energy Policy

The direction of UK policy on renewable energy has been established through its commitments to international and European climate change instruments. The UK government is a signatory to the convention of the Intergovernmental Negotiating Committee on climate change which was signed at the UN Conference on Environmental Development 'The Earth Summit' in Rio de Janeiro in June 1992 which commits developed countries to formulating policies and measures:

> *"with the aim of returning individually or jointly to their 1990 levels of anthropogenic emissions of carbon dioxide and other greenhouse gases not controlled by the Montreal Protocol".*

Although these commitments at the Earth Summit were not legally binding on the signatories, at the Third Conference of the Parties to the Convention on Climate Change in Kyoto in December 1997 set binding targets on industrialised nations to reduce their emissions of six greenhouse gases to 5.2% below 1990 levels over the period 2008-2012. The Member States of the EU jointly agreed to exceed this commitment by requiring a reduction in greenhouse gas levels by 8% over 1990 levels by this period. The contribution to this target differs for each member state. The UK has accepted a legally binding target of 12.5% reduction in these greenhouse gases over 1990 levels within the identified time period. Following these binding agreements the EU Environmental Council agreed a list of priority measures to help Member States achieve their individual contributions to the overall target. Promotion of renewable energy was highlighted as one of the principal means to achieving the targets.

The current UK government has gone further and set itself targets beyond those of its legal commitments under the Framework Convention on Climate Change. Its target is to reduce greenhouse gas emissions including CO2 emissions to 20% below 1990 levels by 2010. It was recognised in the consultation document 'UK Climate Change Programme' that this would only be:

> *"a first stage towards what will be needed in the longer term."*

Policy development continues to exert upward pressure on these targets and in 2001 the UK Government announced a thorough review of UK Energy Policy to be undertaken by the Performance and Innovation Unit (PIU) in the Cabinet Office. It was generally agreed that energy policy should address all three objectives of sustainable development - economic, environmental and social - as well as energy security. In conclusion the PIU report suggests that to meet possible carbon reduction targets by 2050 it will be necessary to have:

- a reduction of at least 50% in total energy demand through energy efficiency measures;
- at least 50% of total electricity production produced from zero-carbon sources;
- substantial changes in vehicle technology to ones that provide very low carbon emissions.

The National Assembly for Wales (NAW), is understood to be unique in that it has a constitutional duty under Section 121 of the Government of Wales Act to promote sustainable development. No other national Government in the European Union has such a constitutional duty. Sustainable Development provides the over-arching framework for the development of policies and actions across the Assembly so that social, environmental and economic objectives are taken into consideration in all aspects of the Assembly's duties and functions. With regard to the impact of climate change NAW has produced a report entitled Climate Change Wales - Learning to Live Differently. Published in August 2001, the report identifies the potential impacts of climate change and the areas where there is likely to be a need for adaptation.

With regard to energy production the report identifies a NAW aim of making Wales a global showcase for clean energy production. The following key objectives are included within Better Wales, the strategic plan for the NAW:

- *generate 5% of electricity from renewable sources by 2003;*
- *pursue a course of developing Wales as a global showcase for clean energy production;*
- *to encourage the development of strong environmental goods, services and renewables industrial sectors.*

NAW has identified that it will work with the UK Government, the Scottish Executive and the Department of the Environment (Northern Ireland) to deliver the Kyoto agreement.

The commitments to using renewable sources of energy is being implemented through the new renewables obligation which places a legal obligation on licensed electricity suppliers to supply a specified proportion of their electricity supplies from renewable energy sources. During 2000 the UK Government announced its new policy on renewable energy when the Department of Trade and Industry (DTI) published a consultation document on its Renewable Obligation. The principle aim of the new policy was the stimulation of the UK renewable energy industry with the objective that by 2003, 5% of the UK electricity requirements be met by renewable resources, rising to 10% by 2010. This issue formed the basis of a number of recommendations within the Economic Development Committee (of NAW) Review of Energy Policy in Wales (April 2002). Suppliers who fail to meet their targets will be penalised at a rate of 3 pence per kilowatt-hour. The New Renewables Obligation is therefore stimulating demand for new renewable energy developments including windpower.

In summary the UK Government's renewable energy policy can be considered as having five key aims:

- to assist the UK to meet national and international targets for the reduction of emissions including greenhouse gases;
- to help provide, secure diverse, sustainable and competitive energy supplies;
- to stimulate the development of new technologies to provide the basis for continuing growth of the contribution from renewables into the longer term;
- to assist the UK renewables industry to become competitive in home and export markets and, in doing so, provide employment;
- to make a contribution to rural development.

The National Assembly of Wales has confirmed the important role that Wales plays in assisting to achieve these aims.

It is against this background of international and national energy policy and commitments that individual development proposals for renewable projects should be assessed.

5.3 Planning Policies

This section examines the planning policies against which an application for the proposed Wind Farm would be assessed. Taking each relevant policy document or plan in turn, its relevant policies are extrapolated and explained where necessary.

