

# Dunmore Wind Farm

## Environmental Impact Assessment

IntelligentSolutions

**Volume 3:**  
Non Technical Summary



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## **Environmental Impact Statement Volume 3 - Non-Technical Summary**

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## Introduction – Non-Technical Summary

This Non-Technical Summary (NTS) is the third volume of the Environmental Impact Statement (EIS) for the proposed wind farm development consisting of eight wind turbines on land approximately 1500m east of Largantea Bridge, Dunmore, Limavady (Commonly known as Dunmore).

The other two volumes which comprise the ES are:

- Volume 1: Environmental Impact Assessment
- Volume 2: Appendices (Including Technical and Consultant Reports)

## The Planning Application

The EIS was prepared in support of a planning application for the wind farm development consisting of eight (8) wind turbines, associated transformers and electric cabling, access tracks, temporary storage compound, road improvements and associated ancillary site works. The site address is defined as “land approximately 1500m east of Largantea Bridge, Dunmore, Limavady”.

In accordance with the Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 1999, the NTS provides a summary of the following:

- A description of the physical characteristics of the whole development and the land use requirements during the construction and operation phases;
- An overview of the description of the energy, planning and environmental policy context of wind energy development in Northern Ireland;
- A description of the main characteristics of the production process, including the nature and quantity of the materials used;
- An estimate of the type and quantity of expected residues and emissions resulting from the operation of the proposed development;
- An outline of the main alternatives considered by the developer and an indication of the main reasons for this choice, taking into account the environmental effects;
- A description of the aspects of the environment likely to be affected by the development including, population, flora, fauna, soil, water, air, climate, archaeological heritage, and landscape;
- A description of the likely significant effects of the development on the environment including; direct, indirect, secondary, cumulative, short, medium and long-term, permanent, temporary, positive and negative effects resulting from the existence of the development, the use of natural resources, the emission of pollutants, the creation of nuisances and the elimination of waste;
- A description of the mitigation measures designed to prevent, reduce and where possible offset any significant adverse effects on the environment.

## The Applicant

This wind farm development application is being lodged in the name of *'TCI Renewables Ltd'*.

### **Total Communications Infrastructure Renewables**

TCI Renewables was established in Belfast in 2005 by leading wind industry professionals in order to develop renewable energy projects in the Northern Ireland marketplace. TCIR has developed a strong focus on delivering smaller projects for specific end users hoping to offer energy saving solutions for large electricity users. The company has already developed the Antrim Area Hospital wind project and are currently working on wind turbine projects with Altnagelvin Hospital, North Down Borough Council, Ulster Hospital, Craigavon Area Hospital and other similar large electricity users.

As a leading independent renewable energy business, TCIR undertakes project financing, development, construction and the operational management and maintenance of renewable energy facilities. TCIR is currently working on a large portfolio of wind projects in Northern Ireland, England, Canada and North America.



**PART A  
CONTEXT FOR THE  
PROPOSED DEVELOPMENT**

## Part A: Context for the Proposed Development

### Section 1.0 - Wind Energy Overview

Northern Ireland has an abundant wind resource with some of the highest average wind speeds in Europe. It is important that this resource continues to be harnessed for renewable energy adding to the development and capacity of the Northern Ireland wind industry.

Wind turbine technology has developed considerably in recent years, with 2-3MW turbines maximising energy yields. A wind farm will also help contribute to the regional economic growth of communities, while reducing the reliance and security of fossil fuels, all of which are imported into Northern Ireland.

The future growth of renewable energy is now UK Government policy and is supported by such measures as the:

- Renewable Energy Targets of 12.5% by 2010 and 20% by 2020
- Northern Ireland Non Fossil Fuel Obligation (NINFFO); and the
- Renewables Obligation to Northern Ireland

In addition, the UK Government also purchases approximately 20% of its electrical energy for the government estate from renewable sources.

The generation of wind power continues at an outstanding level throughout the world. Worldwide, wind energy reached over 74,000MW of installed capacity (World Wind Energy Association website) as of December 2006. In fact, wind energy continues to experience incredible world growth rates of 25% per annum.

It is now Government policy that 20% of the UK's primary energy will be generated by renewable energy by 2020 in line with European Union targets for the reduction of greenhouse gas emissions (GHG).

