

Wind Farm Development Proposals Crockagarran County Tyrone



Environmental Impact Statement

Volume 1 Non-Technical Summary

Prepared by: -



WDR & RT TAGGART

Laganwood House, Newforge Lane, Malone Road, Belfast BT9 5NX

**Wind Farm Development Proposals
Crockagarran County Tyrone
A McCrory & W&H Alexander Civil Engineering Limited**

INTRODUCTION

WDR & RT Taggart has prepared this Environmental Impact Statement on behalf of our client, A McCrory & W&H Alexander Civil Engineering Limited, to accompany a Full Planning Application for the development of a wind farm on lands at Crockagarran, County Tyrone.

The Environmental Impact Assessment has been prepared in accordance with the 1999 Planning (Environmental Impact Assessment) Regulations (Northern Ireland), following consultation with the Department of Environment Planning Service and as required by Schedule 2 Part 3 (j) of the Regulations.

The Environmental Impact Statement supports a full planning application for a wind farm of 18 MW installed capacity, comprising 6 No. wind turbines and associated transformers, access tracks and gates, a sub-station, control room, meteorological mast, site signage and all ancillary works.

The purpose of the Environmental Impact Assessment is to: -

- Explain the need for the proposal and describe the physical characteristics, scale and design of the wind farm;
- Examine and present the existing environmental character of the application site and the area likely to be affected by the wind farm;
- Predict possible environmental impacts of the wind farm;
- Describe measures, which would be taken to avoid, offset or reduce adverse environmental impacts.

The full scope of the Statement was determined following initial consultation with statutory consultees and from previous experience of wind farm developments. The major issues that are addressed in this environmental statement are the implications of the siting of the turbines on: -

- The achievement of policy objectives (global, national and local).
- The visual impact on the landscape quality and landscape character.
- The flora and fauna of the site.
- The cultural heritage of the site and its surroundings.
- The local population in terms of noise, traffic generation, electromagnetic interference and employment.
- The local soils and water system.

The Environmental Impact Assessment and Report Statement have been completed and compiled with assistance from a number of specialist sub-consultants. The full team that has prepared the statement is as follows: -

- W & H Alexander Civil Engineering Limited
- WDR & RT Taggart
- Inis Environmental Services
- Envirocentre
- FR Mark and Associates
- Northern Archaeological Consultants
- QinetiQ.

POLICY CONTEXT

For the purposes of this Environmental Statement it is assumed that the planning application for the proposed wind farm at Crockagarran will be determined against the planning policy framework described in this section. Before Northern Ireland Legislation and Area Plan Policies are considered some insight into National Policies and the development of renewable policy is provided, as they are material considerations in the determination of the present planning application. Policies are examined at: -

- UN Global Policy Context
- European Policy Context
- United Kingdom Policy
- Northern Ireland Context

The local legislative and policy context are examined in greater detail, the Northern Ireland Review is made up of the following documents: -

- The NI Executive Programme for Government
- The Regional Development Strategy
- A Planning Strategy for Rural Northern Ireland (PSRNI)
- Planning Policy Statements 1, 2, 3, 6, 10 & 14
- The Omagh Area Plan 1987 - 2002
- DCAN 10

The above policy documents above contain a number of key tests informing the suitability of the development proposals. However, there is no concise guidance available that is tailored expressly towards wind farm development, therefore the main tests are comprised of a combination of the different policies balanced against the context of the site and the effects of the development.

PSRNI through PSU12 carries a presumption in favour of approval for wind farm developments. PSU12 remains the main consideration in any assessment of the proposals; as none of the following policies addresses wind farm development specifically they must be seen as supplementary to it.

The PPS1 test is that harm must be demonstrated for the application to be refused. This test is more general and wide ranging than that of PSU12 as it is not focused on a specific development type. The wording of paragraph 59 indicates that it is the Planning Service's role to demonstrate that harm would be caused.

The PPS1 test brings in other material considerations, specifically, the impact of the development on the landscape of its context and its effects on material assets, soils, water, air, noise, climate and human beings.

Planning policy is reasonably supportive of the proposal. It is a matter of the competent authority being satisfied that the environmental impacts on assets of material importance either are not sufficiently significant to justify refusal or can be mitigated to allow the consideration to balance in favour of the development. We are of the opinion that there is a presumption in favour of development and in principle we endorse the proposal and recommend its assessment against the environmental effects.

THE PROPOSED SITE

The proposed site lies in the jurisdiction of the District Council area of Omagh within County Tyrone. The site is located on Crockagarran Mountain within the upland regions of Mid Tyrone. The nearest nucleated settlements are Carrickmore 5 km north of the site, Pomeroy 6km north east, Sixmilecross 6km west of the site, Ballygawley 9km south, and Castlecaulfield 11km east.

A number of minor country roads run around the site (Gleneeny Road to the north and Whitebridge Road to the west of the site), these connect to the B46 road approximately 2km to the north. The B46 leads to the A5 to the west which connects Ballygawley to Strabane and then joins the A2 to Derry. The A5 travels in an easterly direction to join the A4 which links Ballygawley with the M1 motorway to Belfast.

The surrounding landscape is mainly agricultural land, with Altmore Forest to the east and a small hamlet of 9 houses to the west of the site. The site is not designated as an ASSI, SAC or Ramsar, nor is it involved in the Environmentally Sensitive Areas (ESA) or the Countryside Management Scheme (CMS) administered by the Department of Agriculture and Rural Development.

The site is comprised mostly of raised peat bog with a small area of drained peat bog that is now being used for agricultural use. The proposed site is within the catchment area of the Camawen River. The key hydrological features comprise three streams that drain from the study area; there are also a number of areas of standing water within the peat bog which tend to be located near areas of former peat cutting. These streams are all tributaries of the Altanagh River, which in turn is a tributary of the Camawen River.

The Soils Map for the area published on behalf of the Department of Agriculture indicates that the majority of the site is classified as peat. There are no noted areas of soils considered as high quality agricultural land within the site or its surrounds. The site is not considered to be the Best or Most Versatile Land.

The main habitats on the site comprises: -

- Improved Grassland
- Wet Modified Bog – once blanket bog but following peat cutting and drainage in past is much disturbed and dried out with a number of dry peat banks throughout and drains running through the habitat, some of the area is used for grazing.
- Blanket Bog – area affected by drying out as a result of adjacent drains and peat extraction & as a result ground conditions are firm. Natural drainage channel runs through the bog area.

The open moorland forms 1 farm holding, the ownership boundary encompasses the access route, the sub-station and the preliminary stretch of overhead exporting line. Legal agreements in relation to the proposal are in place with the landowner.

This site recorded eighteen species of bird during the breeding season. A winter bird survey on this site recorded five species of birds, all of which were recorded on the site and not flying over the site. Indications and signs of two other species were noted though these birds were not seen. The proposed turbine layout has been arranged to maintain a reasonable distance between any turbine and an area identified as being a possible Merlin habitat.

DESCRIPTION OF DEVELOPMENT

The wind farm proposal involves the construction of 6 wind turbines, together with internal access tracks to facilitate construction and servicing. Electricity generated will be fed into the Northern Ireland grid via a Sub Station and Control Building. A monitoring mast has already been erected on a temporary basis, however this application includes the provision of a permanent mast elsewhere on the site to replace the existing mast.

With 6 3.0MW machines, the combined site overall has a potential installed capacity of 18 MW. On the basis that the total capacity of wind energy that had been installed in Ireland (north and south) at the end of 2004 was 422.59MW¹ the proposal represents an additional 4% over the existing capacity.