5.3.1 Planning Policy Wales

Planning Policy for Wales sets out the land use planning policies of the NAW. It is supplemented by a series of Technical Advisory Notes which are identified in Section 5.3.2. Procedural advice is given in NAW/Welsh Office circulars. Planning Policy Wales, Technical Advisory Notes and circulars together comprise national planning policy which need to be taken account of in the preparation of Unitary Development Plans and where material, in decisions on individual planning applications.

Planning Policy Wales identifies, within its Sustainable Energy section, that climate change is a widely accepted issue caused in part by the burning of fossil fuels. In light of this other sources of energy generation need to be developed to be consistent with UK Government energy policy to ensure a secure, diverse and sustainable supply of energy. The NAW aim is to secure the strongest economic development policies to underpin growth and prosperity in Wales and recognise in this the importance of clean energy, both as an economic driver and to take forward the Assembly's commitment to sustainable development. As part of this the Assembly Government intends to encourage the development of the renewables sector and promote energy efficiency and conservation in an economic, environmentally sound and socially acceptable way.

Renewable energy currently accounts for some 3% of Wales's electricity generation. The Assembly Government wishes to see the planning system play its part in contributing to the UK Climate Change Programme. This commitment to renewable energy sources includes water, solar, geothermal energy and biomass as well as wind.

Planning Policy Wales indicates that Local Planning Authorities should make positive provision for all forms of renewable energy by:

- Considering the contribution that their authority area can make towards developing and facilitating renewable energy and energy efficiency and conservation through their UDPs.
- Ensuring that development control decisions are consistent with national and international climate change obligations, including a contribution to renewable energy targets, having regard to emerging national and international policy on the levels of renewable energy required and on appropriate technologies.
- Recognising the environmental, economic and social opportunities that the use of renewable energy resources can make wider planning goals and objectives and the delivery of renewable energy targets.

At the same time Local Planning Authorities should:

- Ensure that international and national statutory obligations to protect designated sites, species and habitats and the historic environment are protected from inappropriate development.
- Ensure that environmental effects on local communities are minimised.

Planning Policy Wales promotes the potential of UDPs for indicating broad locations or specific areas where wind energy developments are likely to be permitted. In defining such areas the guidance states the need to balance the scale and contribution of such developments to certain levels of renewable energy against the sensitivity of the receiving environment. Small scale or domestic scale schemes may be appropriate in most locations whereas in nationally designated areas large scale deployment of renewable energy may not be appropriate.

In terms of assessing planning proposals for renewable energy generation consideration should be given to impacts on the local environment. Where a development is likely to cause demonstrable harm to a designated area, and the purposes for that designation, consideration should be given to refusing the proposal if such effects cannot be overcome.

5.3.2 Technical Advice Notes

Technical Advice Notes (TAN) provide statements of NAW policy on nationally important land use and other planning matters. A number of TANs are relevant to the determination of this application:

- TAN 5 Nature Conservation and Planning (1996);
- TAN 6 Agriculture and Rural Development (2000);
- TAN 8 Renewable Energy (1996);
- TAN 11 Noise (1997), detailed guidance pertaining to noise and wind farms is included within TAN 8.

Of particular note is TAN 8 which identifies the key issues to be assessed and taken into account with respect to wind farm proposals.

TAN 8 notes that:

> *"The principle of harnessing wind energy by wind turbines is well established, and there is no doubt about the technical feasibility of wind power."*

TAN 8 also identifies that modern wind turbines have distinctive features which must be taken into account in planning and development control, these are:

- *The need to site the machines in open, exposed locations, with annual wind speeds generally of more than 7.5 metres per second at hub height, often in rural areas, which may also be in attractive landscapes;*
- *The nature of noise emissions from the turbines;*
- *The movement of the blades;*
- *Considerations relating to the safety and electro-magnetic interference.*

With regard to wind farms TAN 8 outlines specific development issues:

> *"Wind turbines need to be positioned so that the distances between them are around 5-10 rotor diameters (about 150-300 metres). This spacing represents a compromise between compactness which minimises capital cost and the need for adequate separations to lessen energy loss through wind shadowing from upstream machines. Turbines should be sited in sympathy with local features and should respect the grain and form of the land. Turbine siting will always be a compromise between maximising energy capture and minimising visual impact."*

It also raises a number of key issues which need to be considered in relation to the siting of wind turbines:

- safety;
- proximity to airports, roads and railways;
- shadow flicker;
- noise;
- electro-magnetic production and interference;
- scattering of signal;
- siting and landscape;
- ecology;
- construction disturbance.

These subjects have all been addressed either directly within this Environmental Statement or via consultation with third party consultees.

5.3.3 Regional and Local Planning Policy

The proposed wind farm spans the former Port Talbot Borough Council and Borough of Neath Council Areas. These authorities were reorganised into the County Borough Council of Neath Port Talbot. As a result there are a number of Local Plans which impact directly upon the proposed site.

Relevant to the determination of the application.