The "**Stern Report**" (a detailed, government-commissioned study into the economic costs of climate change) which was published in October 2006, has concluded that the cost of climate change is a staggering £2.68 Trillion. It states;

*"The scientific evidence is now overwhelming: climate change presents very serious global risks and it demands an urgent global response. From the detailed studies from regional and sectoral impacts of changing weather patterns through to economic models of the global effects – shows that climate change will have serious impacts on world output on human life and on the environment. All countries will be affected. The most vulnerable – the poorest countries and populations – will suffer earliest and most even though they have contributed least to the cause of climate change".*

(Stern Report - HM Treasury, 2006, P1)

Current scientific research and government policy supports the urgent need to; act against the damaging effects of climate change, reduce greenhouse gas emissions from the energy generation sector, and encourage the development and the future growth of the wind energy industry.

## Section 2.0 - Site Description

The proposed development site is located approximately 8 kilometres north east of Limavady, County Londonderry. The site is an area of upland moor used for grazing sheep in the town land known as Dunmore.

The grid references for the proposed wind turbines were recorded using a Global Positioning System (GPS) as:

Turbine 1:	Easting: 274530	Northing: 428445
Turbine 2:	Easting: 274589	Northing: 427874
Turbine 3:	Easting: 274837	Northing: 428242
Turbine 4:	Easting: 275028	Northing: 428631
Turbine 5:	Easting: 275168	Northing: 428072
Turbine 6:	Easting: 275357	Northing: 428460
Turbine 7:	Easting: 275752	Northing: 428414
Turbine 8:	Easting: 275661	Northing: 428793

Seven of the proposed wind turbines are located east of Bolea Road and One turbine is located to the west of Bolea Road on land which forms part of the Harkin land holding.

The topography of the area rises to the south and northwest of the site and slopes down southwest towards Limavady. The site itself is flatter with a ground height of approximately 235m ASL as shown in Figure 2.0 below.

The map below in Figure 2.0 shows the final layout for the proposed wind farm. This layout was optimised to provide the maximum electricity using eight wind turbines while avoiding the electricity link running through the north of the site. The design of the wind farm was achieved to maximise energy yield, meet manufacturers warranty conditions, whilst meeting noise guidelines set by the Department of Trade and Industry.