One megawatt of wind electricity generates the following benefits² *per year*: -

- Power for 650 homes
- Displacement of 2,500 tonnes of Carbon Dioxide
- Displacement of 30 tonnes of Sulphur Dioxide
- Displacement of 10 tonnes of Nitrous Oxide
- Avoidance of 175 tonnes of slag and ash
- Avoidance of the need to import 650 tonnes of fossil fuel.

On this basis we have calculated that the Crockagarran Windfarm project will offer the following significant national benefits to Northern Ireland *per year*: -

- Power for almost 11,700 homes
- Displacement of 45,000 tonnes of Carbon Dioxide
- Displacement of 540 tonnes of Sulphur Dioxide
- Displacement of 180 tonnes of Nitrous Oxide
- Avoidance of 3,150 tonnes of slag and ash.
- Avoidance of the need to import almost 11,700 tonnes of fossil fuel.

The Turbines

The type of turbine proposed will have a rotor radius of maximum 90 metres, and will be mounted on a 80 metre maximum height tower. The likely installed capacity of 3.0 MW will place them among the most powerful onshore turbines available commercially.

Six wind turbines are proposed for the site. They comprise tube towers of 80m in height supporting a rotor hub consisting of a generator, gearbox, control system, hydraulics etc... which shall be driven by three 45 m blades. The turbines are to be set out in a line of 4 turbines stretching across the southern boundary of the site with two turbines in a line parallel to and north of that line, one due north of turbine 2 and one of turbine 3. The turbines will be spaced at distances varying from 360 to 400m.

The turbines are accessed from the Gleneeny Road to the north of the site from which there is an existing track that travels in a south westerly direction into the site before spurring off to the east towards proposed turbine 1. From the end of the existing track a new track is proposed which provides access to turbine 1 and then travels to the east, north and east respectively to provide access to the permanent met mast, turbine 6 and turbine 5. From the met mast the proposed new access track changes

¹ Irish Wind Energy Association

² Information Sourced from Renewable Energy Information Office Ireland

Wind Farm Development Proposals

Crockagarran County Tyrone

A McCrory & W&H Alexander Civil Engineering Limited

to a proposed floating track which travels in a south easterly line to provide access to turbines 2, 3 and 4. A new access is created off the Gleneeny road which provides direct access to the switch house and car park to the north of the site.

Construction Phase

The potential sequence of construction work activities is likely to be as follows: -

- Upgrade as necessary any existing site tracks;
- Construct new access tracks within the site;
- Construct the temporary site compound and offices;
- Commence construction of the Control Building and Substation Compound;
- Excavate the wind turbine foundations, and construct the turbine bases and transformer bases;
- Carry out necessary and agreed public road improvements;
- Construct crane hardstandings;
- Excavate cable trenches and lay the power and instrumentation cables;
- Construct site entrance modifications;
- Carry out necessary modifications to public roads to enable wind turbine component deliveries;
- Erect and commission the wind turbines;
- Erect the meteorological monitoring mast;
- Carry out all reinstatement works; remove temporary accommodation compound, and clear the site.

The installation of the grid connection will be the responsibility of NIE.

Decommissioning of the Wind Farm

The wind farm is presently envisaged to have an operational life of about 25 years. At that time it will be necessary to decide whether to refurbish, replace or remove the turbines.

If the site is to be decommissioned, the turbines and towers will be removed from the site in their entirety; the upper sections of the foundations projecting above ground will be removed, and the remainder of the foundations covered by peat/topsoil and left to re-vegetate naturally. All transformers, sub-station equipment, Control Buildings, compounds and meteorological masts will be removed from site. Underground cables will be cut back at the turbine/transformer terminations and left buried in the already vegetated peat. Tracks will be left for use by the landowner.

ASSESSMENT OF ALTERNATIVES

Alternative Sources of Energy

Alternative sources of energy include Nuclear Power and Fossil Fuels. The main renewable energy sources are considered to include Wind, Solar, Geothermal Energy, Biomass, Hydro and Wave / Tidal.

Benefits of Wind Energy include: -

- Significant energy generating potential (The proposed wind farm at Crockagarran will supply 11,700 Homes³).
- Low environmental impact.
- Harnessing renewable energy helps diversify energy supplies.
- Less pressure on existing energy supplies.
- Contributes to targets for greenhouse gas emission reductions.
- Helps reduce the serious threat of climate change by reducing Carbon Dioxide emissions.
- Wind is a clean source of electrical energy.
- Proposal helps to meet targets set by Kyoto Protocol UK.
- Contributes to Irish Wind Energy Association's and British Wind Energy Association's targets.
- Contribution to local economy through employment and use of local materials and plant.
- Modern well-sited wind farms can generate electricity, which is cheaper than nuclear power and comparable in cost with fossil fuel sources of electricity.
- Wind is a source of power that is inexhaustible; therefore it is a secure and stable energy supply for the long term.
- Proposal will displace 45,000 tonnes of carbon dioxide per year⁴.
- Reduces emissions of acid rain gases.
- Does not generate any long-lasting noxious wastes.
- Reduces dependence on imported or expensive fuel sources and depletion of fossil fuel reserves
- Investment and employment in indigenous renewable projects often takes place in rural and underdeveloped areas, thereby contributing to their local economies.

Site Selection Process

The considerations which were assessed in order to select Crockagarran as a possible wind farm site are described below.

³ Renewable Energy Information Office

⁴ Ibid

**Wind Farm Development Proposals
Crockagarran County Tyrone
A McCrory & W&H Alexander Civil Engineering Limited**

CRITERIA	DESCRIPTION	SITE SPECIFIC ISSUES
A wind resource	This is a vital characteristic of any site. In Ireland an inland site will generally need to be about 250m (800 feet) ASL. Obstructions such as nearby trees, higher hills in the direction of the prevailing winds etc, which can adversely affect the wind on a site and therefore energy production.	The wind resource at Crockagarran was found to be above average and commercially viable. An application for an Anemometer (Wind Measuring) Mast was approved on 27 th October 2004.
Proximity to dwellings	In general, wind turbines are not situated in close proximity to dwellings.	The most proximate residential properties are located to the north and west of the site approximately 520m from the nearest proposed wind turbine.
Land area	Modern wind turbines must be spaced large distances apart. They need to be positioned so that distances between them are around 5-10 rotor diameters apart in order to maximise the energy output from the turbine. A good rule of thumb is that every 20 acres could accommodate one turbine. This can vary according to turbine size and site characteristics.	The total area of the proposed wind farm site is approximately 89 hectares, which is technically large enough to accommodate the proposed scheme.
An economically priced grid connection	The wind farm will need to export the power to the national grid. Generally, a grid connection will be via an overhead line to the nearest sub-station. If this distance were long, then the cost of constructing the grid connection would make the project unworkable. Also, the sub-station may not be able to take the full capacity of the wind farm. In that case, either a scaled down project would proceed or an alternative connection point to the grid would be used. This may be further away and therefore more costly. (The grid connection is also subject to a separate planning application from the wind farm).	Consultation has been instigated with NIE who have suggested a new line from the wind farm to Tullyaran Central 33/11kV substation to feed in to the Dungannon main.
Availability of access to a chosen area of land	Turbine components are large loads and therefore good site access is vital. If the road route to the site consists of physical features such as sharp bends, narrow roads or bridges then these may need to be upgraded in consultation with Planning Service and Roads Service.	A number of access points onto Crockagarran Mountain have been assessed. The most viable and best environmental option was to utilise where possible the existing access track on the site. The proposed access route is considered to be the most environmentally sound route, which will have a minimal impact.