- Southwest Wales Regional Planning Guidance;
- West Glamorgan Structure Plan (Review No 2) 1991-2006. Adopted February 1996;
- Upper Afan Valley District Plan. Adopted June 1982;
- Borough of Neath Local Plan. Adopted 1994;
- Port Talbot Local Plan. Deposit Draft Approved for Development Control Purposes 1996;
- Also within the reorganised Neath Port Talbot area the Cwmafan, Bryn, Goytre Valley and Rural Margam Local Plan 1989;
- Emerging Neath Port Talbot Unitary Development Plan. Pre-consultation deposit 2000. (Proposal will not be assessed against the content of this document but its inclusion to highlight the future direction of Neath Port Talbot is of interest).

Adjoining Authorities which could be impacted upon by the proposal.

- Mid Glamorgan Replacement Structure Plan 1991-2006. Adopted January 1999;
- Ogwr Borough Local Plan. Adopted April 1995;
- Emerging Bridgend Unitary Development Plan. Deposit Plan March 2001;
- Rhondda Local Plan 1991-2006. Adopted February 1998;
- Cynon Valley Local Plan 1991-2006. Inspectors Report 2000;
- Brecon Beacons Local Plan Adopted May 1999;
- Emerging Brecon Beacons Unitary Development Plan. Deposit March 2002.

Table 5.1 summarises the status of the development plans at the time of production of this ES.

Table 5.1 Development Plan Status

Regional Planning Guidance			
Southwest Wales Regional Planning Guidance			
Structure Plans			
West Glamorgan Structure Plan (Adopted)		Mid Glamorgan Structure Plan (Adopted)	
Local Plans			
Neath and Port Talbot County Borough Council	**Bridgend County Borough Council**	**Rhondda Cynon Taf County Borough**	**Brecon Beacons National Park Authority**
Upper Afan Valley District Plan (Adopted)	Ogwr Local Plan (Adopted)	Rhondda Local Plan (Adopted)	Brecon Beacons Local Plan (Adopted)
Cwmafan, Bryn, Goytre Valley and Rural Margam Local Plan (Adopted)	Bridgend Unitary Development Plan (Deposit Draft)	Cynon Valley Local Plan. (Adopted)	Brecon Beacons Unitary Development Plan (Deposit Version)
Borough of Neath Local Plan (Adopted)			
Port Talbot Local Plan. Deposit Draft (approved for Development Control Purposes).			
Neath Port Talbot Unitary Development Plan - Deposit anticipated Autumn 2002.			

The following table summarises the main points of the detailed review of regional and local planning policy included as Appendix A. It also identifies the context of Ffynnon Oer against these policies.

Table 5.2 Summary of Relevant Regional and Local Planning Policy and Context for Ffynnon Oer

Planning Policy Document and Detail	Ffynnon Oer Context
Southwest Wales Regional Planning Guidance "Support the development of suitable renewable and sustainable energy projects at appropriate locations within the area."	ES addresses issue of appropriate location
West Glamorgan Structure Plan 1996 • EQ1 encourages renewables • EQ2 identifies constraints which renewable energy and proposals must meet to be permitted • Policy C5 identifies constraints on development in the open countryside	ES Addresses issue of appropriate location EIA process has contributed to mitigation development and ES assesses proposals against constraints. Site is not within Brecon Beacons Park and has no nature conservation The ES provides an assessment of effects on sector economics and community and describes existent nature conservation and agricultural conditions
Upper Afan Valley District Plan 1982 • No policies, allocations or designations considered relevant to the proposals	Not applicable
Cumafan, Bryn, Goytre Valley and Rural Morgan Local Plan • Plan encourages development that is appropriate and does not have adverse effects on environment and amenities amongst other aspects • No particular policies on renewable energy are stated	ES sections on socio-economics, landscape and nature conservation consider these effects
Port Talbot Local Plan – Approved for Development Control Purposes • E13 protects low quality agricultural land of nature conservation value • E18 protection to designated landscape protection areas unless can be demonstrated that there is no detrimental effect on the ecology and landscape and these qualities are enhanced	ES section on nature conservation considers this ES section on landscape considers effects. Enhancement and compensation for nature conservation addressed in Section 14. Various ES sections address these aspects of the proposals
Borough of Neath Local Plan In addition to a number of general policies to protect sensitive environments • E64 Archaeology identifies constraints to development affecting archaeological interests	ES section on cultural heritage assesses these effects

5.4 References

- Afan Borough Council and West Glamorgan County Council. Upper Afan Valley Local Plan 1982;

