Table 13.2 Mitigation Incorporated into the Construction and Operational Phases of the Wind Farm

Impact	Mitigation Incorporated into the Proposed Development	Impact Wholly or Substantially Mitigated?[1]
Construction Phase		
1. Access Tracks		
Tracks, leading to disturbance of peat and drainage regimes	• Access tracks are to be constructed to standard wind farm design • Deep areas of peat will be avoided • Filter drains will be constructed either side of access tracks • Lateral drains will allow drainage to watercourses	Partially
Tracks crossing streams leading to channel bank disturbance, and sediment input	• Stream crossings have been kept to a minimum, but where crossings are necessary bank stabilisation works and culverts will be used to minimise impacts	Partially
Track drainage could result in the entrainment of sediment	• The track surfaces will be compacted to reduce the likelihood of sediment becoming entrained within runoff • Tracks will be designed to shed runoff quickly • Water quality leaving the site will be monitored to ensure there is no deterioration of quality in streams and to ensure that the private water supply abstraction from the Nant Cregan is protected	Mostly
2. Electric Cables		
Trench digging during cable laying could lead to collection of runoff, erosion of soils and sediment laden runoff	• Where possible the digging of trenches will be undertaken during dry periods	Mostly
3. Wind Turbine foundations and Crane Pads		
Accidental spillages of concrete which could enter streams	• Turbine locations will be set a minimum distance of 50m from streams to avoid concrete spillages entering watercourses • Spill response plans will be developed to ensure that any spillages will be contained and removed from site	Yes
4. Roadstone Quarry		
Discharge of sediment charged waters if borrow pits require de-watering	• Any de-watering will be passed to a small settling lagoon for removal of suspended sediments	Yes
5. Site Working Practices		
Accidental spillages of oils and diesel from heavy plant and machinery, or suspended sediments	• Best working practices will be adopted when working with oils and diesel • Spill response measures will be put in to place to ensure any spillages are quickly controlled	Mostly

Table 13.2 (continued) **Mitigation Incorporated into the Construction and Operational Phases of the Wind Farm**

Impact	Mitigation Incorporated into the Proposed Development	Impact Wholly or Substantially Mitigated?[1]
	• EA Pollution Prevention Guidance Notes will assist with the development of an environmental management plan for the site	
Operational Phase		
1. Access Tracks		
Permanent impact on site hydrology due to access tracks	• Lateral drains where tracks run parallel to contours will ensure drainage of surface water runoff • As described under Construction Phase, runoff will be shed off access tracks onto adjacent soils. Where soils are dry, infiltration drains will be installed	Partially
Erosion of access track surfaces during heavy rainfall events	• Tracks will be constructed to ensure that water is shed quickly	Partially
2. Site Working Practices		
Accidental spillages of oils and diesel from heavy plant and machinery, or suspended sediments	• Best working practices will be adopted when working with oils and diesel • Spill response measures will be put in to place to ensure any spillages are quickly controlled	Mostly

Note - [1] Key to predicted success of mitigation

Yes - Impact fully mitigated and no effects predicted.
Partially - Mitigation would be successful at reducing impacts, but some effects likely. These effects are discussed in section 13.4.
Mostly - Mitigation would be successful at reducing impact in most cases. Some effects possible under abnormal conditions (e.g. extreme weather conditions). These effects are discussed in section 13.4
No - Mitigation not possible to reduce level of predicted impact

13.5 Predicted Impacts and Effects

13.5.1 Introduction

This section describes the likely residual impacts and effects following the incorporation of mitigation and enhancement measures. It addresses those impacts presented in Table 13.2 that are not wholly mitigated i.e., those impacts where mitigation is either partially successful or not possible.

13.5.2 Construction Phase

Access Tracks

The track construction will result in unavoidable changes to the hydrological regime, and in particular the way surface water runoff occurs over the site. These changes will be limited in extent to points where access tracks run parallel to contours, with simple drains diverting this runoff to Melin Court Brook or Nant Cregan. During heavy rainfall events there is the potential

for the erosion of track surfaces and excavated soil material, which could lead to sediment entrainment within runoff. This runoff will be shed quickly off these tracks and any sediments will be filtered naturally by vegetation adjacent to the tracks. Therefore no deterioration in water quality within any of the watercourses draining the site from sediment input is expected, and thus local private water supplies would be protected.

Electric Cables

Due to the temporary nature of the small trenches that would be constructed to hold electric cables there will be few residual effects. It is possible that during particularly wet conditions water could collect within these trenches and entrain sediment. However these trenches would not be dug close to watercourses or allow drainage water to enter surface watercourses. Therefore no significant effects are predicted.

Site Working Practices

Site working practices would be formalised during the construction phase. This will assist in reducing the likelihood of accidental occurrences and providing response measures to deal with potentially polluting spillages. However rigorous these controls might be the potential for uncontrolled releases to watercourses within the site would still exist. The likelihood and magnitude of these effects will be small given the best practice measures adopted. Measures will also be tailored to ensure that nearby private water supplies are protected throughout construction and it is envisaged that these will no be effected by the scheme.

13.5.3 Operational Phase

Access Tracks

As for the construction phase, erosion of access track surfaces may be unavoidable during extremely heavy rainfall periods. This could lead to the progressive damage to track surfaces and the entrainment of suspended sediments within drainage. However roadside drainage and natural filtration by adjacent vegetation would ensure there is limited sediment entrained runoff entering surface watercourses. In places the access tracks will divert drainage from its natural flow path. These effects will be localised and will not effect the regimes of nearby streams or threaten private water supplies.

Site Activities

As discussed within Section 13.4.3 site working practices will be formalised to ensure appropriate environmental management of the site. This will assist in reducing the likelihood of accidental occurrences and providing response measures to deal with potentially polluting spillages. However rigorous these controls might be the potential for uncontrolled releases to watercourses within the site will still exist. It is considered that local private water supplies will not be affected, as for the construction phase of development.

13.6 Evaluation of Effects

13.6.1 Introduction

This section outlines the evaluation of the predicted residual impacts and effect and presents the methods by which this has been determined.

13.6.2 Criteria

Four criteria have been used in evaluating the hydrological and hydrogeological effects of the proposed development:

- the type of effect, i.e. whether it is positive, negative, neutral or uncertain;
- the probability of the effect occurring based on the scale of certain, likely or unlikely;
- the policy context for the evaluation based on the following:
  - international (trans-national boundaries);
  - national (Wales wide);
  - regional (South Wales);
  - district (greater than 2 km beyond the site, but less than 20 km);
  - local (within a 2 km radius of the site boundary);
- the magnitude of the effect in relation to the resource that has been evaluated, i.e. high, medium, low or no effect.

The findings in relation to all of these criteria are brought together to give an assessment of significance for each effect. Effects are considered to be of major, minor or no significance. This assessment relies on professional judgement rather than any scoring of the criteria.

13.6.3 Evaluation

Table 13.3 summarises the hydrological impacts and effects of the proposed development and assesses the significance of effects.

Table 13.3 Effects and Evaluation of Significance

Hydrology	Type of Effect	Probability of Effect Occurring	Policy Importance or Sensitivity	Magnitude of Effect	Significance	
					Level	Rationale
Construction Phase						
Changes to the hydrological regime of the site	-ve	Certain	Local	Minor	Not Signt	Access tracks will alter the drainage regime, but only on a small scale, plus the design will mitigate impacts
Erosion of sediments during construction of access tracks which could enter surface watercourses	-ve	Likely	Local	Minor	Not Signt	The access tracks have been designed to shed water quickly to minimise runoff and erosion potential

Table 13.3 (continued) Effects and Evaluation of Significance

Hydrology	Type of Effect	Probability of Effect Occurring	Policy Importance or Sensitivity	Magnitude of Effect	Significance	
					Level	Rationale
Soil erosion entering surface watercourse during the laying of electric cables	-ve	Likely	Local	Minor	Not Signt	Cable trench will be dug during dry periods and will be temporary features
Accidental spillages of oils and diesel	-ve	Unlikely	Local	Minor	Not Signt	Best practice measures will be adopted
Operation Phase						
Changes to the hydrological regime of the site	-ve	Certain	Local	Minor	Not Signt	Access tracks will alter the drainage regime, but only on a small scale, plus the design will mitigate impacts
Erosion of sediments from access tracks which could enter surface watercourses	-ve	Likely	Local	Minor	Not Signt	The access tracks have been designed to shed water quickly to minimise runoff and erosion potential
Accidental spillages of oils and diesel	-ve	Unlikely	Local	Minor	Not Signt	Best practice measures will be adopted

Key:	Type	Probability	Policy Importance	Magnitude	Significance
	-ve = Negative	Certain	International	Major	High
	+ve = Positive	Likely	National (UK)	Some	Low
	? = Unknown	Unlikely	Regional	Medium	Not Significant
	0 = Neutral		District Local	Minor	
				None	

13.7 Conclusions

This Section describes the existing conditions of the surface water environment and describes the nature of underlying groundwater. Streams radiate from the site with the main stream, the Melin Court Brook having its source on the site at the Ffynnon Oer spring. Groundwater is present beneath the site, though in limited quantities, and may well have been affected by historical mining activities.

Overall the impacts and effects will be restricted mostly to the construction phase of the development, though the effects are not predicted to be significant. This has been achieved by ensuring that the key hydrological and hydrogeological features were identified prior to the design of the wind farm layout, and through the introduction of a range of mitigation measures.

The main process effecting the hydrological regime will be the introduction of access tracks to the site, which may lead to the generation of sediment charged runoff during construction and through into operation. The access tracks have been constructed however to ensure that runoff is quickly shed to avoid the generation of large volumes of runoff.

The site has been designed and will be operated in accordance with best management practices, particularly with regard to the avoidance of pollution issues. All oils and diesel held on the site during construction will be kept with a designated area, where any accidental spillages can be controlled.

13.8 References

Institute of Hydrology, (1998). *Hydrological Data UK- Hydrometric Register and Statistics 1991-95.*

Environment Agency, Pollution Prevention Guidance Notes (PPG)1 *General Guide to the Prevention of Water Pollution.*

Environment Agency, Pollution Prevention Guidance Notes (PPG) 2 *Above Ground Oil Storage Tanks.*

Environment Agency, Pollution Prevention Guidance Notes (PPG) 5 *Works in, near or liable to affect watercourses.*

Environment Agency, Pollution Prevention Guidance Notes (PPG) 6 *Working at Construction and Demolition Sites.*

Forestry Commission, (2000). *Forest and Water Guidelines.*

14. Geology

14.1 Introduction

This section describes the site geology, based on available information, and notes impacts to the geology from the proposed site development. Mitigation measures are also referenced.

In addition constraints to the development from the geological conditions are also discussed and it is recommended that a ground investigation is undertaken at the site to inform final micro-siting.

14.2 Methodology

The methodology is based on interpretation of the following published geological map.

- British Geological Survey of Great Britain 1:50,000 Sheet 248 Drift.

In addition a Coal Authority mining report has been obtained for the site, this includes a plan identifying known mine workings.

14.3 Baseline Description

The 1:50 000 geological map shows the site to be underlain by Carboniferous Upper Coal Measures strata. The conjectured outcrop of the Mountain coal seam is shown in the north and south of the site - essentially following the hilltop relief. In the west of the site the Graigola seam is also brought to outcrop by the north - south trending Pen-y-Castell fault. Superficial deposits are not shown at the site. However, in the west and north of the site, on the slopes to the higher ground, landslipped ground is shown.