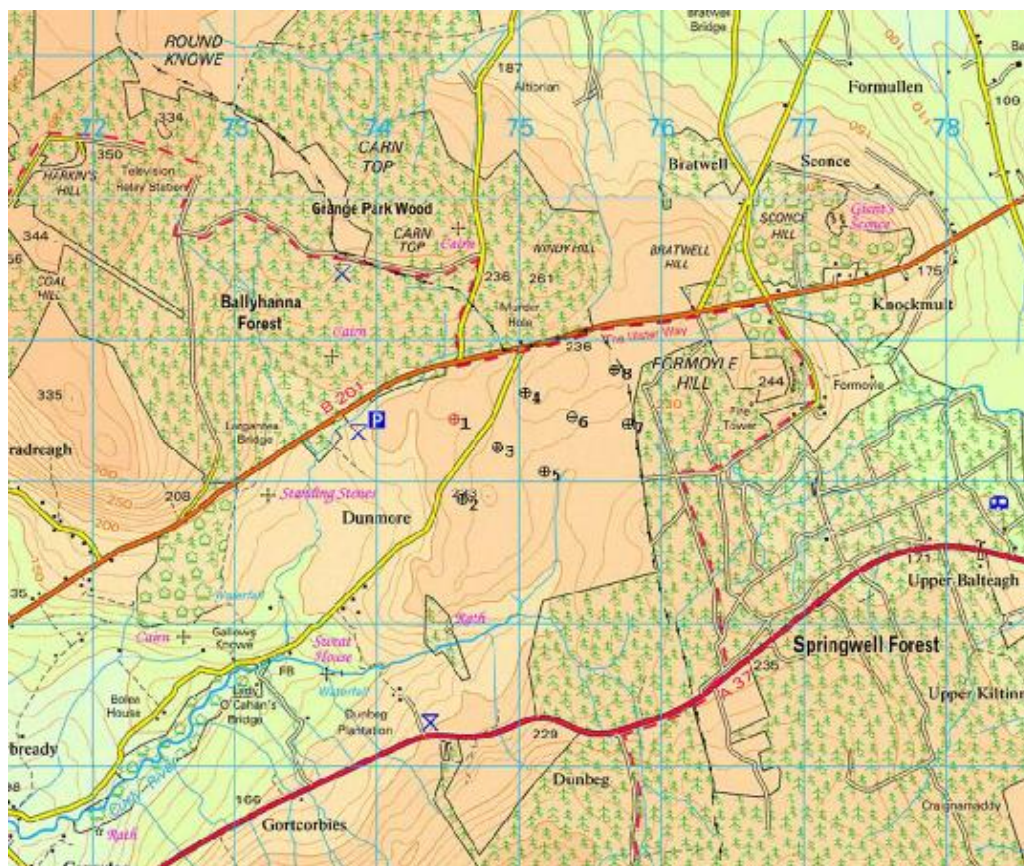


Figure 2.0 Location of the proposed Dunmore Wind Farm

## Landscape Character

The Binevenagh area has the following key characteristics:

- Sloping upland basalt plateau ending at dramatic, cliff-like escarpment.
- Escarpment summits have a distinctive profile and form a sequence of local landmarks.
- Large-scale mosaic of upland moor and extensive conifer plantations.
- Open, exposed upland moors, with few native trees or field boundaries.
- Rocky outcrops and scree slopes reveal grey basalt rock.
- Patchy, textured pattern of moorland grass, heather, rushes and stunted scrubby bushes.

A map of the area is shown below. For the full Binevenagh landscape character assessment report see Appendix A05 volume 2.



Figure 2.1 Binevenagh LCA Map

A balance is needed between conserving designated areas and the need for renewable energy projects to contribute towards UK energy targets. The Dunmore wind farm will occupy only 0.02% of the 14100 ha Binevenagh AONB designation and will generate enough electricity to power the equivalent of approximately 12,900 houses.

There would also be significant environmental benefits from the wind farm, such as a saving of over a million tonnes of CO<sub>2</sub> throughout the 20 year lifetime of the project (full details can be found in Section 17 Air and Climate). The site has good wind speeds for a wind farm development and would contribute towards renewable energy targets and the fight against global warming. TCIR feel that these positive environmental benefits outweigh the loss to the AONB. Development in AONB areas is avoided where possible; however, through environmental studies the Dunmore site has proved to be an appropriate site for a wind farm and will contribute towards renewable energy targets which need to be acted upon now.



## Section 3.0 The Proposed Development

The proposed development consists of eight (8) horizontal axis wind turbines up to 125m in height (from the tower base to blade tip), associated transformers, underground electric cabling, access tracks, temporary site storage compound, road improvements and other ancillary site works. The development has three distinct phases which are reviewed in this section:

- Construction
- Operation, and
- Decommissioning

### The Turbines

The turbines would be state-of-the-art in design, incorporating a tapered tubular tower and three blades attached to a nacelle housing containing the generator and other operating equipment.

The towers will be fixed to the ground by a substantial concrete foundation requiring a width of 17.5m x 17.5m to incorporate the tower base and foundation loading, which has dimensions of 4.1 metres wide at its base and about 2.3 metres wide at the top.

The switchgear for the turbines will be contained within the base of the tower or within a small equipment kiosk located adjacent to each turbine tower. The turbines will operate automatically and independently.

The final selection of turbine is subject to competitive tender after development consent has been granted; however, for the purposes of this development application, a 3MW candidate machine has been selected.

### The Construction Program

The main construction period would last approximately 52 weeks, from the survey of civil works, through to the installation and commissioning of the turbines and ending with landscape rehabilitation.

Northern Ireland Electricity (NIE) will be responsible for the design and planning application for the grid connection route.

### Haulage and Site Access

Turbine haulage will be carried out by the manufacturer and a specialist haulage contractor.

There will be a requirement for the use of Police Service of Northern Ireland (PSNI) escorts and traffic management procedures during turbine transportation.

The level of inconvenience experienced by the local community during the haulage phase of the project will be temporary.

The turbine deliveries will contain the following components:

- 32 tower sections (4 per tower)
- 24 blades - length up to 45m
- 8 Nacelles
- 8 Rotors

**Total Maximum Height = Up to 125m**

Several haulage routes were identified and all junctions examined for potential problems such as kerbing, signage, services, drainage, verges and widening issues.