**Wind Farm Development Proposals
Crockagarran County Tyrone
A McCrory & W&H Alexander Civil Engineering Limited**

CRITERIA	DESCRIPTION	SITE SPECIFIC ISSUES
Nature conservation, archaeological and land use designations	The Environmental Impact Assessment that has been carried out as part of this application has considered all of these aspects.	This environmental statement considers in detail the range of issues necessary to give a full appreciation of on-site environmental issues. The site is not located within a designated area.
Safety consideration	Including proximity of public roads	Crockagarran has been designed with safety concerns addressed through construction, operation and maintenance phases.
Electro-Magnetic Interference (EMI)	Avoidance of impeding or interfering with major electronic transmissions, and airport communication systems.	This EIS includes an assessment of EMI issues.
Likelihood of Planning Permission	This is the most important aspect of any development and can really only be assessed on a site-to-site basis.	It is considered that the potential impact of this proposed wind farm has been assessed against the need to protect and conserve the environment and therefore complies with the requirements of PSU12 of The Planning Strategy for Rural Northern Ireland.

Alternative Site Layouts Considered

The current layout subject of this application has been developed through an iterative process, which seeks to respect technical, environmental, commercial and planning concerns associated with this site. A number of alternative turbine options were assessed for the proposed development.

	Type of Turbine	Number of Turbines	Capacity (MW)
Layout 1	1.5 MW	16	24
Layout 2	1.3 MW	11	14.3
Layout 3	2 MW	8	16
Layout 4	3 MW	6	18

The initial layout looked at providing 3 parallel lines of 1.5 MW turbines running from northwest to south east across the site, this maximised the coverage of the site with 16 turbines. This layout was then amended to take into account ground conditions across the site leading to Layout Option 2 with 2 parallel rows of smaller turbines along the northern and southern ridges of the site.

Having reached a decision to proceed to full investigation on Crockagarran a number of detailed site specific surveys were undertaken to derive an optimal layout that respected environmental features and considered on-site constraints.

Wind Farm Development Proposals

Crockagarran County Tyrone

A McCrory & W&H Alexander Civil Engineering Limited

Following commencement of the EIA layout 3 was produced and an analysis was carried out based on the following variables:

1. Wind direction/resource,
2. Roughness,
3. Wake losses,
4. Distance from dwellings and roads,
5. Slope and other physical constraints – including forestry
6. Visuals
7. Impact Assessments.

Visual assessments suggested that less large turbines had less of or an equal effect as a larger number of smaller turbines.

The layout was finalised by taking into account the impact assessment conclusions and any mitigation measures which arose. The ornithological study highlighted the potential for Merlin to the north east of the site, in order to mitigate against any potential negative impact on the bird, turbines 5 and 6 were removed from the site.

The final layout proposes 6 3 MW turbines arranged in two parallel lines across the northern (turbines 5 and 6) and southern (turbines 1 to 4) ridges of the site with wide spacing. The turbines have been sited for optimum capture of the prevailing south westerly winds and present a balance in visual and landscape terms. The layout was micro-sited to avoid any area of deep peat, drainage ditches or any steep gradient.

Summary of Considerations

It is acknowledged that in practice every wind farm site has some impact on the locality. However, as a result of considering the above factors, it was considered that the Crockagarran wind farm site offered the following significant factors in its favour:

- Good wind resource;
- One Landowner
- Adequate distance to nearest habitations;
- Low ecological sensitivity
- Low archaeological sensitivity
- Stable ground conditions
- No existing or proposed designations
- Easy Access
- Low Ecological Sensitivity

In terms of the site layout options, it has been clearly illustrated that the layout evolution has gone through in-depth assessment and analysis.

ASSESSMENT OF ENVIRONMENTAL EFFECTS

The full scope of the Environmental Statement was determined following consultation with the relevant Planning Office and consideration of previous wind farm development projects as well as having regard to the regulations.

A scoping for the proposed wind farm development in accordance with Schedule 4 of the Regulations would suggest that the following areas must be fully addressed: -

- Ecology and Ornithology
- Soils, Geology, Hydrology and Hydrogeology
- Archaeology
- Electromagnetic Interference
- Shadow Flicker
- Noise
- Traffic
- Socio – Economic
- Climate and Air Quality
- Health and Safety
- Visual Impact/Landscape

FLORA AND FAUNA

Flora

The proposed development site does not lie within or adjacent to a site designated for nature conservation (i.e. ASSI, SAC, or SPA).

The following are the various habitats found within the proposed development site.

- Improved Grassland
- Wet Modified Bog
- Blanket Bog

Improved Grassland

Direct habitat loss will occur in areas where access roads and turbines are to be located in the area of improved grassland. As the habitat type is regarded as being of low ecological importance these impacts are deemed to be **imperceptible negative impacts**.

Wet Modified Bog

Direct habitat loss will occur in areas where turbines and associated infrastructure are to be placed. Secondary impacts on this area will include localized drying out of the habitat in the area around the turbine bases and close by the new roadways to be constructed. This impact is expected to be short term and the habitat is expected to re-wet itself soon after construction work has been completed. These impacts are considered to be **minor negative impacts**.

Blanket Bog

Direct habitat loss will occur in the areas where the turbines are to be located and the areas where the associated infrastructure including roads are to be placed. The construction of turbine foundations will involve the removal of surface vegetation and the extraction of peat and subsoil to a depth necessary to secure foundations. Similarly this would also be true of the areas where new access roads and associated infrastructure are to be constructed on the bog habitat. The introduction of hard core concrete to these areas may result in increased run-off. The area of blanket bog may suffer secondary impacts including hydrological impacts. Areas of habitat surrounding the turbine bases will suffer drying out and species composition may change depending on the extent of drying out. This impact is expected to be short term and over time the habitats will be expected to recharge with water as the drainage regime of the surrounding habitat should not be changed. The use of heavy machinery in the construction of the windfarm will cause compaction of peat in areas where the machines will be used, this may cause local changes in the peat and as a result species composition may be changed and it may facilitate peat erosion of the surface which in turn may cause sedimentation of watercourses. Considering that the habitat type has suffered drying out in the past it is not overly sensitive to hydrological change. As a result of the proposed work it is not foreseen that any species will be removed from the site and overall species diversity should remain at the current level. The construction of a windfarm at the site will cause habitat fragmentation of the bog habitat by the construction of access roads and the erection of turbines. It will cause some areas of habitat to become smaller. The habitat itself is of high local importance and the impacts will cause some changes in the ecological value of the habitat and therefore the impacts are considered to be **minor negative impacts**.

Wind Farm Development Proposals

Crockagarran County Tyrone

A McCrory & W&H Alexander Civil Engineering Limited

General Mitigation Measures

Construction

Habitat disturbance in areas of semi-natural habitat during construction work should be strictly confined to within the direct land-take of the proposed windfarm and associated infrastructure.

Mitigation of hydrological impacts

Settlement ponds will be used to prevent any siltation of watercourses in or surrounding the study area. Mitigation for impacts to watercourses will be dealt with in more detail in the water quality and hydrology section of the environmental assessment.

Mitigation of habitat fragmentation

Many of the impacts of habitat fragmentation/barrier effects are not practicably mitigatable. Continuation of a similar habitat type/structure onto the road embankments and mounding within the site may provide some mitigation, by reducing the effective barrier width.