The Coal Authority (CA) mining report states the following:

- The site is within the likely zone of influence on the surface from workings in six seams of coal, at shallow to 1020 m depth, the last date of working being 1968;
- The site is not within the zone of likely physical influence on the surface from any present underground coal workings;
- The property is not within a geographical area for which a licence to extract coal is awaiting determination by the CA. However reserves of coal exist and the site is within a geographical area for which a licence to extract coal by underground methods was granted in October 1996. The grant of this licence is conditional on the applicant securing other rights, permissions (including planning permission) and consents to enable him to carry out his operations;
- The site is not within the zone of likely physical influence at the surface of future workings for which the CA have plans;

- Within, or within 20 m of the site, there are thirty-six mine entries. The CA do not have records of what steps, if any, have been taken to treat the mine entries. They also note that their records may be incomplete and therefore mine entries may exist in this locality about which they have no knowledge;
- The site is not located within the geographic boundary of an opencast coal site, nor is it within 800 m of an opencast site with a granted licence, or licence awaiting determination;
- The site is within a geographical area where notices of entitlement to withdraw support were published in 1949, 1953 and 1956;
- The site is not within an area where a notice for payments to owners of former copyhold land has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

14.4 Mitigation and Enhancement

Impacts to the geological environment during the construction phase activities are similar to those considered in the hydrology and hydrogeology section of this ES (Section 13). Namely: construction of access roads, laying of electric cables, construction of wind turbine and crane pads, and excavation of borrow pits for recovery of material for use as roadstone. The potential impacts of these activities to the hydrological and hydrogeological environments are discussed in Section 13. The hydrogeological environment is part of the geological environment and is the only aspect of the geological environment realistically at risk. Impacts to the geological environment are therefore covered by the hydrogeological considerations.

Turbines have been sited away from the landslipped ground and away from the locations of known mine entrances. Consolidation of known or presently unknown mineworkings may be required to ensure stability of the turbine foundations (see Section 14.6, below). Again the potential effect of this impact on the geological environment is in fact an impact on the hydrogeological environment. This potential impact is also discussed in Section 13.

14.5 Evaluation of Effects

As noted above the impacts to the geological environment are more accurately described as impacts to the hydrogeological environment. The evaluation of these effects is discussed in Section 13.

14.6 Constraints to the Development

The available information (see Section 1.2 above) has indicated the following four potential geological constraints to developments at the site.

- Geological faults;
- Landslipped ground in the northwest and west of the site;
- Shallow mineworkings;

- Mine entrances.

For clarity a figure is presented showing these constraints, Figure 14.1.

The influence of these constraints (extent and nature of fault zone, extent and nature of any shallow open voids from coal mining, stability of the landslipped ground and condition of mine entrances) will need to be investigated further as part of a ground investigation at the site. Such an investigation, which will also obtain information for temporary works and foundation design, should be designed when an approved scheme has been finalised. It is however likely to involve trial pitting, cable percussion and rotary drilling with appropriate laboratory and *in situ* testing. Geophysical work may also be recommended.

It is worth noting at the stage that if future works are undertaken that intersect, disturb, or interfere with any coal or coal workings then permission is required from the Coal Authority.

14.7 Summary and Conclusions

The site is underlain by Carboniferous Upper Coal Measures strata.

The effects of the proposed development on the site geology have been discussed and are considered to be hydrogeological effects, see Section 13. The construction phase activities for the proposed development are: construction of access roads, laying of electric cables, construction of wind turbine and crane pads, and excavation of borrow pits for recovery of material for use as roadstone. The hydrogeological environment is the only aspect of the geological environment realistically considered to be at risk.

There a number of geological constraints to development at the site. The strata at the site are known to have been worked at shallow depth and there are thirty-six recorded mine entrances within the site area (unrecorded entrances may exist). In addition, the site is crossed by a fault, and landslipped ground is present in the northwest and west. Turbines have been sited to avoid the landslipped ground and known mine entrances. A phased ground investigation will be required at the site to better understand these geological constraints and assist with the technical elements of the design of the scheme for the most economic and environmentally appropriate solution.

15. Ecology & Nature Conservation

15.1 Introduction

15.1.1 Scope of the Ecological Assessment

This section describes the potential ecological changes and consequences resulting from the construction, operation and decommissioning of the proposed wind farm development.

It should be noted that, although the contribution of the wind farm to reducing national carbon dioxide emissions and the amelioration of climate change is acknowledged, it is impossible to quantify the effects of this specific contribution on the flora and fauna present at the site.

15.1.2 Scope

A scoping opinion was sought as well as information on statutory and non-statutory designated conservation sites and records of species that are afforded legal protection or are otherwise of nature conservation concern within the search area (a 2 km radius of the application site) from the following organisations:

- Countryside Council for Wales;
- Neath & Port Talbot County Borough Council;
- Glamorgan Wildlife Trust;
- Forest Enterprise, Coed-y-Cymoedd Forest District; and the
- Environment Agency.

The scoping opinion from the Countryside Council for Wales (CCW) identified no issues of particular concern. CCW recommended that, with respect to nature conservation, the following points (amongst others) should be addressed in the Environmental Statement.

- The presence of nearby statutory and non-statutory designated nature conservation sites;
- Reference to the *UK Biodiversity Action Plan* (*UKBAP*) (UK Biodiversity Steering Group, 1994) and the *Local Biodiversity Action Plan for Neath & Port Talbot (LBAP)* (Glamorgan Biodiversity Advisory Group, 2001);
- Assessment of temporary and permanent habitat loss or damage;
- Assessment of direct or indirect effects on habitats and species of nature conservation concern; and
- Details of habitat enhancement and creation.

There are no statutory or non-statutory designated nature conservation sites within the search area.

Some of the habitats present at the survey site are the subject of the *UKBAP* and the *LBAP*. Purple moor grass & rush pasture and blanket bog are two Priority Habitats that occur at the application site, for which targeted action has been prepared in the *UKBAP*. Targeted action for purple moor grass & rush pasture is included within the *UKBAP* and *LBAP*. Targeted action for blanket bog is also included within the *UKBAP* and is a habitat of international importance listed in Annex 1 of the Council Directive 92/43/EEC: *Conservation of Natural Habitats and Wild Fauna and Flora Directive* (Commission of the European Communities, 1992). We therefore considered it was necessary to undertake a Phase 1 Habitat Survey of the survey site, and a more detailed survey of the marshy grassland and blanket bog habitats.

Some of the species recorded from the survey site are the subject of the *UKBAP* and the *LBAP*. Skylark (*Alauda arvensis*) and reed bunting (*Emberiza schoeniculus*) are two Priority Species that are listed in the *UKBAP* which occur at the application site. There was a possibility that marsh fritillary (*Eurodryas aurinia*) and brown hare (*Lepus europaeus*), also Priority Species listed in the UKBAP and LBAP, and lapwing (*Vanellus vanellus*), an LBAP species, may inhabit the survey site. Lapwing, skylark and reed bunting are also the listed in the *Birds of Conservation Importance* (JNCC, 1996). We therefore considered it was necessary to conduct surveys for invertebrates (particularly marsh fritillary), breeding birds and mammals (particularly brown hare).

15.2 Methodology

15.2.1 Field Survey

Habitats

During the site visits of early May and mid June 2002, the vegetation at the survey site was recorded. Two main approaches were used:

Identification and Mapping of Habitat Types

A Phase 1 Habitat Survey was conducted to determine whether there are any habitats of nature conservation concern at the site. This survey is a standardised system for classifying and mapping British habitats (Joint Nature Conservation Committee, 1993) which involves producing an annotated habitat map and target notes for features of nature conservation interest.

More Detailed Description of the Vegetation Types

The habitat types present were surveyed in more detail to determine the main plant community types as defined in the National Vegetation Classification (Rodwell, 1991 *et seq*). Plant species cover-abundance and depth of peat (if present) in each quadrat was recorded.

This sampling regime ensured the identification of habitats and plant species that are afforded legal protection or are of nature conservation concern.

Fauna

During the site visits of early May and mid June 2002, the presence of faunal species that are afforded legal protection or are of nature conservation concern at the survey site were recorded. The survey focused on three taxonomic groups.

Invertebrates

The survey site was assessed for the invertebrates it supports and particularly for those species which receive legal protection or are of nature conservation concern, by:

- Determining any existing invertebrate records within the search area; and
- Performing a site walkover to determine habitat suitability in terms of its existing value for invertebrates, particularly marsh fritillary.

Birds

The survey site was assessed for the birds it supports and particularly for those which receive legal protection or are of nature conservation concern, by:

- Determining any existing bird records, main migration routes, nesting and foraging sites within the search area; and
- Performing a breeding bird survey using standard methodology for censuring upland breeding waders (Brown & Shepherd, 1993). The survey site was assessed for its potential to support nesting lapwing, skylark and reed bunting. The coniferous plantations surrounding the application site were also scanned for raptors.

Mammals

The survey site was assessed for the mammals it supports and particularly for those which receive legal protection or are of nature conservation concern, by:

- Determining any existing mammal records within the search area; and
- Performing a site walkover and searching for evidence of brown hare and other mammal activity, particularly badger, otter and water vole.

15.3 Baseline Description

The survey site is located on an exposed mountain ridge which is situated between two parallel river valleys to the northwest and southeast. The main semi-natural habitats on the mountain ridge are blanket bog on the high ground and acid grassland on the slopes, which have both been improved for grazing. Surrounding the survey site, most of the mountain ridge has been planted with extensive stands of coniferous trees some of which have recently been clear felled.

The survey site is centred on Cefn Mawr, and includes all land between the 250 m contour and its peak at 464 m AOD, within 500 m of the proposed turbine locations. A blanket bog occurs on the highest part of the mountain. The main habitat on the mountain is acid grassland which occurs on the north, west and south slopes. At the base of the mountain slopes are several acid flushes that are the source of tributaries that flow north, west and south of the site. Surrounding the acid flushes are extensive areas of marshy grassland that occur on the lower slopes of the

mountain. There are several stone walls and the derelict remains of buildings on the lower slopes to north and south of the mountain. To the north of the application site there are some derelict buildings and vegetated spoil heaps that are associated with former coal mining activities.

15.3.1 Habitat Types

The results of the Phase 1 Habitat Survey are presented in Figure 15.1, which indicates the distribution of habitats across the survey site.

Blanket Bog

Wet modified blanket bog occupies approximately 22 ha (14%) of the application area. Blanket bog occurs on the highest ground at Cefn Mawr. The peat is 0.5 m deep around its margins and is expected to be deeper towards the centre of the bog. This habitat is best described as wet modified blanket bog because it has been improved for grazing. The northeastern part of the bog has been extensively drained in the past, with drainage channels (grips) cut into the peat. Consequently, this part of the bog has begun to dry out and supports a dense cover of soft rush (*Juncus effusus*). The southwestern part of the bog has been weed-swiped but has not been drained. This part of the bog remains relatively waterlogged and soft rush is restricted to its margins.

Blanket bog (Target Note 1) is characterised by the presence of small hollows with bog mosses (*Sphagnum* spp.), although at Cefn Mawr they are relatively scarce but widespread throughout the bog. Bog mosses that are present include (*Sphagnum papillosum*) and (*Sphagnum capillifolium*). Other bryophytes present include the mosses (*Campylopus paradoxus*), (*Polytrichum commune*), (*Dicranum scoparium*) and also the liverwort (*Calypogeia trichomanis*). The vegetation is dominated by tussocks of purple moor-grass (*Molinia caerulea*) which support growths of hare's-tail cottongrass (*Eriophorum vaginatum*). Wavy hair-grass (*Deschampsia flexuosa*) and bilberry (*Vaccinium myrtilus*) are also present but are relatively scarce. This vegetation type is most similar to M20a *Eriophorum vaginatum* blanket and raised mire, species-poor sub-community.

The sward in the northeastern part of the bog (Target Note 2) is approximately 500 mm high and it supports a more diverse assemblage of plants probably because it has not been weed-swiped. Soft rush is dominant, and other plant species present include foxglove (*Digitalis purpurea*), cuckooflower (*Cardamine pratensis*), common sedge (*Carex nigra*), common spike-rush (*Eleocharis palustris*), meadow thistle (*Cirsium dissectum*), marsh thistle (*Cirsium palustre*), lady fern (*Athyrium felix-femina*), narrow buckler fern (*Dryopteris carthusiana*), cross-leaved heath (*Erica tetralix*), bog stitchwort (*Stellaria uliginosa*), bog asphodel (*Narthecium ossifragum*) and round-leaved water-crowfoot (*Ranunculus omiophyllus*).