Initial contact regarding the haulage route has been made with Adam Quigley of Development Control Section in DOE Roads Service. Correspondence with the Road Service has allowed TCIR to establish all requirements of Road Service for the EIS including potential haulage routes for turbine components, concrete and stone.

A sufficient turning circle is required to allow blade and turbine component entry onto the site. This will require the construction of two new site entrances off the Bolea Road (one to the east to allow access to turbine locations 2-8 and one to the west to allow access to turbine location 1). The land at the site entrance will be laid with gravel to accommodate wide and heavy loads entering the site.

The construction site entrances will be used by all vehicles, including cranes and cement trucks.

### Cabling and Grid Connection

All eight wind turbines would generate electricity at 690V. This would be stepped up to 33kV using transformers installed within the base of the towers or in the adjacent equipment kiosks. From the transformer, underground cables would connect the wind turbines to the most suitable NIE connection.

It is proposed that the electricity supply would be connected to the Coleraine Main 33kV substation, requiring up to 10km of new 33kV line to accommodate the wind farm output. However, the exact location of the "new build line" is subject to survey, planning and design by NIE.

All necessary switchgear, isolators, current and voltage transformers and protection relays will be provided to the requirements of G59/1/N1 to ensure safety. The connection of the wind farm to NIE's system will be subject to the requirements of a Generator Agreement.

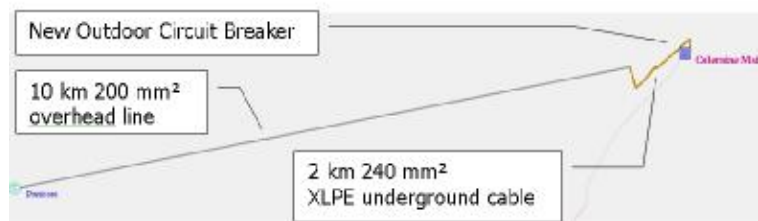


Figure 3.0 NIE Grid Connection Proposal

### Operation and Maintenance Phase

The operational life of the wind farm is expected to be 20 years. The routine operation and monitoring will be carried out with the assistance of a computerised control system (SCADA system).

Operations and maintenance (O&M) is the initial responsibility of the turbine supplier. However, after this warranty period has elapsed, an Operations & Maintenance company will be contracted to ensure the wind turbines are regularly maintained every six months.

Turbine control and monitoring systems operate with several levels of redundancy to protect the equipment from damage.

In the event of performance issues, including loss of grid connection or voltage variability, the turbines shut down automatically via braking mechanisms. In addition, turbines are fitted with vibration and barometric sensors so that if a blade was damaged, the turbine automatically shuts down.

After the construction of the wind farm, the turbines will be monitored by remote internet computer links. However, when routine maintenance or inspection is required, two personnel will access the site in a small 4x4 or light vehicle using existing access tracks.

The effect of maintenance traffic on the local road network is considered to be negligible.

### **Decommissioning or Repowering**

During the process of decommissioning, the wind turbines would be removed from the site using extendable long vehicles.

The foundations would be covered over with topsoil and reseeded.

The cables interconnecting the wind turbines to the electricity grid system would be de-energised and removed from the site, with cable marker signs removed.

All aspects of decommissioning would be in accordance with the conditions of planning approval or such that were agreed between the owner of the wind farm, the planning authority and relevant government agencies.

The decommissioning process would take approximately 20 weeks to complete. A decommissioning program would be agreed with the relevant authorities prior to commencement of the required works.

An alternative course of action at the end of the operational life of the wind farm could be to refurbish or replace the wind farm components to repower the wind farm. This would be a new development, requiring a new development consent application.

## Section 4.0 – European Legislation and Policy Context

The burning of coal, oil and gas is a major cause of climate change. It is widely recognised across the UK, that future energy policy must be based on using less fossil fuels, increasing energy efficiency and increasing the use of renewable energy technologies such as wind energy.

The UK Government has set a greenhouse gas reduction target for renewable energy with a 20% target by 2020. An interim target of 12.5% for 2012 has also been established.