- Borough of Port Talbot Cwmafan, Bryn, Goytre Valley and Rural Margam Local Plan 1990;
- West Glamorgan County Council. West Glamorgan Structure Plan 1996;
- Port Talbot Borough Council. Port Talbot Local Plan 1996;
- Borough of Neath. Neath Local Plan 1994;
- Neath Port Talbot County Borough Council. Neath Port Talbot Unitary Development Plan. Pre Deposit Consultation 2000;
- Ogwr Borough Council. Ogwr Local Plan Written Statement and Proposals Map 1995;
- Bridgend County Borough Council. Bridgend Unitary Development Plan Deposit 2000;
- Brecon Beacons National Park Authority. Brecon Beacons Local Plan 1999;
- Brecon Beacons National Park Authority. Brecon Beacons Unitary Development Plan Consultation Draft 2002;
- Rhondda Cynon Taff County Borough Council. Mid Glamorgan Replacement Structure Plan 1999;
- Rhondda Cynon Taff County Borough Council. Rhondda Local Plan (including waste policies) 1998;
- Rhondda Cynon Taff County Borough Council. Cynon Valley Local Plan Deposit Version 1997;
- Rhondda Cynon Taff County Borough Council. Cynon Valley Local Plan Proposed Response to the Inspectors Report and Proposed Modifications to the Deposit Local Plan 2000;
- Welsh Office. Technical Advice Note 8 (1996) Renewable Energy;
- National Assembly Wales. Planning Policy Wales 2002;
- National Assembly Wales. Economic Development Committee, Report for Consultation. Review of Energy Policy in Wales. Part 1: Renewable Energy. 2002;
- National Assembly Wales. Climate Change, Learning to Live Differently 2001.

6. Site Selection and Alternatives

6.1 The Renewables Obligation

The Renewables Obligation (RO) came into effect on the 1 April 2002. From this date all licensed electricity suppliers were required to provide 3% of their electricity sales from renewable sources in the period to March 2003, rising to 10.4% of sales for the year ending March 2011. For the longer term, even more ambitious targets are expected to be set. The UK Government intends that the Obligation will form the framework for the development of renewable energy in this country up until at least 2027.

The RO effectively replaces the Non Fossil Fuel Obligation (NFFO) system, which had been the main driver behind renewables. Unlike the NFFO system, there is no competitive bidding for power purchase contracts. Under the RO, the electricity supply company pays a penalty (currently 3p/kWh) if it does not meet its obligation and the resulting penalties are recycled back to the supply companies in proportion to how much renewable energy they have supplied.

NWP is a wholly owned subsidiary of Innogy which is an integrated energy company and who are part of the RWE group. A sister company to NWP is Npower, the country's leading licensed electricity supply company. For this reason Npower has the largest Renewables Obligation within the UK which will, in part, be met by wind farms developed by NWP. Innogy Hydro, another division of Innogy also supply Npower with renewable electricity.

6.2 Site Selection process

This section describes the process and criteria by which potential wind farm sites are selected by National Wind Power (NWP). It explains how they where used to identify the Ffynnon Oer Wind Farm location and how consideration was given to other locations within the County Borough of Neath Port Talbot.

The selection of an appropriate site for a wind farm is a complex and lengthy process that involves the examination and balancing of a number of technical, commercial and planning and environmental issues.

6.2.1 Land Acquisition

Acquiring land for wind farm development has two possible start points. The first is a top down approach in a given area e.g. a Unitary Authority, prioritising areas for renewable development based on selection criteria. The second is assessing land that has been suggested by individual or groups of landowners as a result of their own initiative or in response to advertisements. Critical to either approach is the ability to secure the land under an agreement.

There are economies of scale to be considered in selecting sites for wind farms. Larger sites that can accommodate larger numbers of turbines will be more viable than smaller sites. It is therefore important to consider the 'potential wind power installed capacity' alongside other factors considered below.

6.2.2 Technical and Environmental

Irrespective of the start point, a desk study of each potential site must be undertaken to establish its suitability, viability and likely planning prospects. Such a desk study includes but is not limited to the following criteria:

Practical Considerations:

- Wind characteristics (initially based on the Noabl average);
- Availability of suitable grid connection;
- Construction considerations (including ground conditions, access and highway issues among others, availability of roadstone on or close to site).

Planning and Environmental Considerations:

- Planning policies at regional and national levels;
- Noise levels and relative proximity to sensitive receptors;
- Ecological considerations and presence of designated habitat and use of site by designated species;
- Existing land use and opportunities for enhancement;
- Existing site infrastructure;
- Archaeology and historic landscape issues;
- MOD and civilian aircraft issues (including radar and low flying).

This scoping process may also identify additional sites in the locality, or requirements for additional land in order to make the original site viable. If the process indicates that a site does have potential, NWP seek to carry out on site measurements and surveys to confirm its suitability. Such site work is carried out on the basis of reaching a formal agreement with the landowner(s) to allow for access, the siting of test equipment and surveying activities to be carried out.

Where tests suggest a site will be viable, a legally binding long term contract is agreed with the participating landowner(s). This allows for access, the siting of the wind turbines and access tracks and for the operation of the wind farm throughout its life, whilst minimising any disruption to the landowner's existing agriculture or land management activities. Given the capital investment required for the planning and construction of the wind farm these agreements are entered into prior to the submission of the planning application.