Acid Grassland

The combination of unimproved and semi-improved acid grassland occupies approximately 54 ha (34%) of the application area. In addition, species poor grassland which has been improved for grazing occupies approximately 32 ha (20%) of the application area. Acid grassland occurs on the slopes of Cefn Mawr around the blanket bog. Most of the acid grassland at Cefn Mawr has been improved for grazing and is very variable in condition. The steep slopes of Cefn Mawr support species-rich unimproved acid grassland, but on gently sloping ground the grassland is species-poor.

The unimproved acid grassland (Target Notes 3 & 4) comprises a mixture of dwarf shrubs, forbs and grasses. Dwarf shrubs that are present include bilberry which is abundant, heather (*Calluna vulgaris*) which is relatively scarce and gorse (*Ulex europaeus*) which is rare. Characteristic forbs found within the grassland include heath bedstraw (*Polygala serpyllifolia*), tormentil (*Potentilla erecta*), sheep's sorrel (*Rumex acetosella*) and dandelion (*Taraxacum* sect. *Spectabilia*). The unimproved acid grassland is dominated by common bent (*Agrostis canina*) with abundant sheep's fescue (*Festuca ovina*), and with frequent mat-grass (*Nardus stricta*) and wavy-hair grass. Soft rush, heath rush (*Juncus squarrosus*) and field wood-rush (*Luzula campestris*) are occasional. Sweet vernal grass (*Anthoxanthum odoratum*) and heath grass (*Danthonia decumbens*) are also present but relatively scarce. The unimproved acid grassland supports a diverse assemblage of mosses that include (*Rhytidiadelphus squarrosus*), (*Hypnum cupressiforme*), (*Dicranum scoparium*), (*Polytichum commune*) and (*Dicranella heteromalla*). This vegetation type shows close agreement with U4e *Festuca ovina-Agrostis capillaris-Galium saxatile* grassland, *Vaccinium myrtillus-Deschampsia flexuosa* sub-community.

The species-poor grassland (Target Note 5) occurs on the gently sloping ground on the northwest side of Cefn Mawr. Plants such as tormentil and heath bedstraw are noticeably absent, and are replaced by white clover (*Trifolium repens*) and perennial ryegrass (*Lolium perenne*). Other common species include common bent, Yorkshire fog (*Holcus lanatus*), smooth meadow-grass (*Poa pratensis*), sweet vernal grass, common mouse-ear (*Cerastium fontanum*), yarrow (*Achillea millefolium*), creeping thistle (*Cirsium arvense*), spear thistle (*Cirsium vulgare*) and common nettle (*Urtica dioica*). Bryophytes are relatively scarce but include the mosses (*Rhytidiadelphus squarrosus*) and (*Hypnum cupressiforme*). This vegetation type shows poor agreement with MG6a *Lolium perenne - Poa pratensis* grassland, typical sub-community.

Acid Flush

Acid flush occupies approximately 10 ha (6%) of the application area. Acid flushes occur along the spring lines around the base of Cefn Mawr, where the peat substrate is at least 0.5 m deep. This vegetation type is characterised by a carpet of mosses overlain by rushes (*Juncus* spp.) and sedges (*Carex* spp.). The vegetation is dominated by tussocks of purple moor-grass and soft rush. The tussocks also support hare's-tail cottongrass and wavy hair-grass. Between the tussocks there are lawns which support tormentil and heath rush which are abundant.

This vegetation type (Target Note 6) includes the following mosses: (*Sphagnum papillosum*), (*Sphagnum capillifolium*), (*Sphagnum cuspidatum*), (*Calliergon cuspidatum*), (*Polytrichum commune*), (*Dicranum scoparium*), (*Hypnum cupressiforme*) and (*Rhytidiadelphus squarrosus*). The acid flush also supports other grasses and sedges which are less frequent, such as creeping bent (*Agrostis stolonifera*), Yorkshire fog, sweet vernal grass, field wood-rush, star sedge (*Carex echinata*) and common sedge. Other plant species present include common marsh-bedstraw (*Galium palustre*), cross-leaved heath, marsh thistle (*Cirsium palustre*), meadow thistle, marsh willowherb (*Epilobium palustre*), marsh valerian (*Valeriana officinalis*), narrow buckler fern, lady fern, foxglove, common nettle, common sorrel, lesser spearwort (*Ranunculus flammula*), marsh pennywort (*Hydroctoyle vulgaris*), common spike-rush, bog stitchwort and cuckooflower. This vegetation type agrees most closely with M25c *Molinia caerulea-Potentilla erecta* mire, *Angelica sylvestris* sub-community.

Peat Pool

The peat pool occupies approximately 0.8 ha (0.5%) of the application area. The Ffynnon Oer peat pool (Target Note 7) which is situated at the base of the northwest facing slope of Cefn Mawr supports a different vegetation type. The vegetation is characterised by bog pondweed (*Potamogeton polygonifolius*), pond water-crowfoot (*Ranunculus peltatus*), lesser spearwort, marsh pennywort, common cottongrass (*Eriophorum angustifolium*), round-leaved sundew (*Drosera rotundifolia*), common spike-rush, yellow sedge (*Carex viridula* ssp. *viridula*) and common sedge. Mosses that are present include (*Sphagnum cuspidatum*), (*Sphagnum papillosum*) and (*Polytrichum commune*). This vegetation type agrees most closely with M29 *Hypericum elodes-Potamogeton polygonifolius* soakway community.

Valley Bog

Outside of the application area, to the northwest of Ffynnon Oer peat pool, is a small valley bog (Target Note 8). The vegetation is characterised by common cottongrass, bog asphodel, cross-leaved heath, round-leaved sundew, carnation sedge (*Carex panicea*) and common spike-rush. Mosses that are present include (*Sphagnum cuspidatum*), (*Sphagnum papillosum*) and (*Polytrichum commune*). This vegetation type agrees most closely with M21b *Narthecium ossifragum-Sphagnum papillosum* valley mire, *Vaccinium oxycoccos-Sphagnum recurvum* sub-community.

Marshy Grassland

Marshy grassland occupies approximately 39 ha (25%) of the application area. Marshy grassland occurs on level or gently sloping ground adjacent to the acid flushes and other watercourses where the peat substrate is less than 0.5 m deep. The marshy grassland is characterised by a mosaic of unpalatable soft rush tussocks (that have a cover-abundance of greater than 25%) interspersed with tightly grazed 'lawns'. In the dense stands of soft rush, species such as common marsh bedstraw, greater bird's-foot-trefoil, cuckooflower and tormentil are frequent. Between the tussocks there are 'lawns' that support common sorrel, marsh thistle, creeping buttercup, Yorkshire fog, creeping bent and sweet vernal grass. This vegetation type bears most resemblance to M23b *Juncus effusus/acutiflorus-Galium palustre* rush pasture, *Juncus effusus* sub-community.

15.3.2 Invertebrates

There were no records of previous surveys of the site for invertebrates. It was considered that the habitats present at Cefn Mawr support a range of groups, including dragonflies, butterflies, hoverflies, craneflies, beetles, bugs and spiders. The acid flushes and marshy grassland habitats are structurally quite diverse, and may support relatively high densities of invertebrates. The site surveys involved a search for marsh fritillary, as well as its larval food-plant Devil's-bit scabious (*Succisa pratensis*). However, neither marsh fritillary nor Devil's-bit scabious were recorded.

15.3.3 Birds

The results of the breeding bird survey are presented in Figure 15.2, which indicates the approximate locations of all breeding birds across the survey site.

Within the application area, meadow pipit was the most abundant breeding bird, with at least 25 territories. Skylark was the next most abundant breeding bird, with at least 19 territories.

Meadow pipit territories were closely associated with blanket bog, acid flush and marshy grassland habitats. Skylarks were found to be more closely associated with drier terrain, particularly acid grassland with a rush cover-abundance of <25%. The greatest combined density of meadow pipits and skylarks was found to be on the highest parts of Cefn Mawr.

In comparison with meadow pipits and skylarks, the abundance of all other species recorded during the survey was low. Three pairs of wheatear (*Oenanthe oenanthe*) and a single pair of pied wagtails (*Motacilla alba*) were found nesting in stone walls near the southern boundary of the application area. Two pairs of reed bunting were considered to be nesting within the acid flushes, although only one pair was present within the application area. A single pair of stonechats (*Saxicola torquata*) were nesting outside the application area within an area of coarse vegetation within marshy grassland habitat. No wader species were recorded at the survey site.

Non-breeding birds that frequent the hill-pasture at Cefn Mawr include an abundance of corvids that associate with the sheep, particularly carrion crow (*Corvus corone*) and raven (*Corvus corax*). Mistle thrush (*Turdus viscivorus*), blackbird (*Turdus merula*), song thrush (*Turdus philomelos*) and chaffinch (*Fringilla coelebs*) were also observed foraging within the application area, but were probably nesting in the adjacent coniferous plantations.

Birds recorded foraging within the coniferous plantations that border the application area include robin (*Erithacus rubecula*), blackcap (*Sylvia atricapilla*), willow warbler (*Phylloscopus trochilus*), goldcrest (*Regulus regulus*), coal tit (*Parus ater*), siskin (*Carduelis spinus*) and crossbill (*Loxia curvirostra*). Single buzzard (*Buteo buteo*) and kestrel (*Falco tinnunculus*) were observed on one date only over the plantation to the west of the site. A single red kite (*Milvus milvus*) flew low over Cefn Mawr on one date only. Red kite is a *LBAP* species which receives protection under Schedule 1 of the *Wildlife and Countryside Act 1981* (as amended). The nearest known red kite nest site is approximately 10 km northeast of the application site (Tucker *pers comm.*, 2002).

15.3.4 Mammals

A single brown hare was flushed from the northeastern part of the blanket bog just on one survey visit. There are no records of other mammal species of note from the site, and no signs of any were noted during the survey visit.

15.4 Evaluation

This section evaluates the nature conservation value of the site with respect to the habitats present and their importance for invertebrates, birds and mammals. The value of the site is determined in terms of its nature conservation importance in local, regional (Neath & Port Talbot County Borough), national and international contexts.

15.4.1 Blanket Bog

Active blanket bog, along with other peatland habitats, such as lowland raised bog, have been identified as Priority Habitats in the *UKBAP*. Active blanket bog is defined as:

> *"...still supporting a significant area of vegetation that is normally peat forming"*

Although the blanket bog at Cefn Mawr is very variable in condition because it has been drained and otherwise improved for grazing, it is still considered to be active and capable of peat formation.

The publication *Guidelines for Selection of Biological SSSIs: Bog* (JNCC, 1994) advises that areas of blanket mire vegetation over 25 ha that show peat-forming capability should be considered for selection as SSSIs. The wet modified blanket bog within the application area is unlikely to qualify for designation as a statutory nature conservation site because it:

- occupies an area <25 ha (21 ha);
- exhibits limited variation in microform topography;
- exhibits limited variation in plant community/subcommunity composition;
- has <25% *Sphagnum* cover.

However, the blanket bog may be of importance within Neath & Port Talbot County Borough.

The site surveys revealed that the blanket bog vegetation is variable in condition, having been affected by drainage, agro-chemical application and over-grazing in places. The most diverse vegetation is on the deepest peat on the centre of the bog, which supports the greatest cover-abundance of *Sphagnum* moss. The blanket bog is considered to be unlikely to support a diverse invertebrate fauna.

15.4.2 Acid Grassland

The most important areas of acid grassland are found on the steeper slopes of Cefn Mawr. We consider these unimproved grasslands to be of local nature conservation importance within Neath & Port Talbot County Borough.