Progressive wind energy policy incentives across the EU is backed up by government funding through capital grants, subsidies or preferential tariff structures for wind energy. This demonstrates the importance given to the issue of climate change.

However, in Northern Ireland, there are still long delays in obtaining wind farm planning consents and this has caused stagnation of the industry. Other issues such as: a lack of grid capacity, curtailment and containment issues are also significant problems for the Northern Ireland wind energy industry.

It is anticipated that a '*Planning Policy Statement 18: Renewable Energy*' will be released for public comment throughout Northern Ireland in the later part of 2007.

### Northern Ireland Wind Policy

All wind farm proposals in Northern Ireland are assessed by the Planning Service within the Department of the Environment (DOE). This planning process determines if the proposals should be assessed against *The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 1999*.

The strategic regional planning for Northern Ireland is guided by ***A Planning Strategy for Rural Northern Ireland***, and other relevant Planning Policy Statements (PPS). This strategic document is gradually being superseded by individual and more detailed Planning Policy Statements.

The Department of Regional Development has also published its regional development strategy for Northern Ireland ***2025 Shaping Our Future***. This document aims to guide future development in Northern Ireland until 2025.

The Regional Development Strategy (RDS) was formulated "*after four years of extensive, probably unprecedented, consultation including an independent examination in public, scrutiny by the assembly committees, and very close working across departments*".

The RDS is complimentary to the development of wind energy infrastructure as it supports proposals that bring significant environmental and economic benefits to rural areas.

Planning Policy Statements (PPS) set out policies on land use and other planning matters and apply to the whole of Northern Ireland. They are gradually replacing the policy provisions of the Planning Strategy for Rural Northern Ireland. Their contents are taken into account in the preparation of development plans and are also relevant to decisions on individual planning applications.

There are no specific references to renewable energy and energy efficiencies in the PPS' in Northern Ireland.

In planning for the use of land for electricity generating installations the general aim is:

- To ensure that energy demand is met, consistent with protecting the local and global environment;
- To ensure that any environmental damage or loss of amenity caused by energy supply and ancillary activities is minimised; and

- To prevent unnecessary sterilisation of energy resources.

A balance will be required between increasing wind penetration levels, conventional fossil fuel-based electricity supply and the need to reduce greenhouse emissions.

### **Conclusions**

Governments and Industry across the world recognise that zero-emission energy generation is central to reducing the effects of climate change.

The burning of oil, coal and gas reserves to generate electricity creates atmospheric pollution. It is reasonable to assume that energy prices will increase as demand grows, security of supply decreases, and the price of carbon is integrated into the cost of electricity generation.

Northern Ireland's wind energy industry is maturing in response to the need to take immediate action to *limit* and *reduce* greenhouse gas emissions and the effects of climate change.

The development of wind farms in Northern Ireland can provide considerable benefits for the environment, for the economy and for the sustainability of Northern Ireland's energy security.

However, all wind farm planning decisions need to be made within the context of the need to find a balance resulting from the proposed development and the perceived negative effects.

TCI Renewables strongly believe that the proposed Dunmore Wind Farm should be granted planning approval.

## Section 5.0 Site Selection

The selection of the Dunmore site for a wind farm was assessed against the following criteria:

- Wind speed
- Terrain and topography
- Access to site
- Grid connection availability
- Avoidance of telecommunications interference
- Noise compliance

TCI Renewables approached Mr Harkin in the Summer of 2006 to discuss the possibility of a renewable energy project on his land. After this feasibility assessment, it was concluded that the Dunmore site could accommodate a maximum of eight wind turbines that would be capable of providing a significant energy yield with minimal environmental effects.

In order to maximise energy yield and achieve noise compliance at neighbouring properties, it was considered appropriate to limit the scale of the development to eight turbines with a capacity of up to 3MW each.

After the completion of background noise monitoring and predictive wind turbine sound emission levels, it was confirmed that the proposed wind turbines would not exceed 3MW in capacity and will produce sound levels well within the recommended ETSU guidelines at the nearest occupied residential properties.

The Dunmore Wind Farm Design Team sought to minimise the land take required for the development of the wind turbines, access tracks and crane hardstandings as much as possible, by following field boundaries and contours within the landscape.