6.3 The Ffynnon Oer Wind Farm Site

6.3.1 Site History

The Ffynnon Oer Wind Farm site first came to the attention of NWP in 1993 following the landowner responding to advertisements in the local farming media. The above practical, planning and environmental considerations were applied in assessing the site's suitability as a

site for a wind farm. In addition to this a preliminary Landscape and Visual Assessment was undertaken by ADAS, which concluded:

> "*My preliminary evaluation is that the site is a favourable one for the location of a wind farm as there would be few primary or significant views of the wind farm from surrounding settlements. The fact that most of the site lies outside specially designated landscape areas is also an advantage*"
>
> (Mike Davis, Landscape Architect, ADAS, 1994)

The results of the site selection considerations are detailed below and do not include for the detailed investigations that have formed part of this EIA process. From the assessment it can be seen that the site was considered an excellent location for a wind farm and so following a successful period of wind speed monitoring an application was made for a power purchase contract under the third tranche of the Non Fossil fuel Obligation (NFFO) system. At the time the NFFO system was the enabling mechanism for renewable energy projects. Unfortunately the Ffynnon Oer Wind Farm site was unsuccessful with its application as it could not compete with the very windiest sites available in England and Wales. The site was not progressed further until 2001 when it was known that the RO was likely to become legislation.

6.3.2 Preliminary Considerations

Land Area:
The Ffynnon Oer site has around 150 ha of useable land on which to site wind turbines, which is ideal for a medium sized wind farm.

Wind Speed Assessment:
An anemometer mast was successfully installed at the site at SS846988 during the summer of 1995 and wind speeds were successfully recorded for several months. The results from this exercise confirmed that the site has a sufficient wind resource for a viable wind farm project. A second area to the north of the site SN845005 was also monitored, however the average wind speed was found to be too low for a viable wind farm project.

Grid Connection:
Preliminary studies showed several grid connection options, one to the Northeast (33 kV) and a second to a sub-station (66 kV) to the South.

Construction Considerations:
The proposed site is one of a relatively flat plateau on two levels, one at approximately 400-450 m above sea level and the second at 350-400 m above sea level. Although an area of degraded (drained) peat lies in the centre of the site, this would be largely avoidable through design and micro-siting.

Site access would be possible via existing forest access tracks from the A4061. These access tracks were found to be of the highest grade that the Forest Enterprise construct. Prior to the forest access tracks the A4061, A465 and the M4 were all deemed suitable. No villages or towns would be impacted upon along this route.

Whilst not essential, the existence of a open cast site with the potential to supply road stone without using public roads was also identified as having the potential to reduce the local effects of the project.

6.3.3 Planning and Environmental Considerations

Planning Policy
No national designations were found to apply. A review of local designations concluded that part of the site was classified as a Special Landscape Area within the Port Talbot Local Plan 1996-2006. Note this plan had not been formally adopted.

Noise
No local communities were within 2 km of the centre of the site and the closest property was at approximately 600 m. Initial modelling therefore showed that a wind farm could be designed with the relevant criteria regarding noise.

Ecological Consideration
A full study would be required, however the land was generally improved grassland used for grazing of sheep and cattle. The area of peat at the centre of the site had been drained to improve the grazing potential and surface grips added to improve grazing potential.

Existing Land Use
The existing land use (grazing) would be able to continue following the construction of a wind farm. No PROWs cross the site although several are close by.

Existing Infrastructure
Forest access tracks would reduce the need for new tracks to be constructed. On the actual site, several kilometres of existing tracks, albeit in bad repair, were found to exist.

Military and Civilian Aircraft
The area lies outside MOD low flying areas and over 30 km from civilian and military airports.

6.4 Alternatives in the Neath Port Talbot County Borough Area

In early 2002, the selection criteria were used to assess the potential for other wind farms within Neath Port Talbot County Borough. This was driven by the UK wide move towards devolved targets based on what an area can contribute and aimed at ensuring that every area plays its part in reaching the target of 10% of electricity supply being generated by renewable methods. Table 2.2 shows how the area of Neath Port Talbot County Borough can be reduced from an initial 450 to 69 square kilometres following the application of the selection criteria as described.

An additional screening criteria involving land under current forestry use has been included. It is the view that this land is not openly available to wind development companies, until it is cleared it has an existing permanent land use.

The result of this process was that a total of approximately 13 square kilometres was defined as being suitable for a medium sized wind farm development with Neath Port Talbot County Borough.

Table 6.1 Neath Port Talbot Land Area Assessed Using NWP Criteria

Column Heading	Area ($km^{2)}$
Total Area	450
Area with windspeed > 7 m/s	80
Area > 7 m/s, > 600 m from residences	69
Area > 7 m/s > 600 m from residences, non forested	13

The remaining 13 kilometres were then subject to desk studies which at all times used the Ffynnon Oer site as a benchmark. The following brief descriptions summarise the rationale for concluding that the Ffynnon Oer site provided the best prospects. Other sites were viable though presented a broader range of unresolved technical, planning and environmental issues.