The site surveys revealed that the grasslands are variable in condition, having been affected by agro-chemical application and over-grazing. Species-poor grasslands are found on the northwest side of Cfen Mawr and are considered to be of very limited nature conservation value.

15.4.3 Acid Flush

The acid flushes that occur along the spring lines around the base of Cfen Mawr, where the peat substrate is at least 0.5 m deep. We consider that these acid flushes are likely to be of nature conservation importance within Neath & Port Talbot County Borough. The main acid flush NVC community type is M25c, which is included within the "Purple Moor-grass and Rush Pasture" Priority Habitat in the *LBAP*.

15.4.4 Peat Pool

We consider that the peat pool is likely to be of nature conservation importance within Neath & Port Talbot County Borough.

15.4.5 Valley Bog

We consider that the valley bog is likely to be of nature conservation importance within Neath & Port Talbot County Borough.

15.4.6 Marshy Grassland

The marshy grassland occurs on the level and gently sloping ground surrounding Cefn Mawr, where the peat substrate is <0.5 m. The marshy grassland is characterised by a mosaic of rush tussocks and closely grazed lawns. The vegetation community type that most closely matches this habitat is M23b, which is included within the "Purple Moor-grass and Rush Pasture" Priority Habitat in the *LBAP*.

15.4.7 Invertebrates

The acid flushes and marshy grassland habitats were found to be structurally diverse, and we consider them suitable to support a range of common invertebrates.

15.4.8 Birds

Skylark had a breeding density of approximately 16 pairs km^2 within the application area, which is typical for an upland area (Brown & Shepherd, 1991). Skylarks were found to be most abundant where the rush cover-abundance in the acid grassland is <25%. While skylark are a *UKBAP* priority species, this is largely as a result of recent declines in population density in lowland farmland, and they remain common and widespread. The national decline in the population of skylark, particularly in lowland areas is thought to be related to the wide-scale intensification of agriculture, rather than as a result of the cumulative effect of individual developments. Given that no significant effects have been recorded on territorial skylarks and meadow pipits during recent studies of wind farms (Thomas 1999).

Meadow pipit had a breeding density of approximately 12 pairs km^2 within the application area, which is typical for an upland area (Brown & Shepherd, 1991). Meadow pipits were found to be most abundant on the blanket bog on Cefn Mawr.

A low density (2 pairs) of breeding reed buntings were recorded in the acid flush habitat at the base of Cefn Mawr.

A single red kite was observed flying over Cefn Mawr, presumably searching for food within the application area on one survey date only. The nearest known red kite nesting site is approximately 10 km from the application area, and we consider that breeding birds are more likely to forage closer to their nest sites.

15.4.9 Mammals

The application area was found to be little used by mammals. A single brown hare was recorded on the acid grassland on one survey date only. We consider that the application area only supports a small population of brown hares. Brown hares have large home ranges and are therefore likely to wander over the adjoining marshy grassland and acid grassland habitats.

15.5 Predicted Trends

15.5.1 Blanket Bog

The main factors affecting vegetation change in the blanket bog are grazing and drainage. The current grazing levels at the site are relatively high, but the site surveys revealed only a few signs of overgrazing in places. This may be because the grazing is concentrated on the fringes

of the blanket bog. Drainage of the blanket bog has probably had more effect on vegetation dynamics. The northeastern part of the bog was drained about 15 years ago and it has begun to dry out. The southwestern part of the bog, unlike the northeastern part, has been cut and weed swiped, which has led to a marked reduction on the abundance of soft rush. Purple moor-grass and hare's-tail cottongrass have increased in cover due to drainage and are now abundant across much of the site. Both are vigorous, tussocky species, and it is unlikely that *Sphagnum* moss (the main peat-former) will be able to out-compete it and increase in cover. Therefore, under current grazing levels, it is predicted that the blanket bog vegetation will persist in its present condition.

15.5.2 Acid Grassland

Grassland vegetation dynamics depend on management, principally by grazing. The current grazing pressure is relatively high on the acid grassland and if that is sustained, it may be expected that unpalatable species such as mat-grass and soft rush will increase in cover. The acid grassland on the steep slopes of Cefn Mawr is not overgrazed and vegetation changes are not expected. If grazing ceases entirely, the grassland would undergo succession to other habitats. The species most likely to colonise at first are dwarf shrubs such as bilberry, heather and gorse, but it may also be expected that trees will gradually become established.

15.5.3 Acid Flush

The main factors affecting vegetation change in the acid flushes are grazing and drainage. The current grazing levels at the site are relatively high, but the site surveys revealed only a few signs of overgrazing in places. This may be because the grazing is concentrated on the fringes of the acid flushes. Access road construction across several of the acid flushes has had affected their drainage and has probably had more effect on vegetation dynamics. As a result the extent of acid flush has diminished with plants more usually associated with drier conditions colonising their margins.

15.5.4 Marshy Grassland

Grassland vegetation dynamics depend on management, principally by grazing. The current grazing pressure is relatively high on the marshy grassland and if that is sustained, it may be expected that unpalatable species, particularly soft rush will increase in cover. If grazing ceases entirely, the grassland would undergo succession to other habitats. The species most likely to colonise at first are trees such as goat willow (*Salix caprea*) and downy birch (*Betula pubescens*).

15.6 Information Gaps

No significant information gaps have been identified.

15.7 Avoidance, Mitigation, Compensation and Enhancement

This section describes measures to reduce impacts on flora and fauna. This includes avoidance of potential effects achieved through the design proposals, and the reduction of effects, whereby

the layout of components of the development is specifically considered in order to minimise the potential effects. Mitigation that will be incorporated into the development during the construction and operation phases is described. Short-term impacts due to construction activity are considered under the construction phase and long-term impacts that occur as a result of the development are considered under the operation phase. Where impacts cannot be adequately mitigated, appropriate compensation measures are proposed. Opportunities to enhance the nature conservation value of the site are also proposed.

The details of exactly how the identified mitigation, compensation and enhancement measures are to be implemented have not yet been determined. However it is intended that following the grant of consent an outline habitat management plan and monitoring plan will be prepared to guide their implementation, and that the programme and nature of these will be agreed with the planning authority. It is also intended that their implementation will be secured through appropriate planning conditions and/or legal agreements.

15.7.1 Avoidance

There is potential for the avoidance of specific localised or small-scale areas of ecological sensitivity.

The initial site search and selection process (described in Section 6) included consideration of a wide range of factors including potential ecological effects. The Cefn Mawr site was found to be favourable in respect of many of these factors, including the absence of international, national or local nature conservation designations applying to any land within 2 km.

Following the selection of the site, findings of all specialist reports and assessments have been considered throughout the iterative design and assessment process of the proposed wind farm e.g. adjustment of the access track layout and turbine locations to minimise effects on acid flush and blanket bog habitats (see Table 2.2). Hence significant environmental effects have been avoided where possible, and reduced where avoidance has not been possible.

15.7.2 Mitigation

Construction Phase

Access Roads

The mechanisms by which damage may occur to the blanket bog vegetation are mainly through changes in hydrology. Therefore, the mitigation measures proposed to avoid or reduce effects on the hydrology of the blanket bog (Section 13), such as using a floating road construction, will also reduce impacts on the vegetation.

Electric Cables

The laying of electric cables, that will link the wind turbines with the on-site sub-station, will be in small trenches (500 mm wide by 750 mm deep) adjoining the edge of the access tracks, which will be back-filled with compacted fill.

Wind Turbines and Crane Pads

The mitigation measures proposed to reduce the impacts on hydrology (Section 13) will also reduce the impacts on vegetation, because the characteristic vegetation communities are dependent on the peat remaining waterlogged. It is estimated that the total volume of peat to be

excavated from the 5 turbine foundations (numbers 6, 7, 12, 13 and 14) will be about 198 m^3. However, micro-siting of turbine foundations will endeavour to locate no more than two of these five turbines on the blanket bog. This peat will be used to fill in the existing drainage channels (grips) to improve the condition of the wet modified blanket bog.

Site Working Practices

During construction, activity will be limited as far as possible to the areas under development. Storage of surplus materials will avoid sensitive habitats, such as blanket bog, acid flush and unimproved acid grassland. The storage compound is situated close to the sub-station in an area of marshy grassland that has been improved for grazing. Other mitigation measures to prevent spillages of pollutants into watercourses (described in Section 13) will also prevent spillages onto sensitive vegetation.

Operational Phase

This section describes the mitigation measures that will be incorporated into the development during the operational phase to reduce impacts on flora and fauna. Apart from the operation of the wind turbines and general maintenance of the turbines, there will be little on-site activity during the operational phase.

Access Tracks

Any impacts on the blanket bog surrounding the access roads are expected due to changes in hydrology. Therefore, the mitigation measures proposed in Section 13 are applicable here.

Site Working Practices

Site working practices will be formalised, as will the environmental management of the site during the construction phase. This will ensure that there is minimum disturbance to sensitive habitats and assist in reducing the likelihood of accidental occurrences and providing response measures to deal with potential polluting spillages.

Table 15.1 summarises the mitigation incorporated into the wind farm development.

Table 15.1 Mitigation Incorporated into the Wind Farm Development

Impact	Mitigation Incorporated into the Proposed Development	Extent to Which Impact Mitigated *
Construction		
1. Disturbance of hydrological regime of blanket peat and consequent changes in vegetation composition due to construction of access tracks, laying of electric cables and construction of wind turbines and crane pads	• Layout of access roads and turbine locations avoid deep peat • Micro-siting of access tracks and turbines, with specialist advice • Access tracks are to be of geogrid reinforced construction to prevent compaction of soils and allow free movement of water through the body of the peat • Laying of electric cables in slits where possible. Where trenches have to be dug, topsoil and peat will be carefully replaced • Topsoil and peat will be carefully replaced in cable trenches • Top soil, including peat will be kept separate from subsoil during the excavation of turbine platforms • Peat will be loosely stored to ensure compaction of the material is kept to a minimum, and stored for the minimum amount of time possible • Peat will be replaced into the excavation where possible. Any excess will be reused on site to infill drainage channels • Deep open pits within the peat will be supported with sheet piling to avoid slumping of surrounding peat soils	Substantially
2. Damage to sensitive vegetation and watercourses due to spillages of pollutants	• Spillages will be contained, preventing impacts on flora and fauna • Avoid storage of surplus materials on vegetation or beside watercourses	Fully
Operation		
1. Land take due to 6.2 km of access roads (5 m excavated width): New track 3.2 x 1000 x 5 = total area 16000 m^2; Widening existing track by an additional 2 m width; 3 x 1000 x 2 = 6000 m^2; Total land take = 22000 m^2 = 2.2 ha	• Mitigation as described for Hydrology (Section 13), e.g. geogrid reinforced track construction reduces risk of peat drying at edges of tracks. Other habitats are less sensitive than the blanket bog	Partially

Table 15.1 (Continued) Mitigation Incorporated into the Wind Farm Development

Impact	Mitigation Incorporated into the Proposed Development	Extent to Which Impact Mitigated *
2. Land take due to turbine foundations and crane pads: Each turbine foundation area ~17 m^2, each crane pad Area 1 = ~243 m^2 (approx.), each crane pad Area 2 = ~124 m^2. Total landtake due to 16 turbines = ~0.6 ha	• Excavation of ~198m^3 of peat from 5 turbine foundations (assuming an approximate peat depth of 3 m)	Partially
3. Site Working Practices Accidental spillages of oils and diesel from heavy plant and machinery	• Best working practices will be adopted when working with oils and diesel • Spill response measures will be put in to place throughout operation to ensure any spillages are quickly controlled	Substantially
4. Land take due to substation and compound	• The selected location of substation and compound are on areas of marshy grassland which have been improved for grazing and are of limited nature conservation value	Fully

*** Key to Predicted Success of Mitigation:**

Fully - Impact fully mitigated and no effects predicted.

Substantially - Mitigation would be largely successful at reducing impact. Some effects possible, which are discussed in Section 15.8.