### Turbine Selection

A technical review of turbines available was carried out. The objectives of this analysis were to look at the underlying factors of importance, which included:

- Energy demand characteristics / grid capacity in the area
- The suitability of the turbine for the site; including restricted delivery access (due to blade lengths), wind classification, localised site topography, sound power levels
- Performance reviews of the various turbines, which include the production and delivery lead times, reliability, availability of new parts, warranty specifics etc.
- Assessment of the various commercial suppliers, and their technical and commercial history in the marketplace.

The final choice of wind turbines will not be made until a planning decision has been determined. Commercial negotiations between the Developer and turbine manufacturers will continue should planning permission be granted.

Several turbines are being reviewed for the project based on land and road access constraints, as well as permissible noise levels under ETSU Noise Guidelines. Following a visual and acoustic assessment, it was determined that a maximum overall tip height of 125 metres, capacity up to 3MW and a rotor diameter of 90 metres would not be exceeded.

## Section 6.0 Benefits of the Proposed Development

Wind power provides significant environmental, economic and community benefits to Northern Ireland.

### Environmental Benefits

Wind power delivers zero-emission electricity. They assist in securing and safeguarding Northern Ireland's energy supply system.

Table 6.0 below shows the emissions avoided by the Dunmore Wind Farm over its anticipated 20 year lifespan.

Emission Type	Quantity (tonnes)
Carbon dioxide (CO <sub>2</sub> )	Up to 1,000,000 tonnes (depending on source of generation the project is offsetting).
Sulphur dioxide (SO <sub>2</sub> )	12,200
Nitrogen oxides (NO <sub>x</sub> )	3660

Table 6.0 Emissions saved by the Lisnamuck Wind Farm over 20 years

### Local Community Benefits

Substantial construction contracts will be available for tender by local companies.

The construction of the turbine foundations, the erection of the wind turbines, the construction of the access tracks, cable trenching and laying are likely to involve the employment of more than 45 people over a period of up to 12 months.

Other local economic benefits may include the purchase and delivery of civil construction materials such as large quantities of concrete for the turbine foundations, stone and gravel for access tracks, as well temporary fencing.

Additionally plant and equipment would be sourced locally where available. Income will also be generated by the landowner in the form of rental income, local authority rates and insurance payments which would all be paid throughout the life of the 20 year project.

### Operation Phase

The operational life of the wind turbines is expected to be approximately 20 years. During this period the routine operation and monitoring will be carried out by a computerised control system. Periodic maintenance will be carried out by wind farm engineers.

Whilst the turbines are under warranty from the manufacturer for a period of 5 years, the responsibility for operations and maintenance is under their remit. However, once this period has elapsed, an Operations and Maintenance company will be contracted to ensure the wind farm operates at safe and optimal performance levels.

Turbine control and monitoring systems operate with several levels of redundancy to protect the plant from damage. In the case of technical faults the turbines shut down automatically via fail-safe braking mechanisms.

While the turbines are generating electricity, normal seasonal farming practices would continue. Sheep would continue to graze freely right up to the turbine bases. The underground cables connecting all three wind turbines would be buried at a sufficient level to ensure that ploughing would not impact on the operation of the wind farm.

### **Decommissioning Phase**

After 20 years, the wind turbines may be fully decommissioned or new nacelle/generator technology installed replacing the existing technology.

In the event of the wind farm being fully decommissioned, the turbines would be removed and where ever possible, components recycled and the turbine sites reinstated for farming. The wind turbines would be removed from the site using extendable vehicles.

The foundations would be covered over with topsoil and reseeded. The cables interconnecting the wind turbines to the electricity grid system would be de-energised and removed from the site, with any cable marker signs removed.

The site provider, in conjunction with the wind farm owner and relevant authorities, may negotiate to retain the access tracks after decommissioning for the benefit of the landowner's farming operations.

This process of decommissioning the wind turbines themselves is easily achievable and cost effective.

The decommissioning process would take approximately 20 weeks to complete. A decommissioning programme would be agreed with the relevant authorities prior to commencement of the required works.



## **Part B – Assessment of the Proposed Development**

### **Section 7.0 Environmental Assessment of the Proposal**

#### **Section 7.1 Landscape and Visual Assessment**

The landscape and visual assessment was undertaken by RPS Consultants. They have considerable experience undertaking landscape and visual assessments for wind farm proposals.