Specific Mitigation

Excavated peat will be placed strategically around the site and allowed to re-vegetate naturally. It is expected that peatland species such as Ling Heather and Soft Rush would colonize these mounds in a relatively short period of time. It is important that peat from the surface layer (brown peat) be spread on the surface of these mounds and not the lower highly humified peat (black peat) as this will re-vegetate at a much quicker rate. During construction care should be taken when working in the more sensitive blanket bog habitats to ensure that compaction and habitat disturbance does not occur away from the footprint of the development. Construction staff should be aware of the sensitive nature of the bog habitat.

Residual Impacts

The proposed development should not have any significant negative residual ecological impacts on terrestrial habitats or flora of high conservation importance.

Fauna

Birds

This site recorded eighteen species during the breeding season. During the winter bird survey this site recorded five species of birds, all of which were recorded on the site and not flying over the site. Indications and signs of two other species were noted though these birds were not seen.

In conclusion the majority of this site is of low ecological importance as far as habitats are concerned – apart from the greater part of the blanket bog, the other habitats present have been modified. There is a high biomass/biodiversity of birds on this site and most are common and widespread species. This development does not pose any threat locally or nationally to any of these species. The ground nesters and site-specific species such as larks and pipits will be most likely to be affected but only temporarily during the construction phase. Adverse effects on these species would be at most of moderate significance regionally and in fact such adverse effects are more likely to be of low/negligible significance.

The fact that no merlin were present during the 2004 survey season is irrelevant as they may return at any time to a productive area such as this. This fact means that

Wind Farm Development Proposals

Crockagarran County Tyrone

A McCrory & W&H Alexander Civil Engineering Limited

turbines must be sited away from their core usage area, which has been identified as the northeastern edge of the site, proximal to and bounding Altmore forest. The two nesting sites identified in 1998 and 1999, and the plucking hummocks are within this core area. The developer's preliminary design had placed turbines within this core area. Following consultation with the developer all turbines were moved out of this area and a distance was insisted on between the core area and the closest turbine. To facilitate this the developer has used larger capacity turbines, than in the preliminary design, and therefore less turbines are needed on site to produce the same amount of electricity.

All turbines are now at a considerable distance from the core area and are placed on habitats that are unsuitable for merlin nesting. The foraging area for merlin is not reduced by this layout and there remain considerable tracts of unused blanket bog and modified bog for the merlin to forage on. A few immediate mitigation measures should be undertaken to protect breeding and overwintering birds from major disturbance if the proposed wind farm is approved.

Disturbance

(1) Disturbance in the form of cattle grazing and turbary use are outside the influence of the developer. No grazing took place on the merlin 'core area' pre 1999 and the disturbance and damage to this habitat as a result of grazing may be behind the fact that the merlin has not bred here this year. No mitigation can be proposed for this disturbance although it would be preferable if grazing within the merlin core area could be stopped.

The fence posts around the anemometer are being used as perches by corvids and birds of prey to predate small birds and their nests. This is causing undue disturbance to site specific species and should not be happening.

Mitigation

Black plastic bags should be placed on top of the fence posts to deter birds from perching on them.

(2) Temporary disturbance to the avifauna of the site would occur mainly during the construction phase. There may be some temporary impact on the local passerine populations from construction activities but this will be minimal and once construction is completed birds will use the site again in the same densities. A previous survey (INIS Environmental Services, 2002) by the author of this report on a wind farm post construction showed that densities of small birds using the site were back to pre construction densities in two years.

Mitigation

Prior to construction any ground nesting birds nesting areas will be identified. These areas will be marked out and avoided during the construction period.

(3) Post construction, there may be disturbance in the form of human activity (maintenance) human activity on the site would constitute no more than a few visits per year.

Mitigation

Human activity should be kept to a minimum at all times and people should restrict their movement to onsite roads. Access to the site should be restricted to the operators of the wind farm and local farmers.

Wind Farm Development Proposals

Crockagarran County Tyrone

A McCrory & W&H Alexander Civil Engineering Limited

Habitat Loss

(1) Loss of some habitat inevitably results from wind farm construction.

Mitigation

The habitat within the merlin core area must be retained. No movements of machinery or personnel should take place within this zone. This area needs to be marked off to prevent entry.

No turbines should be placed proximal to the identified breeding/foraging area of the Merlin. The habitats that the turbines have been positioned on are not suitable for breeding Merlin as Merlin nest on the ground amongst old heather and recently with increasing frequency in conifer plantations. Therefore the wind farm does not represent a habitat loss to their breeding habitat as the turbines have been placed on habitat where the vegetation is low. Where turbines have been placed on blanket bog these areas have been poached and grazed heavily.

Movements of construction machinery should be restricted to onsite roads to avoid unnecessary loss of habitat.

Turbines should be sited as close as possible to onsite tracks and roads to avoid excessive damage to breeding bird (ground nesting species) habitats.

Collision

Merlin

(1) At circ. 16 revolutions per minute, the blades present a low collision risk to birds on the proposed site. The available evidence that moving blades could cause mortality among merlin is very tenuous.

The prey chasing behaviour of the merlin involves quick chases over the heather. This chase may bring them into contact with the turbines. Also the fact that they display over the prospective nesting area might bring them into contact with the turbines. These aerial displays are however infrequent (Sharrock 87).

Mitigation

The turbines have been placed away from the identified breeding area and also from the area where birds have been active in the past i.e. plucking mounds.

Using solid tubular towers rather than the lattice design that was formerly used will mitigate against collision for all bird species. The lattice form turbines had guy wires, used for support, that accounted for many fatalities and also their structure enabled and attracted birds to roost. This in turn caused fatalities as the birds approached and left the roost.

With sensitive siting, design and timing of development, the effect that this proposed windfarm will have on the biodiversity of birds breeding and wintering at Crockagarran should be insignificant.

Mammals

Only three species of mammal were seen on the site. These were Pygmy shrew *Sorex minutus*, Field mouse *Apodemus sylvaticus* and Fox *Vulpes vulpes*. The fox was seen near the farm at the western edge of the proposed site and the shrews were seen and heard in Soft Rush (*Juncus effusus*) near the area where the cattle are

**Wind Farm Development Proposals
Crockagarran County Tyrone
A McCrory & W&H Alexander Civil Engineering Limited**

being fed (north of the site). The field mouse was seen as a male kestrel on the site killed it.

The tracks of badger were seen close to where the cattle are being fed also. There are no setts on the site and this area does not provide any foraging opportunities for badgers, as their main staple is earthworms, which are foraged at night on open grassland. Badgers tend to follow roads and small tracks foraging at night and will probably use this route over and over if they find foraging opportunities here.

Fox scats were recorded from five on-site tracks and it is felt that these mammals range over the entire site. They are most probably scavenging remains from the many plucking posts identified in the northeastern edge of the site near the coniferous forestry. Pygmy shrews were seen near where the cattle are being fed in areas of soft rush. Pygmy shrews are strictly protected in Northern Ireland in accordance with its listing in Appendix III of the Bern Convention. CEDRA records do not show any other records for mammals in this area but it is safe to assume that there are other species of mammal present both on and adjacent to the site.

Increased human activity and movement of machinery may interfere with badger activity around the site. However in most cases, this is a temporary consequence of the change in use of a site and it is felt that this proposed development does not pose a threat to badgers either locally or regionally.

The impacts on mammals from this type of development will be minimal.