6.4.1 Mynydd Marchwell SN760025

Wind speed prediction models estimate this site has a sufficiently high annual wind slightly lower than the Ffynnon Oer site. The site is of a ridge nature with the spine of the ridge aligned in unpreferred SW/NE direction. The ridge has steep access gradients, which could create difficulties for construction in relation to Ffynnon Oer.

6.4.2 Mynydd-y-Gaer SS765935

Wind speed prediction models estimate this site has a sufficiently high annual wind speed albeit slightly lower than the Ffynnon Oer site. The site is of a "point" nature with a very small plateau compared to Ffynnon Oer, and has an archaeology feature occupying most of the area suitable for turbines. Site access would be via C class roads, which may require upgrading and via a relatively large community with housing directly adjacent to the road including at critical junctions.

6.4.3 Foel Trawsant SS840942

Wind speed prediction models estimate this site has a lower annual wind speed than the Ffynnon Oer site. The site is of a plateau nature similar in size to the Ffynnon Oer site. Site access would be via either of two A class roads, however following the driving of these routes it is expected that significant upgrading would be required if access was possible at all. This is in contrast to the Ffynnon Oer site.

6.4.4 Cefn Morfudd SS790973

Wind seed prediction models estimate this site has a lower annual wind speed than the Ffynnon Oer site. The site is of a plateau nature similar in size to the Ffynnon Oer site, however a

significant percentage of the plateau is forested. Site access would require the use of A- C class roads via communities with steep gradients and sharp bends, which have housing adjacent. This is contrast to the Ffynnon Oer site.

6.4.5 Ergyd Isaf SS795887

Wind speed prediction models estimate this site has a similar wind speed to the Ffynnon Oer site. The site is of a plateau nature similar in size to the Ffynnon Oer Site. Access is via A-C class roads, the later of which is likely to require some upgrading unlike the Ffynnon Oer site. Final access would be via forestry tracks due to gradients within the forest. The land is completely designated as an SLA, in contrast to Ffynnon Oer site.

6.4.6 Mynydd Uchaf SN720100

Wind speed prediction models estimate this site has a similar wind speed to the Ffynnon Oer site. The site is of a plateau nature similar in size to the Ffynnon Oer Site. Access to the site would be via A-C class roads, which are likely to need upgrading. Although no local or national designation applies to the site, it is closer to the Brecon Beacons National Park (being approx 3 km from the Park boundary).

6.4.7 Hirfynydd SN825055

Wind speed prediction models estimate this site has a similar wind speed to the Ffynnon Oer site. The site is of a ridge nature with the ridgeline in the unpreferred SW/NE direction. The East facing slope is currently forested reducing the area available. A small plateau does exist. Access would be off A class roads, however a preferred route is not obvious. No local or national landscape designation applies to the site, however it is within 5 km of the Brecon Beacons National Park.

6.5 Conclusion

Whilst it is several years since the Ffynnon Oer site came to the attention of National Wind Power, the initial analysis and reason for selection are still valid. Although a benchmarking exercise involving all land deemed available within the Neath and Port Talbot County Borough has identified a number of sites which could be appropriate, Ffynnon Oer is judged to offer best fit in terms of Practical, Planning and Environmental criteria.

7. Socio-Economic and Community Issues

7.1 Introduction

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 affect principally the local communities of Resolven, Croeserw Abercregan, Cymer Duffryn and Glencorrwg all of which are located within a 4 km radius of the site and within the district of Neath and Port Talbot. However the implications of siting the Wind Farm on the perceptions of visitors to the area, particularly those intending to visit existing and proposed attractions will also be considered.

7.2 Methodology

Published information provided by Neath and Port Talbot County Borough Council and the National Assembly of Wales has been 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 is then assessed using information commissioned by a range of organisations including National Wind Power into the public perception of wind turbines both throughout Wales and in respect of the communities surrounding this proposal.

7.3 Baseline Description

7.3.1 The Socio Economic Profile

Neath Port Talbot CBC

In March 2000 the unemployment rate of Neath Port Talbot was 6.1% against a Welsh average of 5.9% and UK average of 4.9%. Basic unemployment rates however do not in themselves provide a true picture of the socio-economic conditions of an area. This is better provided by an Index of Multiple Deprivation against which Neath Port Talbot ranks from the third to the sixth most deprived local authority area in Wales. These different positions arise because of the number of different methodologies used by the National Assembly to assess relative deprivation. The Neath Port Talbot Community Plan 2002-2012 refers to the Welsh Multiple Deprivation Index that was complied by Oxford University in 2000 on behalf of the National Assembly. This index is based upon a range of factors that can be used to judge the relative deprivation of one area compared to another, and include income, employment, health, education, housing, accessibility and child poverty. The areas used in the index are the 865 electoral wards in Wales, the 100 most deprived awards are being targeted by the Assembly for resources.