The methods used in the Dunmore Wind Farm Landscape and Visual Assessment were derived from the *'Guidelines for Landscape and Visual Impact Assessment'* (LVIA) by The Landscape Institute and Institute of Environmental Assessment 2002.

The existing landscape and visual context of the study area was established through a process of desktop study, site survey work and photographic surveys. The proposal was then assessed against the baseline conditions to allow the identification of potential effects, prediction of their magnitude and assessment of their significance. Mitigation measures could then be identified to reduce as far as possible any potential landscape and visual impacts.

#### **ZVI – Theoretical Zones of Visual Influence**

The 2D computer-generated "ZVI" is defined as the area within which views of the wind farm can be theoretically obtained.

The extent of the ZVI was determined primarily by the topography of the area. Using terrain-modelling techniques combined with the wind turbine height specifications, a map is created showing areas from which the wind turbines would, in theory, be seen. A worst case scenario is taken in line with Landscape Institute guidelines.

In reality, the actual ZVI is considerably less in extent than the theoretical one, since turbines are difficult to focus on at a distance (greater than 15km), with localised topographic features, hedges, treelines and weather conditions filtering views. Field survey work beyond 15 km has established that no significant visual impacts will occur.

<b>Distance</b>	<b>Perception</b>
Up to 2 km	Likely to be a prominent feature
2 - 5 km	Relatively prominent
5 – 15 km	Only prominent in clear visibility – seen as part of the wider landscape
15 – 30 km	Only seen in very skies – a minor element in the landscape

Table 7.1 Visual perception of turbines at various distances

The following ZVI has been produced for assessment:

- 15 km ZVI for the proposed development (Appendix B02 Volume 2);

#### **Wireframes & Photomontages**

Twenty five representative viewpoints have been selected around the proposed Dunmore wind farm site.

The wireframes and photomontages have been prepared for each viewpoint. These photomontages allow the viewer to see what the wind farm would like after construction from a

selected view point. Full sets of the montages are included in Appendix B, Volume 2 of the Environmental Statement.

Viewpoints are chosen from within a 15km radius from the wind farm. These are carefully chosen to provide a representative sample of views towards the wind farm site in a 360° radius. Viewpoints frequented by members of the public such as lay-bys, local landmarks were chosen along with views from nearby settlements and main roads.

A wireframe of the wind farm and surrounding terrain is generated from each viewpoint using standard commercial software packages, digital terrain data provided by Ordnance Survey of Northern Ireland, the turbine layout and the individual turbine geometry. Photographs from each viewpoint location are then taken covering an arc of view matching that of the wireframe. The extent of the arc covered depends on what the photomontage is intended to show.

The finalised photomontage with rendered turbines may then be aligned with its corresponding wireframe for presentation. The last step in the process is to calculate at what distance the image should be viewed from so as to ensure the turbines are representative of what the eye would see. This is vital to provide an accurate representation.

### The Proposed Development

The proposed wind farm comprises eight turbines with a maximum overall height not greater than 125m to blade tip, internal equipment kiosk, associated transformers, access tracks, a control building, temporary contractor's compound, road improvements and new site entrances off Bolea Road.

In the table below there is a summary of the significance of visual impacts from the twenty five chosen viewpoints (photomontage images of each of these has been included in Appendix B, Volume 2).

Viewpoint Number	Viewpoint Location	Significance of Visual Impact
1	Moneyranel Road	Slight
2	Dog Leap Road	Slight/Moderate
3	Whitehill Farm	Moderate
4	Seacoast Road	Slight /Moderate
5	Limavady Town	Slight
6	Dunmore Hill	Substantial
7	Ballyhanna Forest	Moderate
8	Largantea Picnic Area	Substantial
9	Lisnamuck	Slight
10	Killure Road	None
11	B66 Two Bridges	None
12	Gortgarn Road	Moderate
13	Bolea Road I	Moderate
14	Bolea Road II	Substantial
15	Circular Road, Castlerock	Slight/Moderate
16	Articlave	None
17	Quilley Picnic Area	None
18	Cranagh Hill	Slight/Moderate
19	Portstewart Cemetery	Moderate
20	Windy Hall	None
21	Balinteer	Slight/Moderate
22	Scone Road	Substantial
23	Shinny Road	Moderate
24	Gortgarbles	Substantial
25	Greencastle Co. Donegal	None

Table 7.1.1 Significance of visual impacts

## Impacts on Planning Designations

The proposed 8 turbine wind farm lies within the North Derry AONB and Countryside Policy Area (Ref COU 06).