Speed restriction on traffic on site after darkness

To prevent injury to any badgers during the operation of the site, it is recommended that vehicles on site after darkness should be restricted to a maximum of 20 mph during the hours of darkness (morning or night). This measure should be made known to all drivers and other staff and signs to this effect placed on site during the construction phase.

SOILS, GEOLOGY, HYDROLOGY AND HYDROGEOLOGY

The proposed windfarm development site (NGR IH 263000 367300) is located 6km north of the town of Ballygawley in Co Tyrone. The site is located on a plateau in high ground that rises slightly towards the east. It consists mainly of peat bog, although the south east of the site is former peat bog that has been drained for use as agricultural land. The surrounding landscape is mainly agricultural land, with Altmore Forest to the east and a small hamlet of 9 houses to the west of the site.

The site is not a Regionally Important Geological Site. Due to the fact that there are no widespread exposures on the site it does not (based on the information available and site walkover) appear to possess significant features of geological value (in either solid or drift geology).

The Soils Map for the area published on behalf of the Department of Agriculture for Northern Ireland indicates that the majority of the site is classified as peat; this extends past the southern boundary of the site. There are no noted areas of soils considered as high quality agricultural land within the site or its surrounds. The site is not considered to be Best or Most Versatile Land.

The site is comprised mostly of raised peat bog with a small area of drained peat bog that is now being used for agricultural use. The proposed site is within the catchment area of the Camawen River. The key hydrological features comprise three streams that drain from the study area, there are also a number of areas of standing water within the peat bog which tend to be located near areas of former peat cutting. These streams are all tributaries of the Altanagh River, which in turn is a tributary of the Camawen River

The study area is mostly peat bog, underlain by clay. The sandy clay acts as an impermeable barrier to downward migration of groundwater. Thus, the groundwater is likely to be relatively near the surface held within peat.

This assessment, based upon the desk study, consultation exercise, site walkover and interpretation of findings has drawn the following conclusions:

- The impact of the proposed windfarm on the local geology is negligible therefore no mitigation measures are needed.
- The development will result in the loss of land and the removal of soils. It would be considered good practice to re-use existing soils and peat immediately post-construction restoration works or on poorer areas of the existing site. Storage of material for reinstatement during decommissioning should be encouraged. During decommissioning turbine bases and tracks constructed shall be reinstated wherever practicable. Through the implementation of these mitigation measures the resultant residual impact will be negligible.
- Development in the area has the potential to increase the risk of contamination of surface and groundwater and/or dewatering, particularly during the construction phase. The adoption of best practice and the appropriate mitigation measures detailed will result in a residual impact of minor/negligible for hydrology/hydrogeology.

Should the nature of proposals change significantly this assessment should be reviewed.

ARCHAEOLOGY

There is no known archaeology within the proposed site area. A simple mitigation strategy has been devised for any actual physical impact on any hidden archaeology within the site (see below).

Archaeological Trenching

Prior to the beginning of site works, the licensed archaeologist should be allowed to carry out full mechanical archaeological trenching at the location of all the intrusive site works. In particular, the area or 'footprint' of the wind turbine bases should be completely excavated until either archaeological deposits or the surface of the subsoil/bedrock is reached. The same process should be carried out in relation to any other site works that will penetrate into the ground surface. This will include any access roads, or services, including telegraph poles/ power lines. This will ensure that any archaeological features or finds in the effected areas will be recovered. This should be carried out in a controlled manner using a digger with a toothless bucket under the direction the licensed archaeologist. If the results are negative, then the particular spot can be considered archeologically sterile and site works can be carried out to the required depth without further archaeological monitoring.

Trenching Technique

The archaeological trenching should be carried out using a digger with a smooth-edged bucket under the direction and supervision of the licensed archaeologist. A smooth-edged digger bucket leaves a clean surface. It is important to create a smooth and clean surface, as this greatly aids the archaeologist's ability to spot archaeological features or objects and, conversely, to quickly give the trenched parts of the site the archaeological 'all clear'. Any bulldozer or a digger with a toothed bucket would not be archaeologically acceptable, as they would leave a ragged surface on which archaeological features could not be easily seen.

Timing of Operations

Once a particular area has been trenched down to the subsoil surface and has been confirmed archaeologically sterile, that stretch will no longer need archaeological monitoring. The exact phasing of this work is flexible and either large or small areas can be dealt with at a time. This can be done continuously or in short phases, according to practicalities and the wishes of the developer. The thoroughness of the technique, rather than timing, is of most importance in terms of archaeology. However, time must be allowed for the possibility of the need for meticulous archaeological excavation of any archaeological material or sites uncovered.

Archaeological Manpower

In general, an archaeologist can only monitor one machine at a time during trenching and a separate archaeologist must be present in each area where trenching is being carried out at any given time.

Recording and Excavation

Any archaeological sites or features discovered during monitoring, trial trenching or otherwise must (if preservation in situ is not an option) be fully excavated, recorded and written up into a final report to publication standard. This work must all be carried out by a team of qualified archaeologists under the direction of the licensed archaeologist.

Wind Farm Development Proposals

Crockagarran County Tyrone

A McCrory & W&H Alexander Civil Engineering Limited

Preservation in Situ

Preservation in situ is always the preferred option. Preservation options may include the alteration of the location or design of structures within the development in order to prevent impact on any uncovered archaeological sites. In some cases, sites can, under strict guidelines and archaeological direction, be buried in order to preserve them for future generations to investigate. However, if an archaeological site is to be preserved intact within the development, the developer would have to satisfy the licensed archaeologist and the Environment and Heritage Service that the site would remain intact indefinitely. Preservation of an archaeological site within a development would permanently restrict future land use on the effected stretch of land.

Post-Excavation Work and Final Report

In addition to funding the fieldwork, the developer must also fund the writing up of the findings by the licensed archaeologist to a publication standard. Funding may also be required for specialist archaeological services, such as radiocarbon dating, conservation, osteoarchaeology etc., depending on the nature on any discoveries. These services are a basic requirement for the assessment of some types of evidence.

Appointing the Licensed Archaeologist

The archaeologist who is to carry out and direct the fieldwork should be appointed by the developer at least several weeks before preliminary site works are to commence. No archaeologist can carry out any of the fieldwork/ mitigation measures discussed above without obtaining an excavation licence. These licenses must be applied for to the Environment and Heritage Service, who may take a few weeks to process the application. This Archaeological Impact Report with its mitigation measures also serves as the 'written scheme of works' referred to on most planning documents if the scheme is agreed with the Environment and Heritage Service. If so, a copy can be enclosed with the licence application form by the appointed archaeologist. The developer must send written notification of their full agreement to the mitigation measures described above to the archaeological consultant and the planning section of the Environment and Heritage Service (Built Heritage/ Ancient Monuments) before the license can be issued. The archaeologist must remain within the scheme of works/mitigation measures discussed in the Archaeological Impact Statement. If circumstances require a major divergence from these measures, the archaeologist may have to consult with the Environment and Heritage Service. The EHS case officer will be notified of the director's intent to commence site works. The EHS case officer will be provided with the contact details of the nominated director in advance of any site works. The EHS case officer will be notified immediately of all discoveries that may affect the current programme of works. The EHS case officer will be updated on a regular basis on the progress of the site works.

ELECTROMAGNETIC INTERFERENCE

The proposed site was visited and a visual examination of the surrounding area was carried out from each corner and the highest points of the site. The visit took place on a partially cloudy day with visibility of at least 5 km. The area was isolated moorland with no buildings and 2 temporary masts within the site.