The proposed wind farm development is located principally within the Cymmer Ward with part in Pelenna and Resolven Wards. The settlements of Croeserw, Abercregan, Cymmer and Duffryn to the south of the site, are within the Cymmer Ward. The settlements of Tonmawr and

Efail-fach are within Pelenna Ward and Resolven is within the Resolven Ward. The site is also adjacent to the Glyncorrwg Ward which has the settlement of Glyncorrwgy within. Cymmer is ranked as the 8th and Glyncorrwg as the 24th most deprived wards in Wales, first and second in terms of deprivation within Neath and Port Talbot. Resolven is ranked at 278 in Wales.

The ranking for Cymmer and Glyncorrwg wards against the range of factors is shown in Table 7.1.

Table 7.1 Cymmer and Glyncorrwg Relative Deprivation

Factor	Welsh Ranking (lower figures indicate greatest deprivation)	
	Glyncorrwg	Cymmer
Employment	10	1
Health	6	3
Income	98	70
Education	74	29
Child Poverty	92	71
Overall Ranking (out of 865)	24	8

Source: Neath Port Talbot Community Plan 2002-2012

In order to address issues of deprivation the Neath Port Talbot Community Plan seeks amongst other things to tackle many of the inherent weaknesses that it has identified in the economy. It notes that jobs are fundamental to community prosperity, providing the basic income that determines local living standards and in turn the quality of life and the health and social well being of communities. The area has witnessed an increasing number of job losses, over 5700 partly offset by 3000 job gains. The availability of Objective 1 monies has enabled the Council to develop a strategy founded upon the development of skills and capabilities within the communities. Specific targets are laid down to be achieved by 2006, they include a reduction in unemployment and the delivery of community development initiatives in the 10 most deprived wards.

7.3.2 Tourism

The Neath Port Talbot Tourism Study was published by the County Borough Council and Wales Tourist Board in November 2000. This study sought to profile tourism in the County Borough. The table below demonstrates that its share of the market sector is generally small compared with the three other local authorities that make up Southwest Wales (Pembrokeshire, Carmarthenshire and Swansea).

Table 7.2 Visitors to Neath Port Talbot

1998	Percentage of Wales Share			Percentage of S W Wales Share		
	Trips %	Nights %	Spend %	Trips %	Nights %	Spend %
UK Visitors	1.0	1.0	0.7	3.8	3.9	2.4
Overseas Visitors	1.3	1.3	1.0	6.8	6.7	4.8
Tourism Day Visits	2.3	-	2.8	11.7	-	15.7

Source: Wales Tourist Board - taken from the Neath Port Talbot Tourism Study 2000

The table also illustrates the relatively increased strength of the day visitor market to the County Borough compared with longer stays.

In order to improve the attractiveness of the County Borough the Tourism Study suggested the following strategy:

- raise the profile of the tourism product by building upon existing strengths;
- re-focus, rationalise and brand promotional print;
- raise the quality of the existing tourism infrastructure;
- create stronger partnerships within the industry.

This strategy leads into the Action Plan which contains a range of actions to promote Neath Port Talbot as a visitor destination. Actions considered relevant to the wind farm development proposal are:

- Development of Afan Forest Park:

  The Park is one of South Wales's leading cycling resources. It is attempting to position itself as a future centre of excellence for off-road cycling, with walking and orienteering as supporting product offers.

- Cycle Route Development:

  The County Borough Council aims to fill in the gaps identified in the existing cycle route network including:

  - Cymmer to Glyncorrwg;
  - Extension of the Bryn Cycletrack to provide a circular route in Bryn and a link to the COED Morgannwg Way.

7.3.3 Other Developments

There are also proposals for an adventure holiday park just to the west of Croeserw for which a planning application has been submitted. This potentially provides a significant source of employment in this area.

7.3.4 Public Attitudes to Wind Farms

Public Attitudes to Wind Energy in Wales, Friends of the Earth Cymru

Published in September 2002 this short study sought to identify the level of public support for wind energy in Wales. A total of 500 adults were interviewed by telephone between 23 August to 2 September 2002. Quota were placed on gender and region. Five regions were used including 'Valleys' which consisted of Blaenau Gwent, Caerphilly, Merthyr Tydfil, Neath Port Talbot, Rhondda Cynon Taff and Torfaen. The results of the study should that 71% of adults stated that they would support a doubling of wind turbines on land in Wales. Support was highest in the SE Wales region (75%) followed jointly by Valleys and North West Wales (71%).

RSPB Research

The RSPB undertook a survey of 1000 people between September and October 2001 to investigate public opinion on energy issues, specifically:

- Awareness of different sorts of electricity power station and views on building them in future;
- Views on the disadvantages of particular methods of electricity generation;
- Awareness of the contribution to climate change made by certain methods of electricity generation;
- Whether views on the future of energy differ depending on whether people know about the perceived links between certain methods of electricity generation and their contribution to climate change.