Partially - Mitigation would be successful at reducing impacts, but some effects likely. These effects are discussed in Section 15.8.

15.7.3 Compensation

The main negative impact of the proposed development is the landtake of blanket bog vegetation due to access tracks and turbine bases. There are 5 turbines on the blanket bog, constituting a total of 85 m^2 of landtake (although following micro-siting it is anticipated that only 2 are likely to be positioned fully on the blanket bog). There are approximately 1.1 km of on-site access roads across the blanket bog, equating to a total landtake of 4400 m^2. Based on an assumed average turbine foundation depth of 3 m excavation into the peat, the 5 turbines would result in approximately 198 m^3 of peat for the restoration. Peat removed from the excavations for the turbines will be used within the site for the improved management of the blanket bog, by infilling of the drainage channels on the blanket bog with excavated peat to restore waterlogged conditions.

15.7.4 Enhancement

Details of the measures that will be taken to enhance the nature conservation value of the site during construction and operation are:

- Removal of soft rush from the northeastern part of the blanket bog;

- Conversion of species-poor grassland to a less intensively managed grassland habitat by cessation of agro-chemical applications; and
- Maintenance of an appropriate grazing regime on all grasslands.

15.8 Predicted Changes and Consequences

15.8.1 Construction Impacts

Access Tracks

Construction activity will cause some disturbance of vegetation either side of the access tracks. The vegetation of the grassland areas is fairly resilient, although disturbance of the peat surface either side of the access tracks across the blanket bog is predicted to have adverse impacts on sensitive species, principally *Sphagnum* moss, and allow the increase in cover of the tussocky purple moor-grass and hare's-tail cottongrass. If disturbance is severe, some peat may be left bare, running the risk of erosion. An appropriate grazing will facilitate the natural regeneration of vegetation during the operational phase of the wind farm.

Electric Cables

Where small trenches have to be dug there will be unavoidable temporary disturbance to the peat. In addition these trenches will enhance the drainage of the peat, by creating a preferential flow path. It is possible that vegetation changes will occur in response; probably soft rush will colonise and expand the way it already has adjacent to the grips in the northeastern part of the bog.

Wind Turbines

During construction, the area surrounding the turbine base, crane pads and laydown areas will be subject to a high level of disturbance. Vegetation is likely to be trampled, leading to the development of bare peat and possible erosion. The total affected area of construction activity per turbine is approximately 2500 m^2 (which constitutes the temporary landtake required for two crane pads and movement of materials), of which only ~17 m^2 is landtake (see operation impacts). The vegetation within the ~17 m^2 area of disturbance around each turbine will, according to the habitat type, recolonise at different rates. For example, it is likely that the bare peat in the blanket bog will take at least 5 years to become revegetated, unlike the grassland which will recover more quickly.

15.8.2 Operation Impacts

Access Tracks

There are 6.2 km of access tracks across the application site. Approximately half of the access tracks (3 km) at the application site will utilise existing farm vehicle tracks which will be widened by 2 m. The new access tracks (3.2 km) will be excavated to 5 m, with the final width, excluding shoulders, of 4 m wide. The total land take due to the creation of new access tracks and widening of existing tracks is estimated to occupy a total area of ~2.2 ha reducing to 1.88ha when the shoulders are reinstated and seeded.

In the absence of previous experience of running such heavy machinery on floating roads, it is difficult to predict the medium to long-term impact of floating roads on hydrology and hence on vegetation either side of the roads. If the floating roads do indeed float and do not sink into the peat surface causing compaction then impacts on hydrology and vegetation will be minimal. If the integrity of the peat is affected, then changes to the hydrological and vegetational system will occur a similar , but lesser extent, to those occurring around the crane pads and turbine bases are to be expected (see below).

Wind Turbines

The total permanent landtake for each turbine is ~17 m^2. The total permanent landtake due to 16 turbines foundations is ~272 m^2. The maximum turbine working area is ~50 m x 50 m (which comprises the turbine foundations and two crane pads Area 1 and Area 2). The total maximum turbine working area affected by the 16 turbines is therefore ~4 ha. This figure represents only 2.5% of the total application area. The habitat of the highest nature conservation value within the survey site is the blanket bog, which will support a maximum of 5 turbines which constitutes ~85 m^2.

Disruption of the hydrological regime due to insertion of impermeable concrete into the peat will cause changes in the vegetation around each turbine and crane pad. The spatial extent and the severity of change will vary across the site, and depend on the current distribution of vegetation communities. In the blanket bog vegetation, it is predicted that vegetation types indicative of the drier peat (*Eriophorum vaginatum - Deschampsia flexuosa* blanket mire) will expand at the expense of the *Sphagnum*-dominated communities. The changes in vegetation should be monitored, to determine whether remedial or ongoing management will be required. The changes in blanket bog vegetation are likely to be permanent, unless other factors favour trajectories in other directions (e.g. changes in grazing pressure, pollution, climate change).

Invertebrates

We consider that there will be no adverse impacts to the invertebrate populations that inhabit the application area.

Birds

We consider that the birds that frequent the application area will become acclimatised to the wind turbines. The risk of collision with the wind turbines is considered to be low, as most birds do take avoiding action. They may detect either an entire wind farm array, or an individual wind turbine, and alter their flight lines so as to avoid the structures; or they may at close quarters see an oncoming blade and take emergency avoiding action (SNH, 2000).

Mammals

We consider that there will be no adverse impact to the brown hares that frequent the application area.

15.8.3 Decommissioning Impacts

Decommissioning is expected to take place approximately 20 years after construction. Turbine removal will cause disturbance of the vegetation surrounding the turbines. It is likely that the vegetation on the blanket bog immediately surrounding the turbines will not have recovered from construction disturbance by this time. Therefore, decommissioning may further degrade

the vegetation. Although turbine foundations will be buried, vegetation changes will be permanent.

Decisions on access track removal will be taken during the decommissioning phase in conjunction with the landowners. If the access tracks are no longer required they will be partially reinstated with topsoil and sown with a suitable seed mixture.

15.9 Evaluation of Effects

Four criteria have been used in evaluating the ecological and nature conservation impacts of the proposed development.

- the type of effect, *i.e.* whether it is positive, negative, neutral or uncertain;
- the probability of the effect occurring based on the scale of certain, likely or unlikely;
- the policy importance or sensitivity of the resource under consideration, in a geographical context: international, national (UK), regional (Neath & Port Talbot County Borough), or local (site and its vicinity, including areas of habitats contiguous with or linked to those on site);
- the magnitude of the effect in relation to the resource that has been evaluated, quantified if possible, if not using the scale high, medium, or low.

Professional judgement is used to assess the findings in relation to each of these criteria to give an assessment of significance for each effect. Effects are considered to be of major or minor significance, or not significant.

Table 15.2 summarises the ecological and nature conservation effects of the proposed development and assesses their significance.

Table 15.2 Effects and Evaluation of Significance

	Type of Effect	Probability of Effect Occurring	Policy Importance or sensitivity	Magnitude of Effect	Significance	
					Level	Rationale
Construction						
1. Disturbance of peat in blanket bog and consequent changes in vegetation either side of access roads due to construction activity and laying of electric cables	-	Likely	Regional	Estimate up to 1m either side of access tracks for a total area of ~0.2 ha (1.6% of the blanket bog)	Minor	Although blanket bog is a UK BAP Priority Habitat, that present at Cefn Mawr does not merit a statutory nature conservation designation and the proportion of the habitat affected is low

Table 15.2 (continued) Effects and Evaluation of Significance

	Type of Effect	Probability of Effect Occurring	Policy Importance or sensitivity	Magnitude of Effect	Significance	
					Level	Rationale
2. If trenches have to be dug for laying of electric cable, a preferential flow path for water may be created, causing vegetation change (possible invasion of soft rush) in blanket bog and other habitats	-	Unlikely	Regional	Low	Not sig.	Most cables will be laid in slits with minimal impact on vegetation
3. Disturbance of area around turbine bases and crane pads situated on blanket bog, causing trampling of vegetation and possible erosion of peat	-	Certain	Regional	17m^2 per turbine, 5 turbines on peat = 85m^2	Minor	Although blanket bog is a UK priority habitat, that present at Cefn Mawr does not merit designation and the proportion of the total habitat affected is low
4. Removal of soft rush from the northeast part of the bog	+	Certain	Regional	Medium	Minor	Enhancement of the blanket bog to increase the extent of high quality bog vegetation
5. Excavation of peat and peaty gleys from turbine bases on blanket bog	+	Certain	Regional	1983 m^3 from 5 turbines	Minor	Infilling of the drainage channels on the blanket bog with excavated peat to restore hydrological and vegetational system
6. Disturbance of breeding birds	-	Likely	Local	Low	Not sig.	Disturbance will be temporary. No medium or long-term effects on populations
7. Disturbance to red kites	-	Unlikely	National	Low	Minor	Disturbance will be temporary. No medium or long-term effects on population
8. Disturbance of brown hares through construction activities	-	Likely	Local	Low	Not sig.	Home ranges are large, and the effect temporary. No medium or long-term effects on population
Operation						
1. Land take due to the creation of new or widening of existing access tracks	-	Certain	Regional	~2.2 ha (1.46% of land cover within the application area))	Minor	A relatively small area is affected

Table 15.2 (continued) Effects and Evaluation of Significance

	Type of Effect	Probability of Effect Occurring	Policy Importance or sensitivity	Magnitude of Effect	Significance	
					Level	Rationale
2. Gradual drying of peat surface either side of roads and consequent changes in blanket bog vegetation	-	Unlikely	Regional	Estimate 1 m either side of roads	Minor	Floating construction should have minimal effect on hydrology and area affected is small
3. Land take due to turbine foundations	-	Certain	Regional	265 m^2 of the application area will be lost; of which 0.4% of blanket bog will be affected	Minor	Although blanket bog is a UK priority habitat, that present at Cefn Mawr does not merit designation and the proportion of the total habitat affected is low Loss of habitat and peat excavation will enable restoration elsewhere
4. Vegetation change around impermeable turbine bases and crane pads	-	Likely	Regional	Up to 10 m radius around bases and pads	Minor	Although blanket bog is a UK priority habitat, that present at Cefn Mawr does not merit designation and the proportion of the total habitat affected is low
5. Improved hydrological condition of blanket bog arising from damming of drains	+	Certain	Regional	Medium	Minor	Although this would undoubtedly lead to an improvement in bog condition, the bog is only of regional importance
6. Increased extent of high quality bog vegetation arising from soft rush removal	+	Likely	Regional	Low	Minor	Although this would probably lead to a localised improvement, the extent of improvement is uncertain, and the bog is only of regional importance
7. Conversion of species-poor grassland to a less intensively managed grassland habitat by cessation of agro-chemical applications	+	Likely	Local	Low	Minor	Enhancement of the grassland to promote the development of a more floristically diverse sward
8. Maintenance of an appropriate grazing regime on all grasslands	+	Likely	Local	Low	Minor	Enhancement of the grassland to promote the development of a more floristically diverse sward

Table 15.2 (continued) Effects and Evaluation of Significance

	Type of Effect	Probability of Effect Occurring	Policy Importance or sensitivity	Magnitude of Effect	Significance	
					Level	Rationale
Decommissioning						
1. Disturbance of vegetation around turbine foundations	-	Certain	Regional	~214 m^2 per turbine, 5 turbines on peat = 0.1 ha	Minor	Although blanket bog is a UK priority habitat, that present at Cefn Mawr does not merit designation and the proportion of the total habitat affected is low. Floating track construction on the blanket bog means that vegetation will recover following decommissioning

Key:	Type	Probability	Policy Importance	Magnitude	Significance
	- = Negative	Certain	International	High	Major
	+ = Positive	Likely	National (UK)	Medium	Minor
	Neutral	Unlikely	Regional	Low	Not Significant
	Unknown				
			Local	Quantified	

15.10 Summary & Conclusions

The activities that will have most effect on the ecology of the survey site are the access road construction and turbine erection. This section describes the current nature conservation value of the site, then presents mitigating measures to be incorporated in the scheme design, and then evaluates the predicted residual effects of the proposed development.