The surrounding area was surveyed for any electromagnetic activity. Apart from the usual broadcast band stations at VHF and UHF there was very little other activity. The levels from 380 to 420 MHz were barely discernable indicating that there were no nearby emergency services radio transmitters operating in this band.

Some of the houses to the west of the site had TV aerials pointing across the site and the turbine blades may well interrupt the signals and cause interference. Other adjacent houses had their TV aerials pointing in the opposite direction indicating that either direction would give acceptable signals.

Subject to the broadcast authorities, emergency services communications authorities, CAA and mobile phone companies having no objections, the conclusion is that the impact of EM Interference to this project is low.

The nearest buildings were at least 700 m from any of the proposed masts and apart from the cluster of houses and works at the north west end of the site there is unlikely to be any significant interference due to the turbine blades.

The impact of electromagnetic interference to this project is low because there are very few dwellings in an area likely to be affected and there is very little electromagnetic activity in the area surrounding the site.

SHADOW FLICKER

Wind turbines, as with trees or any other tall structure, can cast long shadows when the sun is low in the sky. A phenomenon known as shadow flicker, which could be considered a nuisance, even though the effect would be very short-lived, could occur under certain conditions. This is where the blades of a wind turbine cast a shadow over a window in a nearby house. The rotation of the blades might cause a shadow to be cast every second or two in the room whose window is affected. These shadows are not considered a nuisance outdoors any more than shadows from trees moving in the wind.

The shadow flicker effect lasts for just a short period and depends for its occurrence on the following factors: -

- The sun not being obscured and being at a low angle in the sky.
- The turbine being directly between the sun and the affected property.
- There being enough wind for the turbines to be in operation.

The frequency of occurrence and strength of the shadow flicker effect is dependent on seven basic parameters. The first four of these are fundamental and dictated by the geographic location of the observer and the turbine, as well as the design of both the turbine and observation point (i.e. size and number of windows):

- where the observer is in relation to the turbine and the sun (distance and bearing);
- intervening vegetation or buildings between turbine and observer;
- the location, size, and type of windows on the observers residence; and
- how high the sun is in the sky at a given time.

The remaining three parameters are 'moderating variables' dependent on the wind regime, and the site weather conditions:

- the plane of rotation of the turbine rotor;
- whether the sun light is strong or diffused by clouds; and
- whether the turbine is running or not.

The principal means of reducing the potential for shadow flicker is by turbine siting and maintaining a suitable turbine exclusion zone around sensitive receptors.

If a flicker nuisance was identified after entering service the impact could be mitigated, by restricted running of the problem turbine(s) during the few hours when shadow flicker was a problem.

The shadow prediction value of 77.7 hours at worst case for house H26 would be reduced by the moderating factors of rotor plane, cloud and operational hours to a value of less than 16 hours (Less than the 30 hours deemed acceptable at the German Court Case).

There are approximately 11 properties that could potentially be affected by shadow flicker, however given that seven circumstances must occur simultaneously for this to occur and the capability of the turbine to shut down for selective periods it is considered that shadow flicker should not present any significant problems of annoyance or nuisance, therefore no mitigation is proposed.

NOISE

The site is located on Crockagarran to the south west of Sluggan. The most proximate residential properties are located to the north and west of the site approximately 520 m from the nearest proposed wind turbine. The proposal is to construct the wind farm with six 3Mw wind turbines positioned across the site. The site is remote and the predominant noise source is created by the environmental conditions and the occasional vehicle pass-by. All areas of the site are currently used for agricultural purposes or left fallow.

Once the units are functioning only occasional traffic will attend the site for maintenance and test procedures. The existing traffic levels on the site approach roads are very low. The additional occasional traffic in the area would not constitute any significant increase and no significant noise impact would result.

During construction there may be increases in HGV movement, transporting plant and turbine machinery to the site. Such impact will be limited to a short period of time and be occasional rather than regular. Occasional "tourist" visitors to the site, (possible school groups, energy or environmental interest groups, curious individual parties), may cause additional traffic.

The following mitigation measures are recommended to offset any construction noise impact: -

- positioning of static plant as far as possible from residential properties, and utilising available screening by temporary structures, stock piles, etc.
- use of well maintained plant, and where possible new plant manufactured under more strict EC guidelines for manufacturers.
- substitution of unsuitable plant.
- maintenance of silencers and moving components.
- Given the limited impact it would not be appropriate to require noise monitoring of the site.
- It is recommended that the appropriate party should appoint or delegate a 'responsible person' who will be present on site and who will be willing to answer and act upon queries from the local public.
- If there are items of plant (e.g. dewatering pumps and similar) that necessitate use over 24 hours, they should be chosen, sited and enclosed such that levels at the nearest residential properties do not exceed World Health Organisation guidelines of 45 dB L_{Aeq} .

Conclusions

Noise surveys have been conducted at the site during daytime and night-time and a noise "climate" of the existing area has been obtained. The area is very rural and the predominant noise source at the site is environmental noise and occasional localised transportation movement.

It is calculated that the potential noise impact of the turbines operating at higher wind speeds may well be below the target noise level, based on the existing background noise levels at low wind speeds. The background noise levels at higher wind speeds will be higher than the predicted noise level at the near sited residential properties. It is therefore submitted that the potential noise impact of these turbines, when operating, will be below the ETSU target level, and will not create a significant impact at the most proximate residential properties.

Traffic and Construction noise will be negligible at near sited receptors.

CIVIL ENGINEERING AND ROADS

On-Site Access Tracks

Existing tracks and roads within the site will be upgraded and new access tracks will be built as necessary to provide construction access to the individual turbines. The site tracks will generally have a 4.5m wide running surface, widening at bends, junctions and crane hardstandings to suit the long turbine delivery vehicles. In addition, temporary passing bays may be constructed alongside the access tracks in positions to be determined during construction.

Off-Site Access Road

Two access routes to the proposed wind farm site were considered for the exceptional loads, e.g. wind turbine components.

Haulage Route Option 1

The first haulage route considers the turbine components being brought into the Lisahally Port in Londonderry. From here, the abnormal loads would be transported along the A2, then onto the A5 to Strabane. The A5 is followed through Strabane and onto Omagh. It is considered that once at Omagh, the components will be transported through Omagh by use of the new Omagh by-pass which is currently being constructed. However, it is estimated that the Omagh by-pass will not be operational until July / August of 2006. Therefore an alternative route, with the turbine components brought into the Port of Larne, has been considered and this route is described in greater detail below. For the first haulage route, having passed through Omagh, the components will be transported along the A5 before a left turn is made onto the Altamaskin Road. This road is followed until a right turn is made onto the Whitebridge Road. The Whitebridge Road is followed before a right turn is made onto the Gleneeny Road. The Gleneeny Road is followed before a right turn is made into the site access.

Haulage Route Option 2

The second haulage route considers the turbine components being brought into the Port of Larne. From the Port of Larne, the components are transported along the A8, then onto the M2 towards Belfast. The components are then transported along the Westlink and then onto the M1 towards Dungannon. At the end of the M1, the A4 is followed until the Ballygawley roundabout. At this roundabout, the A5 is taken towards Omagh. From the A5, a right turn is made onto the Altamaskin Road. As before, the components are transported along Altamaskin Road, before a right turn is made onto the Whitebridge Road. This road is followed before a right turn is made onto the Gleneeny Road. The site access is located off the Gleneeny Road.