Amongst other things the research found that:

- Two thirds of the public (68%) do not think nuclear power stations should be built in Britain in the next ten years and four fifths (82%) would not want a nuclear power plant built within three miles of their home;
- Nearly 4 in ten of the public (38%) think coal-fired power stations should not be built in Britain in the next ten years, while three in ten (29%) do not want oil-fired power stations to be built. Furthermore, 45% of the public would not like coal-fired power stations within three miles of their homes, while 38% reject the idea of oil-fired stations within three miles of home;
- By contrast, only 3% of the public are opposed to building on-shore wind farms in Britain, and only 14% do not want on-shore wind farms within 3 miles of their home.

The research also found that the public was generally well informed of the climate change debate and could link power generation through fossil fuels to production of greenhouse gasses.

Research Thesis on Behalf of the Welsh Tourism Board

Published in May 2001 this research sought to investigate the impact of wind farms on tourism in Wales. It combined desk-based and fieldwork research including a questionnaire survey of 905 domestic and foreign visitors from which there was a 14.5% (138) response rate.

The findings that came out of the questionnaire were that most people believe that the contribution of wind farms to clean energy production outweighs their impact on the landscape. Almost all visitors questioned (96%) said that they would not be put off visiting Wales if more wind farms were to be developed and 69.3% would visit an information centre if it was built.

Other General Research

Between 1990 and 1996 there were 13 studies by different independent research groups into attitudes to wind power in the UK. In total these studies have canvassed the opinion of over 3500 people. All the studies show that the majority of residents who live near a wind farm are in favour of generating power from the wind and are comfortable with a wind farm in their area. The principle issues of concern in all cases were noise and visual impact. However once operating it was shown that the majority of residents were unconcerned with these aspects. Table 10.4 shows the overall results of the surveys and included in the table are three further studies completed between 1997 and 2002.

Further to these studies, the Scottish Executive in 2002 completed a detailed study of people living in different zones of proximity to wind farms in Scotland. The results are summarised in the following bullet points:

- Respondents were generally positive about wind farms. Those who live nearest a wind farm are more likely to provide positive responses when asked about the wind farm than those in the other zones. For example, while 67% overall reported that there was something they liked about the wind farm, this proportion increases to 73% of those living in the high proximity zone (up to 5 km from a wind farm);
- The proportion of respondents who had anticipated problems prior to the development (40%) was far higher than the proportion who actually experienced problems after the development (9%). Actual noise caused by the turbines or the visual impact of the wind farm did not feature as issues for the large majority of respondents;
- Only 2% of respondents said that they disliked the wind farm because it was noisy, and although 12% of respondents had expected to experience a problem with noise, only 1% had actually experienced a problem;
- Respondents showed low levels of awareness of consultation by either the wind farm developer or the local authority. Twenty percent were aware of consultation being conducted by the wind farm developer and 17% were aware of consultation by the local authority. The most common source of information about the wind farm was local newspapers (42%), with only 7% gaining information from the local authority or the developer;
- When asked about potential future wind farm development, the positive attitude towards the wind farm is reflected in the fact that only 14% of respondents would be concerned if extra turbines were added to the existing wind farm;
- Respondents would be more concerned if a new wind farm development was proposed for their local area, with 27% saying they would be fairly or very concerned.

Although respondents were generally positive about the farms and most would not be concerned about future development, the majority think that wind farms should be located in uninhabited areas and high on hills.

Table 7.3 Findings of Research into Public Attitudes Towards Wind Farms

Location	Sponsor/Organiser	Date	In Favour	Against	Don't Know
Delabole	DTI	1992/1993	84%	4%	11%
Cemmaes	DTI	1992/1993	86%	1%	13%
Llandinam	CCW	1992/1993	83%	3%	14%
Llangwyryfon	CCW	1992/1993	78%	8%	14%
Llandinam	BBC	1994	76%	17%	8%
Rhyd-y-Groes	BBC	1994	61%	32%	7%
Taff Ely	BBC	1994	74%	9%	17%
Kirkby Moor	National Wind Power	1994	82%	9%	9%
Bryn Titli	National Wind Power (pre construction)	1996	68%	14%	19%
Bryn Titli	National Wind Power (open day)	1996	94%	3%	3%
Trysglwyn	National Wind Power (open day)	1996	96%	4%	-
Coal Clough	Liverpool University Dissertation	1996	96%	4%	-

7.4 Predicted Impacts and Effects

7.4.1 Construction

The construction of the wind farm, which will involve an investment of £16 million by National Wind Power which will in turn bring the opportunity for significant direct economic benefits to Neath and Port Talbot and the region.

Subject to planning permission being granted, National Wind Power would put the contract for the supply of the turbines and the construction of the wind farm out to competitive tender. Criteria for selecting the wind turbine manufacturer and civil and electrical contractors would be based on price specifications and guarantees to ensure that performance and technical specifications are met in full. Bids for some aspects of this work can be anticipated to be likely from local companies. This could result in as much as £3 million being spent in the region with local firms.

The assumption provided above are based upon the experience of National Wind Power in the development of the Wind Farms throughout the UK.

In addition to the potential economic benefits to the Region the development of renewable energy presents opportunities for Welsh companies to benefit in the longer term from a reliable source of energy at a competitive price. This is recognised in the Consultation Report of