Within the application area, blanket bog appears to be the most sensitive habitat to construction. Impacts on hydrology and subsequent vegetation change have been mitigated by using a floating road construction and the overall land take due to turbine foundations is 0.4% of the extent of blanket bog habitat on site.

The main mitigating (compensation and enhancement) measures which will have a positive effect include:

- Infilling of the drainage channels on the blanket bog with excavated peat to restore waterlogged conditions;
- Removal of soft rush from the northeastern part of the blanket bog;

- Conversion of species-poor grassland to a less intensively managed grassland habitat by cessation of agro-chemical applications; and
- Maintenance of an appropriate grazing regime on all grasslands.

15.11 References

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16. Existing Infrastructure, Telecommunications, Television, Aviation and Safety

16.1 Introduction

This section considers the potential impacts the proposed Ffynnon Oer Wind Farm will have on existing infrastructure, telecommunications, television and safety on the site. Wind turbines, as with any large structure, can potentially interfere with electromagnetic signals, particularly television and radar. The quality of television reception may be affected, and viewers may suffer loss of picture quality and acoustic interference. Where this occurs it is of a predictable nature and can generally be alleviated by the installation or modification or a local repeater station or cable connection. The turbines also have the ability to affect radar performance and interfere with communication networks. Construction activity will also have to take cognisance of existing ground based infrastructure and aviation safeguarding requirements.

All of these matters have been addressed in the development of this Wind Farm through consultation with system operators and the iterative design of the wind turbine layout.

16.2 Methodology

The basis of this section has been consultation with a number of organisations known to have an interest in telecommunications, television and infrastructure in the area. The consultation list was drawn together based on advice given in Technical Advice Note 8: *Renewable Energy - 1996* Annex A. The consultees relevant to this section are listed in Table 16.1.

Table 16.1 Consultations Made With Respect To Existing Infrastructure, Telecommunications, Television, Aviation and Safety

Telecommunications Consultees
BT Cellnet
Cable and Wireless (Mercury)*
Department of Trade and Industry (Radio Communications Agency)
Liberty Communications Ltd
National Transcommunications Ltd. (ntl) (also in relation to their telecommunications network)*
Ionica
One 2 One
Orange*

Table 16.1 (continued) Consultations Made With Respect To Existing Infrastructure, Telecommunications, Television, Aviation and Safety

Telecommunications Consultees
Vodafone
Public Service Telecommunications Users
Maritime and Coastguard Agency*
Trinity House*
Home Office Police Department
Aviation Safety Consultees
Civil Aviation Authority *
NATs *
Military Aviation Safety Consultees
Ministry of Defence *
Television Consultees
British Broadcasting Corporations (BBC) *
Crown Castle *
ITC *
Infrastructure and Other Consultees
The Coal Authority *
Health and Safety Executive *
Transco *

* Reply Received

16.3 Baseline Description

The consultation responses have enabled a baseline to be established. The following briefly summarises the responses.

16.3.1 Telecommunications Providers

Cable and Wireless (Mercury)

The development will not impact on Mercury microwave radio links.

Orange
Holding reply received. Request for OS grid reference of site supplied. No further resonse received.

NTL
Predict that the wind farm should not have a detrimental affect on any NTL links.

16.3.2 Public Service Telecommunication Users

Trinity House
The installation is sufficiently distant from Trinity House Stations, no objection.

Maritime and Coastguard Agency
They foresee no problems with the site.

16.3.3 Aviation Safety

CAA
The Authority has determined that there are no significant Aeronautical Radio Stations within 30 km of the proposed site.

NATS
Following examination of the proposed development there is no objection to the proposal.

16.3.4 Military Aviation Safety

Ministry of Defence
Confirmation that there is no objection to the proposal subject to the notification of dates of commencement/completion and other complementary information following any grant of planning permission.

16.3.5 Television

BBC
The proposed wind farm is located within an area assigned to the BBC. Domestic reception of UHF analogue television within the area is provided from the broadcaster's transmitters at Wanvoe, Kilvey Hill, Rheola, Glyncorrwg, Croeserw and Abergwynfi. Their assessment shows that viewers of these transmitters should not suffer interference as a result of the proposal. The wind farm development should not have a detrimental effect upon national or local BBC radio reception.

ITC
The area of the development is one for which the BBC has a watching brief on frequency planning matters.

Crown Castle
The area of the development is one for which the BBC has a watching brief on frequency matters.

16.3.6 Infrastructure and Others

Health and Safety Executive
There are no high pressure gas pipelines or other notifiable hazardous installations in the vicinity of the proposed development. The wind farm itself is not a notifiable installation, therefore the HSE has no observations or comments on the proposed development.

Transco
Transco has a National Transmission pipeline in the vicinity, 600 mm Rhigos to Dyffyn Clydach No 2 Feeder. The pipeline is subject to a deed of easement which typically have a width of 24 m (i.e. 12 m either side of the pipeline) and prohibits certain activities in proximity to the pipeline, i.e. permanent or temporary buildings or structures, modifications to ground levels etc. No work should commence in the vicinity of Transco apparatus until a Transco representative has visited the site.

Coal Authority
The Coal Authority has indicated areas within the vicinity of the proposed wind farm which have been the subject of past mining activity. It is within the likely zone of influence on the surface from workings in 6 seams of coal, the last date of working being 1968. It is not within the zone of likely influence from any present underground coal workings. Furthermore the site is not within a geographical area for which a licence to extract coal by underground methods is awaiting determination by the Coal Authority. There are however reserves of coal in the locality that could be worked at some time in the future subject to feasibility, licences and planning consent. There is no record of the risk of the land being affected by subsidence being given under S.46 of the Coal Mining Subsidence Act 1991.

Within or within 20 m of the site there are 36 mine entries.

In view of the mining circumstances a prudent developer would seek appropriate technical advice before works are undertaken on site. No activities should be undertaken that intersect, disturb or interfere with any coal or mines of coal or mines of coal without permission of the Coal Authority.

16.4 Mitigation and Enhancement

Responses to the consultation identify that the development will not affect communications. Correct site practices and further consultation with Transco and the HSE should ensure that the development can be implemented safely.

Construction
During the construction phase of the development, the relevant statutory requirements would be adhered to. All potentially hazardous areas such as the gas pipeline, excavations and electrical installation works would be fenced off and all unattended machinery would be stored in the site compound or immobilised to prevent unauthorised use.

After completion of construction works and commissioning of the wind farm, the wind turbines and roads will be openly accessible to visitors subject to rights of access to the land.

Operation

Wind farms have a proven track record for safety. The minimum desirable distance between wind turbines and occupied buildings calculated on the basis of expected noise levels and visual impact will always be greater than that necessary to meet safety requirements. The build up of ice on turbine blades is also unlikely to present problems on the majority of sites[15].

The operation of the Wind Farm would comply with relevant health and safety regulations. Appropriate warning signs would be installed concerning restricted areas such as transformers, switchgear and metering systems which would be fenced.

Table 16.2 Mitigation Incorporated into the Proposed Development

Impact	Mitigation Incorporated into the Proposed Development	Impact wholly or Substantially Mitigated?
Turbine bases close to gas pipeline	Base foundations sited outside of the 12 m easement. No temporary buildings or equipment allowed within easement.	Yes

16.5 Evaluation of Effects

The proposed Wind Farm has been designed to take account of almost all infrastructural, telecommunications, television, aviation and safety constraints. There is only one outstanding issue relating to the impacts of the proposed Wind Farm, which is its potential impact on future development of telecommunications infrastructure.

16.6 Summary and Conclusion

In accordance with planning policy guidance a range of consultees have been informed about the development proposal. All of those who have replied foresee no problems with the proposal, it should not interfere with communication transmissions nor with television reception. Providing appropriate advice is taken with the relevant bodies prior to the commencement of construction the development should not interfere with the gas pipeline and it will be possible to undertake the appropriate engineering measures to erect the turbines close to former coal addits.

[15] Technical Advice Note (TAN) 8 Renewable Energy -1996 paragraph A21

17. Summary of Predicted Effects

The EIA regulations state that significant effects should be identified and evaluated. In this ES these are classed as effects of major significance. In the preceding sections effects of minor and no significance have also been identified in order that consultees and decision-makers are provided with a full picture of the environmental implications of the proposed development.

Summaries of the predicted significant effects, both adverse and beneficial are tabulated below, further discussion is contained within the relevant sections.

17.1 Significant Adverse Effects

Following the incorporation of mitigation highlighted in the preceding technical sections, it is predicted that the following significant adverse effects would result from the construction and operation of the proposed development. These relate to impacts on public rights of way, visual and landscape effects and are summarised in Tables 17.1 to 17.7.

Table 17.1 Significant Direct Effects on Public Rights of Way During Construction

PROW reference (see figure 10.1)	Length of PROW impacted (crossing open ground)	Type of Effect	PROW Importance or Sensitivity	Magnitude of Direct Effect	Significance	
					Level	Rationale
6/6A St Illtyd's Walk/Celtic Way	1.8 km (1.8 km)	Adverse	National	Medium	Major	Important PROW and publicised long distance route crossing heart of the site hence potential for disruption

Table 17.2 Significant Indirect Impacts on PROW during Construction

PROW reference (see figure 10.1)	Length of PROW impacted (crossing open ground)	Type of Effect	PROW Importance or Sensitivity	Magnitude of Direct Effect	Significance	
					Level	Rationale
St Illtyd's Walk/Celtic Way 6/6A	3.5 km (2.6 km)	Adverse	National	Medium	Major	Although construction activities only visible and audible for a proportion of path they will be dominant experience for that section of a long distance footpath
Bridleway 6	3.4 km (1.9 km)	Adverse	Local	Major	Major	Construction activities will dominate open section

Table 17.3 Significant Indirect effects on PROW during Operation

PROW reference (see figure 10.1)	Length of PROW Impacted (crossing open ground)	Type of Effect	PROW Importance or Sensitivity	Magnitude of Direct Effect	Significance	
					Level	Rationale
St Illtyd's Walk/Celtic Way 6/6A	3.5 km (2.6 km)	Adverse	National	High	Major	Close proximity and no mitigating factors ensure that wind farm will dominate relevant section of long distance footpath
Bridleway 6	3.4 km (1.9 km)	Adverse	Local	High	Major	Turbines will be dominant element in northern section across site
Public Footpaths 33/35/14	3.2 km (3.2 km)	Adverse	Local	High	Major	The turbines and blades will be dominant features for walkers heading in SE direction

Table 17.4 Significant Effects on Landscape Resources: Construction

Identified Activity	Landscape Resource Impacted	Type of Effect	Sensitivity of Resource	Magnitude of Direct Effect	Significance	
					Level	Rationale
Cranes	Landscape characteristics	Adverse	High	High	Major	Introduces a new moving large - scale element into the landscape that is out of proportion with other elements. However tall structures such as radio masts are not uncommon within surrounding landscape
Construction of internal site access roads	Landscape characteristics	Adverse	High	Medium	Major	Loss of acid grassland/raised blanket bog would be localised but undermine the visual harmony of the site by partitioning it into separate parcels..
Material Stockpiles	Landscape characteristics	Adverse	High	Medium	Major	Introduction of numerous alien elements into landscape characterised by its simplicity, unity and openness temporarily undermining these valued characteristics and introducing new, unnatural patterns and combinations of elements

Table 17.5 Significant Effects on Landscape Resources: Operational

Activity	Landscape Resource Impacted	Type of Effect	Sensitivity	Magnitude of Impacts	Significance	
					Level	Rationale
Operation of turbines	Landscape Characteristics	Neutral	High	High	Major	The 16 turbines will be the tallest elements within the landscape introducing a regular, mechanised type of movement into the landscape. This combination of elements and movement undermines existing tranquillity
	Landscape character	Neutral	Medium	High	Major	The effects upon the landscape character area will be both adverse and beneficial. However they will not undermine the prime constituents of this character. Turbines emphasise the elevation and openness of the landscape but demonstrate that it is essentially man-made. Patterns of movement, light, shade and colour will be accommodated within this robust character type.