Suitability of the Proposed Access Route

For the proposed routes, there are sections of roads with reduced widths, where other vehicles would be unable to pass construction vehicles. These sections of roads are mainly along the Whitebridge Road and the Gleneeny Road.

It is intended that exceptional loads will have a police escort along such stretches of road and that delivery of abnormal loads, where possible, will be made during off peak traffic periods. The final stretch of road (along the Woodbridge Road and Gleneeny Road) approaching the site entrance shall be subjected to extensive warning and directional sign regimes during the times in the programme when construction traffic will be at its most frequent and when deliveries of abnormal loads are due.

**Wind Farm Development Proposals
Crockagarran County Tyrone
A McCrory & W&H Alexander Civil Engineering Limited**

Whitebridge Road / Gleneeny Road Junction

Abnormal loads will overrun grass verges and will encroach slightly into a field that is owned by the developer. Temporary works required involve the removal of the boundary fence that consists of timber posts and wire fencing. A new fence will have to be erected as required by the road realignment. Grass verges will have to be strengthened by use of steel plates. The grass levels of the field will have to be adjusted accordingly to tie in with existing road levels. Street furniture will have to be temporarily relocated or removed during the delivery period. There are areas of overgrown trees and hedging that will have to be trimmed back.

In addition to the above, street furniture will have to be temporarily relocated or removed at locations throughout the proposed route. Areas of overgrown mature trees and hedges will need to be trimmed back along the haulage route. The Gleneeny Road is a road of narrow width and all trees and hedges will need to be trimmed back for delivery of abnormal loads. There is street furniture along the Gleneeny Road that will have to be relocated. Grass verges along this road will have to be strengthened by use of steel plates also.

There are several structures along this route which may be adversely affected due to the combined loading of the delivery vehicle and the turbine components. Such structures will have to be structurally assessed. Improvements will be made to any structure that does not have the capacity to carry the loading. Such improvements will be made prior to any other construction work commencing.

Any modifications will be made in accordance with recommendation from DRD Roads Service. It is also noted that Article 11 of the Roads Order (1991) will be required to execute these works. The developer will comply with any legal conditions for such improvements to be made, with the grant of planning permission.

Implementation of the most appropriate method of traffic management will be agreed by the developer / contractor and DRD Roads Service prior to construction commencing.

Vehicle Movements

Vehicle movements can be divided into four distinct phases: -

- i) Civil works;
- ii) Wind turbine erection;
- iii) Routine inspection and maintenance;
- iv) Major maintenance and final decommissioning.

Given that over the whole construction period, the average number of return vehicle movements involved in the construction of the wind farm has been estimated at about 20 heavy goods vehicles per day, the overall impact upon normal vehicle movements may be regarded as reasonable. Within these figures maximum numbers of vehicle movements have been estimated at approximately 80 per day, which will most likely arise when concrete for the turbine bases is being delivered. These days will not be consecutive, but may be 1-2 weeks apart. It is considered that on these days there will be a significant impact on normal vehicle movements in the locality. In all other circumstances, construction site traffic will be kept to a minimum where reasonably practicable.

Wind Farm Development Proposals

Crockagarran County Tyrone

A McCrory & W&H Alexander Civil Engineering Limited

SOCIO – ECONOMIC

The total cost of erecting 6 number wind turbines at Crockagarran excluding the cost of the Wind Turbine Generators themselves estimated at approximately £3 million or an approximately estimated cost per turbine of £500,000. This money would be spent on the engineering, civil works, electrical works, other works, substation construction, wind turbine generator delivery to site, assembly and erection, transmission lines and site management.

Provision of site facilities, concrete foundations and access tracks, together with general civil engineering and technical services, can benefit local companies, contractors and their employees.

It is anticipated that the wind farm development will affect the locality in the following ways: -

- Local expenditure during the construction phase, on-site investigations, studies, monitoring and legal and commercial costs
- Local expenditure on plant and materials
- Effects of initial employment and expenditure on services and activities.
- Local expenditure on operational activities including employment of maintenance and operational staff, ongoing supply of local materials, services and equipment as necessary
- Income from rental of land to landowners and associated 'knock on' effects
- Payment of Local Authority Rates to Omagh District Council
- Energy generated will feed directly into the local NIE electricity distribution grid.
- Reduction in use of fossil fuels and resulting reduction in Carbon Dioxide levels, which will be of general benefit to the health of the local community. The proposed project will lead 45,000 tonnes of Carbon Dioxide, the main greenhouse gas and cause of global climate change, being avoided north and south of the border per annum.
- Wages and salaries to local employees.
- The energy generated by the wind farm development will meet all the electricity needs of approximately 11,700 homes in Ireland.
- Increased security of energy supply in Northern Ireland and an off-setting of the effects of long term oil price rises
- Diversity of supply

Through the lifespan of the wind farm on the site at Crockagarran, the Developer will continually monitor and investigate the potential for investment into the local community.

The developer will aim to support community based projects in the locality of Crockagarran, and will set aside a sum of money per turbine into a fund to support qualifying projects. Discussions regarding management of the fund are in progress.

The development of this project has the potential to have a beneficial impact on areas of the local economy such as community investment, employment during the construction and operational phases, and the tourist industry and other indirect benefits to local services.

AIR AND CLIMATE

Northern Ireland currently depends on fossil fuels for the supply of the bulk of the national primary energy requirement. Reserves of fossil fuels are finite and as they become depleted these fuels will become progressively more expensive. As the various renewable technologies develop however, the price per unit of electricity generated is falling in real terms. This is particularly true in the case of wind energy.

Current efforts to replace fossil fuels with renewable energy sources are driven by international concerns over pollution and climate change. Fossil fuelled power stations account for approximately one third of Carbon Dioxide emissions, the primary greenhouse gas contributing to global warming, and consequential climate change. They also emit sulphur dioxide and oxides of nitrogen, which are major contributors to acid rain.

Wind generators do not emit greenhouse gases. Therefore installed wind capacity, which replaces fossil fuel dependent capacity, reduces the emission of greenhouse gases to the atmosphere. This is the major environmental impact of wind energy installation. Wind energy is, in effect, a tool which is used to delay and possibly avoid the predicted catastrophic effects of global warming.

No fumes or emissions are produced by the operation of the wind farm, other than those associated with vehicles used by construction traffic and maintenance engineers. The use of wind power for generating electricity produces no direct atmospheric emissions and is therefore a major contributor to reducing levels of atmospheric pollutants produced by other forms of electricity production. Local air quality will therefore not be affected by the presence of the wind farm. The wind farm will produce more energy with zero emissions in its first three months of operation than the total required for its manufacture – including mineral extraction and refining – and transport, construction and erection.

We have calculated that the Crockagarran site will offer the following significant national benefits to Northern Ireland: -

- Power for 11,700 homes
- Displacement of 45,000 tonnes of Carbon Dioxide
- Displacement of 540 tonnes of Sulphur Dioxide
- Displacement of 180 tonnes of Nitrous Oxide
- Avoidance of 3150 tonnes of slag and ash
- Avoidance of the need to import 11,700 tonnes of fossil fuel.

Assuming that the project will be operational by 2007 and that it will save the gas emission of 135,000 Tonnes of CO₂ between 2007 and 2010 (3 years at 45,000 tonnes of Carbon Dioxide emission avoided per year), this translates to 2.7 % of the 2010 target in CO₂ reduction.

The proposed windfarm will make a contribution to the reduction of the emissions of carbon dioxide that contribute towards the greenhouse effect, and sulphur and nitrogen oxides which cause acid rain. The increase in non-renewable energy generation and use will have a positive impact in terms of both air quality and climate and as such no mitigation is required.