Table 17.6 Significant Visual Effects: Construction

Visual Receptor Viewpoints and Routes	Distance Between Wind Farm and Receptor Viewpoint	Type of Effect	Receptor Sensitivity	Magnitude of Effect	Significance	
					Level	Rationale
Public Rights of Way						
Coed Morgannwg Way	Close	Adverse	High	High	Major	Very close views of access road, limited views of construction from some sections
St Illtyd's Walk	Close	Adverse	High	High	Major	Very close clear views from northern edge of site
Celtic Trail / High Level Route 47	Close	Adverse	High	High	Major	Very close clear views from northern edge of site
Residential communities						
Croeserw	Middle	Adverse	High	High	Major	Views of construction activities screened by topography and coniferous plantations on mountaintops. But possible views of crane movements elevated above plantations producing a stark visual contrast
Proposed Afan Valley Holiday Park	Middle	Adverse	High	Medium	Major	At time of writing no information available about development period of holiday park proposal. It is not expected to be built or occupied during construction period.

Table 17.7 Significant Visual Effects: Operation

Visual Receptor Viewpoints and Routes	Distance Between Wind Farm and Receptor	Type of Effect	Receptor Sensitivity	Magnitude of Effect	Significance	
					Level	Rationale
Coed Morgannwg Way	Close	Adverse	High	High	Major	Very close views of access road. glimpsed views of turbines through forest plantation with full view on a number of turbines at junction of St Illtyd's Walk and Cefn Ffordd
St Illtyd's Walk	Close	Adverse	High	High	Major	Very close, full views of the wind farm from northern end of site See Figure 9.7a
Sarn Helen	Middle / Long	Adverse	High	High	Major	Turbines would be a dominant feature of the on the skyline and blade rotation would visible from sections nearer the site. From distant sections of Sarn Helen visibility would greatly be affected by clarity of atmospheric conditions. See Figures 9.6b and 9.9a-c
Celtic Trail / High Level Route 47	Close	Adverse	High	High	Major	Very close, full views of the wind farm from northern end of site
Bridleway and Byway on Foel Trawsnant	Middle	Adverse	High	High	Major	Prominent views of turbine towers and blades from both PROWs.
Footpath on Werfa	Long	Adverse	High	High	Major	Long distant views of wind farm on the skyline affected by atmospheric conditions.

Table 17.7 (continued) Significant Visual Effects: Operation

Visual Receptor Viewpoints and Routes	Distance Between Wind Farm and Receptor	Type of Effect	Receptor Sensitivity	Magnitude of Effect	Significance	
					Level	Rationale
Residential communities						
Abercregan	Close / Middle	Adverse	High	High	Major	Intervening plantations and topography combined with orientation of properties limits visibility and number of turbines. Blades and top sections of towers will be clearly visible.
Cymmer	Middle	Adverse	High	High	Major	Intervening topography and forestry plantations limits the number and height of turbines seen. Turbines will be a major feature of views due to distance from site. See Figure 9.7c
Croeserw	Middle	Adverse	High	High	Major	High numbers of turbine towers and blades clearly visible on skyline. See Figure 9.11a-c
Proposed Afan Valley Holiday Park	Middle	Adverse	High	Medium	Major	Glimpsed view of turbines through forestry plantation. Visibility of wind farm / turbines also dependant on amount of forest removed / retained. See Figure 9.12a-c. (Visibility shown at present time with no tree removal)
Properties on eastern edge of Cilfrew	Middle / Long	Adverse	High	High	Major	Visibility of a large proportion of the wind farm on the skyline. Visibility restricted by orientation of some properties and tall vegetation along the roadside obscures some views. See Figure 9.13a-c

17.2 Cumulative Effects

Cumulative effects of the development that have been identified relate to landscape and visual impacts associated with the presence of the Ffynnon Oer wind farm in association with other existing wind farms and those currently submitted for planning consent. No significant effects have been identified.

17.3 Significant Positive Effects

In addition to the identification of significant adverse effects it is anticipated that the following significant positive effect will occur.

Table 17.8 Significant Positive Effects: Operation

Socio-Economic Effect	Type of Effect	Probability of Effect Occurring	Policy Importance or Sensitivity	Magnitude of Effect	Significance	
					Level	Rationale
Establishment of Community Fund and possible community purchase of one turbine using European Funds	Positive	Likely	Local	High	Major	A regular substantial income for community groups if funding is provided to purchase one turbine

18. Conclusion

The development of a 16 turbine wind farm at Ffynnon Oer will contribute to both the Welsh Assembly's and the UK Government's target of 10% renewable energy generation by 2010. Thereby it will assist in reducing the amount of greenhouse gases emitted into the atmosphere which are widely acknowledged as being the main contributors to global warming.

The construction of the turbines will impact upon some of the individual elements which make up the environmental capital of the proposed development site. Surveys have been undertaken using methodologies agreed by relevant statutory bodies and consultees. An analysis of survey results demonstrates that significant adverse effects will be caused to the certain landscape resources and visual receptors along with temporary disruption to users of public rights of way during construction and operation. No other significant adverse effects have been identified nor are any of the cumulative effects considered to be major. It is anticipated that the development could make a major annual financial contribution to the local communities which surround the site.

Appendix A
Review of Regional and Local Planning Policy

10 Pages

Entec

Southwest Wales Strategic Planning Group. Regional Planning Guidance. April 2000

The Southwest Wales Regional Planning Guidance (RPG) was prepared by the Southwest Wales Strategic Planning Group. This group is comprised from representatives of the following authorities; Carmarthenshire County Council, Neath Port Talbot County Borough Council; Pembrokeshire County Council, the City and County of Swansea Council; and the Brecon Beacons and Pembrokeshire Coast National Park Authorities. The guidance contained within the RPG is intended to provide a regional framework for the preparation of Unitary Development Plans within Southwest Wales.

The issue of energy generation is considered within the RPG which highlights that Southwest Wales is a net importer of energy. With specific consideration of Wind Power the RPG acknowledges that areas of extensive coastal and upland areas are suitable for wind turbines due to the levels of wind speeds. The RPG also indicates that much of this potential is constrained as a result of specific designations e.g. National Parks, Areas of Outstanding Natural Beauty, or other sensitive areas such as unspoiled landscape or upland moors. In light of this the RPG in its recommendations on renewable energy indicates that, at 4.58, it will;

"Support the development of suitable renewable and sustainable energy projects at appropriate locations within the area."

West Glamorgan Structure Plan 1996

The approved West Glamorgan Structure Plan contains a number of policies relevant to the determination of the proposed wind farm at Ffynonn Oer. It has policies specific to renewable energy developments which are outlined below:

EQ1. *The County Council will seek to secure progress towards sustainable development and to ensure maintenance of biodiveristy. Accordingly, encouragement will be given to development proposals in appropriate locations that:*

i. *Reduce the consumption of energy and non-renewable resources,*

ii. *Make effective use of renewable resources or waste procedures.*

EQ2: *Proposals for the development of renewable sources of energy will be encouraged, particularly where there are benefits to the local economy, and will be permitted provided that the proposed development:*

i. Would not adversely effect the special character of the Gower AONB, the Brecon Beacons National Park or any other statutorily designated area or site of nature conservation or heritage conservation interest or heritage coasts; and

ii. Would not cause demonstrable harm to:

- *Other areas of special landscape value or sites of special nature conservation or heritage interest to be defined in local plans; or*
- *Areas or facilities of special importance for tourism and recreation; or*
- *The amenity of nearby dwellings or residential areas; and*

iii. Would not dominate any particular prominent skyline or maritime vista to be defined in local plans; and

iv. *If intervisible with existing renewable energy developments, would not result in an unacceptable level of visual impact; and*

v. *Is justified, where necessary, in terms of national energy policies or local and regional energy requirements; and*

vi. *Is accompanied by adequate information to indicate the extent of the possible environmental effects and how they can be satisfactorily contained.*

Policy C5 - Development in the open countryside:

In the open countryside development will not be permitted except where:

i. *It is essential for the rural economy or rural employment; or*

ii. *It can be demonstrated to meet the overriding social or economic needs of the local community; or*

v. *It is essential for communications, telecommunications and other forms of utility service provision, renewable energy generation or minerals extraction.*

vii. *The land is of poor agricultural, conservation or ecological value and the development does not adversely affect the viability of an established farm unit.*

Upper Afan Valley District Plan 1982

The Upper Afan Valley District Plan was prepared jointly by Afan Borough Council and West Glamorgan County Council and adopted in 1982. The preparation of the plan was directed towards producing policies and proposals which are broadly aimed at solving the problems and satisfying the needs of the communities within the Upper Afan Valley. The content of the plan adopts a proactive approach to development within identified areas without including restraint policies for the open countryside. This the only formally adopted plan for this area.

Within the plan there are no allocations or designations specifically relevant to the Ffynnon Oer wind farm site. There are also no policies relevant to renewable energy sources or development.

Cwmafan, Bryn, Goytre Valley and Rural Margam Local Plan

The Cwmafan, Bryn, Goytre Valley and Rural Margam Local Plan was prepared by Port Talbot Borough Council and adopted in July 1990. The plan provides coverage between the urban area of Port Talbot to the south and upper Afan Valley in the North.

The objectives of the plan are to encourage the economic and social development, identify suitable sites for the areas development needs, conserve and enhance the environment, encourage a high standard of design and to resist development that would have a significant adverse effect upon amenities. There are no policies relevant to the development of renewable energy generation.

Port Talbot Local Plan - Approved for Development Control Purposes

The Port Talbot Local Plan was prepared by Port Talbot Borough Council to cover the period 1996-2006. In light of the future need to prepare Unitary Development Plans Port Talbot Borough Council did not continue with the preparation of the plan beyond the draft deposit

stage. As such this plan has not be formally adopted. The content of the plan was however approved for development control purposes and as such its content is materially relevant to development proposals within the Port Talbot area.

Policies considered relevant to the determination of the application for the development of a wind farm are indicated below:

E13 - *Low quality agricultural land will be protected where it supports a great diversity of wildlife and as such is of significant conservation value.*

Part of the proposed wind farm at Ffynonn Oer is within an area identified as being of Special Landscape Character within the Port Talbot Local Plan. Although the plan has not been formally adopted this designation is a material consideration.

E18 - *it is the policy of the Council that those areas listed below as designated landscape protection areas planning consent for development will only be granted where it can be clearly demonstrated that there is no detrimental effect on the environment ecology and landscape of the area but rather seeks to enhance those qualities.*

a) Afan Forest Park and its environs including the upland areas around Aber / Blaengwynfi and Glyncorrwg;

b) Margam Park environs including the Goytre and Cwmwernderi Valley;

c) *the immediate upland areas overlooking Port Talbot, Baglan and Cwmafan.*

E27 - Renewable Energy

It is the policy of the Council that in considering any application for renewable energy installations, the following criteria will be applied to the assessment:

a) land-use and landscape issues:

- *the siting and design of the proposal in relation to the nature, character and scale of the areas landscape;*
- *the visual effect, including the case of wind-turbines arising from shadow flicker and reflected light on the landscape both over the long and short distances;*
- *the likely cumulative effects on the landscape of the area and on nearby communities taking account of other existing and proposed developments in this area;*
- *the extent of damage to or interference with or improvement to and enhancement of other existing or proposed land uses or amenities;*
- *the existing nature and condition of the proposed site and the extent and nature of any improvements that will result from the operations.*

b) Amenity

- *The acceptability of the impact upon neighbouring communities of the operations, structures and associated works, particularly that relating to the level of noise arising from the proposal;*

- *The consequences of the level and duration of traffic movements likely to be generated by the proposal during the construction, operation and decommissioning;*
- *The extent of electromagnetic interference with established and proposed telecommunications facilities.*

c) Conservation

- *The effect on the nature conservation interests of the site and adjoining areas, both over long and short distances, paying particular regard to areas designated for nature conservation purposes;*
- *The effects on agricultural and fishery interests;*
- *The effects on sites of archaeological interest;*
- *The impact on the quality and quantity of water resources.*

d) Other considerations

- *The contribution that the proposal is likely to make to national and regional energy requirements including where appropriate consideration of alternative sources of supply and alternative technologies.*
- *The contribution the proposal will make to meeting national targets for reducing pollution and emissions,*
- *The duration of the operations, restoration and aftercare works,*
- *The economic contribution of the proposal including the employment opportunities likely to be created.*

Borough of Neath Local Plan

The Borough of Neath Local Plan was adopted in 1994. In general it has a number of policies which serve to protect sensitive environments from inappropriate development.

With regard to site specific issues the Local Plan identifies the existence of Scheduled Ancient Monuments. Policy E64 Archaeology states that:

> *Developments which would have a detrimental effect on scheduled ancient monuments or their settings will not be permitted.*
>
> *Where appropriate, an archaeological investigation will be required in order to assist the consideration of a planning application.*
>
> *Where development is permitted, the Borough Council will, where appropriate, seek to ensure that the design pays due regard to the archaeological feature, and that it is recorded prior to development taking place.*

The Ffynnon Oer site is within an area of Open Countryside. Within the plan there is a general presumption against development within the open countryside unless, as indicated in policy E55 it is:

- *Essential to the rural economy;*
- *Provide an acceptable use and adaptation of an existing building; or*
- *Are essential for communitcations; or*
- *Are acceptable in terms of a policy for in the development plan.*

The plan does include a policy for development which is necessary within the open countryside which includes mitigation features. Policy E56 indicates that development should be located and designed in a manner which:

- *Minimises the effect on the landscape, ecology and archaeology of the area;*
- *Ensures that new buildings structures and engineering works are of a design, scale and materials appropriate to the locality;*
- *Includes a landscaping scheme using suitable indigenous plants;*
- *Minimises any loss of efficiency of agricultural or forestry units.*

Part of the Ffynnon Oer site has been subject to landslip and past mining activity. Policy E76 - unstable land is considered appropriate:

> *Where development is proposed on land which is likely to be unstable or potentially unstable, the applicant should demonstrate that the land is stable or that any potential instability can be reasonably overcome.*

Neath Port Talbot Unitary Development Plan - Pre Deposit Consultation 2000.

In response to the Local Government (Wales) Act 1994, local authorities are required to prepare Unitary Development Plans to replace the existing Structure, Local and District Plans. It is anticipated that the Neath Port Talbot UDP will be placed on deposit in Autumn 2002. The emphasis of the plan which will cover the period until 2014 is to move towards more sustainable forms of development by focusing new development within the main settlements of Neath, Port Talbot and Pontardawe. Promote integrated transport, support existing communities, encourage new forms of energy production and defend the countryside against unnecessary and inappropriate development.

Within the consultation draft a proposed policy for renewable energy is included.

> *"the development of renewable sources of energy will be favourably considered provided they would not create unacceptable adverse impact (re policy 1)."*

The consultation draft indicates that the area already contributes significantly to national energy needs through coal extraction. The County Borough Council will place considerable weight on ensuring that any proposals do not create unacceptable impacts upon communities and the landscape or wildlife.

Brecon Beacons National Park Local Plan

The Brecon Beacons National Park Local Plan was adopted in 1999 and covers the period 1996-2006. At present the National Park Authority is preparing the Unitary Development Plan currently on deposit. The policy context of the BBLP has been included since the designation

arises from the national importance of its natural beauty, one of the statutory basis of the National Park is to

- *Conserve and enhance the natural beauty, wildlife and cultural heritage of the park.* (Environment Act 1995 S.61)

In light of this careful control needs to exercised over development which would be conspicuous from within the Park. The NPA is consulted by neighbouring authorities on applications likely to affect the Park, in responding, the NPA will try to ensure that the integrity of the Park is not compromised, the visual amenity of the residents and visitors are not spoilt.

With regard to energy generation the local plan identifies that there is a pressure to develop wind farms and hydro-electric schemes in areas with similar topography to the Park. Although the concept of renewable energy sources is supported their development is not considered appropriate within the National Park. As such Policy PU3 is of interest:

> *"a proposal for any form of power generation, which is not considered a major development, but whose main purpose is to supply electricity to the national grid, will only be permitted where it can be demonstrated that the proposal, including all ancillary developments, will conform to other policies in the Local Plan and will not cause unacceptable harm to:*
>
> - *The qualities or which the NP was designated, including its visual appearance, wildlife, habitats, archaeology, historic landscapes and qualities of remoteness;*
> - *The enjoyment by the public of the Parks special qualities;*
> - *The amenity of residents.*

Emerging Brecon Beacons Unitary Development Plan

Within the consultation draft version of the UDP (March 2002) reference is made to the development of renewable energy developments which reflects that of the existing local plan. The emphasis of the consultation UDP is upon support for the concept but recognition that major development within the National Park would not be appropriate.

Ogwr Borough Local Plan

The Ogwr Local Plan was adopted in 1995 and covers the period 1991-2006. The aims of the Ogwr Local Plan are to accommodate population growth within undue harm to the rural and urban environments, meet the Boroughs Housing Needs, make provision for employment, satisfy vehicular and pedestrian movement, develop the Boroughs role in retailing and leisure, balance the need for development with the need to maintain the quality of the environment and make optimum use of the scare resources of finance and land.

The following policies are of relevance to the proposal:

Policy U5 Renewable Energy

> *Proposals for renewable energy facilities and ancillary structures will be permitted where the development complies with all of the following criteria:*

- *The development does not adversely affect not (sic) visually impinge upon the following areas:*
- *The Glamorgan Heritage Coast;*
- *The Kenfig National Nature Reserve.*
- *The development would not adversely affect, nor visually detract from, the amenity of a conservation area or a listed building;*
- *The development would be sympathetically assimilated into the environment in terms of its siting, scale, design, landscaping, and noise nuisance; and*
- *The development would be safely accessed from the public highway network to permit regular maintenance without detriment to either on-or-off site landscape features or local amenity.*

That part of Bridgend closest to the proposed wind farm is designated as Strategic Coalfield Plateau. Policy EV8 seeks to restrict development that would adversely affect, or visually impinge upon the strategic coalfield plateau the associated valley sides or its setting.

Emerging Bridgend Unitary Development Plan

The emerging Bridgend UDP which is currently at the Deposit stage will replace the current Ogwr Local Plan. Although not adopted there are a number of policies relevant and of interest to the proposed wind farm.

Policy U2 - Exploiting renewable energy sources in principle

Development for the exploitation of renewable energy sources and associated facilities which will:

- *Adversely affect acknowledged environmental interests or visually impinge upon the natural beauty of the Glamorgan Coast, the Kenfig Candidate Special Area of Conservation, or any designated historic landscape, park and garden, and their settings;*
- *Adversely affect any SSSI;*
- *Adversely affect, or visually impinge upon any conservation area, ancient monument or listed building and/or their settings; or*
- *Have an unacceptable 'cumulative' physical, environmental and/or visual impact on 'special landscape areas' and the sub-regional or local landscape or seascape;*

Will not be permitted.

Policy U3 which provides detailed considerations to be assessed in exploiting energy sources is also of significance.

Detailed proposals for the exploitation of renewable energy sources and their associated facilities which do not conflict with policy U2, will be favoured provided that:

- Their impact on the local environment (including biodiversity) can be reduced and/or mitigated to acceptable levels;
- *They will not visually impinge to an unacceptable degree upon any 'special landscape area', the coastal zone and its setting, or other local landscape of the County Borough;*
- *The availability of identified mineral resources or reserves will not be sterilised;*
- *Appropriate arrangements have been made for the satisfactory preservation and/or recording of features of local archaeological, architectural or historic interest;*
- *They will not detrimentally affect local amenity by reason of noise emission, visual dominance, shadow flicker, reflected light, the emission of smoke, fumes, harmful gases, dust, nor otherwise cause pollution to the local environment;*
- *They will not lead to electromagnetic disturbance to existing transmitting and receiving systems (which includes navigation and emergency services), thereby prejudicing public safety; and*
- *Proper provision has been made (if necessary, by the conclusion of appropriate planning obligations/agreements with the council), for the removal of all infrastructure from, and reinstatement of the site following termination of use.*

Mid Glamorgan Structure Plan

The replacement Structure Plan for Mid Glamorgan was adopted in 1999 and covers the period 1991-2006. The objectives of the structure plan are to conserve and enhance the environment, facilitate urban renewal, afford protection to major natural resources, encourage use of public transport and reducing the need to travel.

The Structure Plan includes a brief section on renewable energy indicating broadly areas technically suitable for wind power (i.e. wind speeds over 7.5 m/s). There are two policies of specific interest;

Policy U1 - Renewable Energy Policy - Other Renewable Energy Facilities.

> *The development of renewable energy facilities, including those for wind power, will not be permitted where such development would result in unacceptable levels of damage or disturbance to sites and their settings recognised as having national or international nature conservation, archaeological, architectural or historic importance.*

Policy U2

> *Proposals for the development of renewable energy facilities and associated development, including those for wind power, in areas other than those referred to in U1, will be permitted where:*
>
> - *The proposal can be located to reduce damage or disturbance to the environment to acceptable levels, particularly the level of visual intrusion likely to result from the proposal taking into account the cumulative effects arising from other existing and approved schemes in the area;*

- *Conflicts with surrounding land uses can be reduced to acceptable levels, particularly where the amenity of residential areas in the locality is likely to be affected adversely;*
- *Provisions for the reinstatement of the site when it ceases to operate are considered adequate;*
- *The availability of identified mineral resources or reserves is not sterilised.*

Rhondda Local Plan

The Rhondda Local Plan which includes waste policies was adopted in 1998 and covers the period 1991-2006. The general strategy of the local plan is to maintain a substantial valley community in Rhondda, maintain a net migration balance, develop land use planning policies which reflect the principle of sustainable development and balance the need for future employment needs of the locality and for the needs of industry and commerce. The local plan also has a specific policy for wind energy.

Policy PU10 Wind Energy

Proposals for wind turbines within Rhondda will be permitted where the development complies with the following criteria:

- *The development will not result in an unacceptable intrusion upon the intrinsic landscape quality of the area;*
- *Vehicular access for the construction of the turbines can be provided without danger to highway safety and without significant or permanent damage to the environment;*
- *The development will not have an unacceptable detrimental effect on any scheduled ancient monument, National Nature Reserve, SSSI or any other areas of recognised at a national, regional or local level as of nature conservation, scientific, archaeological interest, strategic landscape areas, or local landscape areas;*
- *The development will not unacceptably harm the amenities of neighbouring occupiers by virtue of its visual dominance, noise emission, shadow flicker or reflected light;*
- *Any proposals to minimise impact recommended in an environmental impact assessment have been included in the scheme.*

Cynon Valley Local Plan

The Draft Version of the Cynon Valley Local Plan with proposed responses to the inspectors report outlines its strategy of securing economic regeneration of the Cynon Valley by providing opportunities for new investment through the allocation of land and the control of new development, having regard to the protection and enhancement of the built and natural environment.

The Cynon Valley local plan has a broad generic policy relating to various forms of renewable energy generation. The Councils policy ENV25 was replaced in light of the Inspectors report to

Proposals for renewable energy schemes will be permitted where:

- *The cumulative effect of renewable energy schemes would not harm the landscape; and*
- *The proposal is accompanied by measures to reduce the impact of ancillary development, such as new roads, tracks, fencing buildings and grid connections.*