HEALTH AND SAFETY

The Statutory provisions relevant to Northern Ireland are as follows: -

- The Health and Safety at Work (Northern Ireland) Order 1978
- The Management of Health and Safety at Work Regulations (NI) 2000
- The Construction (Design and Management) Regulations (NI) 1995
- The Construction (Health, Safety & Welfare) Regulations (NI) 1996
- Electricity at Work Regulations (NI) 1991
- Noise at Work Regulations 1989
- Personal Protective Equipment at Work Regulations 1992
- Manual Handling Operations 1992
- The Lifting Operations and Lifting Equipment Regulations 2000
- Construction (Head Protection) Regulations 1989
- The Health and Safety (Safety Signs and Signals) Regulations 1996.

All relevant legislation will be adhered to during all stages of development. The implementation of current best practice and technology will be used so as to minimise any risks that might be associated with this project. The implementation of the construction design and management principles will result in a quality product, built, operated and maintained to the highest standards of safety.

LANDSCAPE AND VISUAL

Wind farms are considered in variable ways by different people and the Landscape and Visual Assessment has attempted to be objective in what could be considered a very subjective matter. Some people find wind turbines attractive, interesting and acceptable landscape features providing a positive symbolic value giving an image of a sustainable, non-polluting renewable energy as opposed to the blight caused by other forms of energy provision schemes. Some people find wind turbines unsightly elements in the environment that compromise the upland landscape character and visual quality of any view. Many people do not have an opinion either way.

The existing uplands of Slievemore Mountain provides a skyline backdrop to valley areas to the north and south but the gentle topography of the surrounding drumlin landscape ensures that many views of the subject site are closed off. The subject site appears little used and is set amongst a landscape that, while appearing windswept and wild has been extensively affected by man's intervention.

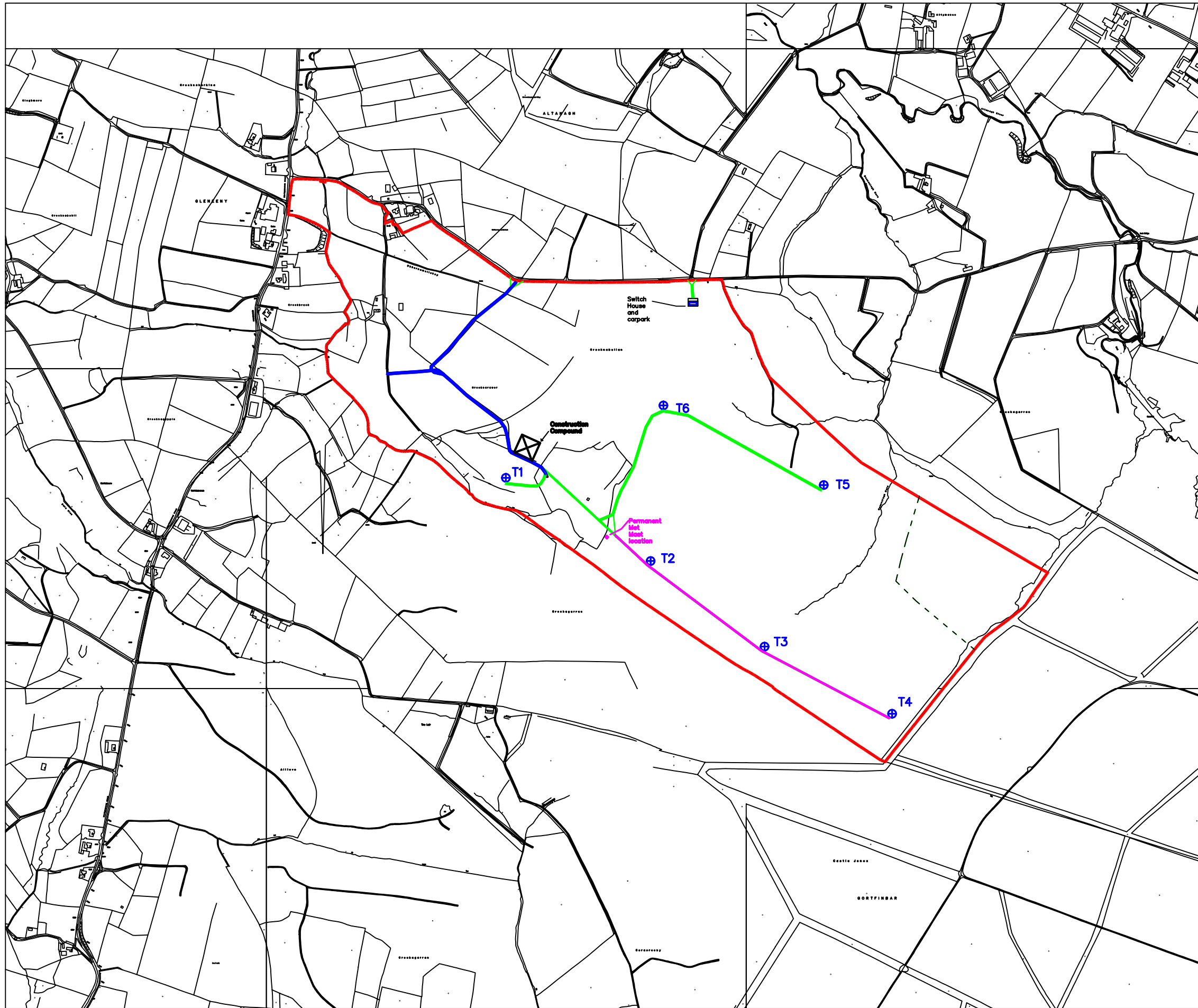
The uplands area is not promoted as a tourist or visitor amenity and carries no designations in the local area or district plans.

The proposal involves construction of 6 Wind Turbines and ancillary equipment on Crockagarran Mountain. The wind turbines total height is 125 m (inclusive of the blades)

The most appreciable changes will be to the area within 2 km of centre of the subject site on the upland plateaux but this area is not heavily settled or used. The changes are likely to have a moderate effect on the landscape character for the occasional road users and properties at Crocknabohill while there will be a slight negative effect on the visual amenity.

The majority of "visual receptors" are located in the valley areas. Views from these areas are intermittent, partial and often completely obscured by intervening ridgelines and mature vegetation. Where views are afforded, they are generally distant and effects on the landscape character will be minor with a slight negative effect on visual amenity. The open upland landscape is of such a wide and large-scale panoramic nature that the proposals can be effectively absorbed.

To be as objective as possible, consideration was given by the design team to the number, size, colour and nature of the turbines and their location insofar that they were of an appealing nature in terms of design and the landscape did not appear to be cluttered and completely dominated by these new introductions. In the consultant's opinion, this has been successfully achieved.



ALEXANDER

**PROPOSED WINDFARM
AT
CROCKAGARRON**

- PROPOSED SUBSTATION / CONTROL BUILDING
- METEOROLOGICAL MAST
- X TEMPORARY CONTRACTORS COMPOUND
- ⊕ TURBINE LOCATION
- SITE BOUNDARY
- PROPOSED FLOATED TRACK
- PROPOSED ACCESS TRACK
- EXISTING ROAD

TITLE	SITE LAYOUT PLAN		
FIGURE	2		
SCALE	1:10000	DRAWN	RSH
DATE	APR 05	CHECKED	GMcK



WDR&RT TAGGART