The ZVI indicates that only a small portion of the AONB is potentially affected by the proposed wind farm. The majority of areas with intervisibility lie outside the boundaries of the AONB. The magnitude of change in landscape resource for the portion of AONB with the wind farm (<3km) will be high. The landscape sensitivity of this landscape is high. The significance of landscape impact on the North Derry AONB within the immediate vicinity (<3km) of the wind farm is substantial.

Due to the presence of large blocks of forestry planting to the north and south of the site combined with the sites location between Keady Mountain and Harkins Hill/ Carn Top the influence of the proposal on the extensive upland landscape of the North Derry AONB is extremely limited. The magnitude of change in landscape resource within the remainder of the uplands within the AONB is low due to the limited influence beyond a 3km radius of the site. The landscape sensitivity of this landscape is high. The significance of the landscape impact for the remainder of the AONB is therefore moderate.

Significant visual impacts will occur for the Ulster Way where it passes through the Springwell Forest area where it would be substantially affected. However, it could also be argued that the proposal would be a significant attraction encouraging more use of the Ulster Way. Similarly, it is also a matter of conjecture as to whether the general public finds wind farms a negative or positive impact.

### Mitigation Measures:

#### General

The design evolution of the proposed wind farm has been undertaken to incorporate the following recommendations:

- sensitive use of local materials for constructed elements (access tracks, hardstandings etc);
- careful integration of constructed elements with existing elements such as, existing access tracks etc;
- careful grading and reinstatement proposals;
- appropriate materials and colour of security fencing and any buildings;
- appropriate colour of wind turbines; and
- high quality of finish to access track edges, gates, fences and general site housekeeping designed to complement local styles and materials.

Associated structures such as site entrances, boundaries and buildings should be designed to complement local styles and materials.

All excavated organic material should be stored carefully for reinstatement work within the site, and the disturbed edges of tracks made up with turf won from such disturbed parts of the site.

To reduce the visual impact there should be no overhead cables between the wind turbines and any proposed substation. All cables should be trenched and follow, where possible, the route of the access tracks, and installed as track construction progresses.

It is recommended that the wind turbines be painted in a neutral, matt colour so as to minimise the visual intrusion on the landscape. The following colour specification (RAL.7035) is considered to be appropriate for most conditions.

Good site design, use of an environmental management plan during the construction phase and incorporation of mitigation measures identified above will effectively mitigate the impact of ancillary works.

### **Conclusions:**

The proposed eight turbine wind farm at Dunmore, Bolea Road Limavady at an overall height of 125 m, is located directly within a landscape character area identified as Open Upland Hills and Mountains. The lower lying surroundings consist of enclosed undulating rural landscape with improved agricultural fields. The Zone of Visual Influence (ZVI) has been established and the areas of significant visual impact identified. Limited viewer exposure reduces the potential landscape and visual resource change of the proposal for a significant proportion of the study area to the north and south due to the nature of the topography and extensive forestry plantations at Binevenagh, Ballyhanna, Grange Park Wood, Springwell and Cam Forests. The direction of most views will be from the west and east outside the AONB and from distance.

When views from towns and villages are considered no significant visual impacts will occur from Limavady, Coleraine, Ballykelly, Portstewart, Portrush, Macosquin, Articlave or Castlerock.

When views from Class A roads are considered significant visual impacts will occur for parts of the A37 between Limavady and Springwell Forest. No significant visual impacts will occur for the A2, the A54 or A29.

When views from Class B roads are considered significant visual impacts will occur for parts of the B201 west of Limavady between Dirlagh and Formoy Hill. No significant visual impacts will occur for the B186, B66, B185, B207, B68, B192, B69, B510 and B119.

Whether predicted levels of change in visual resource and the resultant significance of visual impacts are negative or positive will depend on the perceptions and opinions of the individual experiencing the view.

A total of 25 viewpoints have been assessed. Significant visual impacts occur for 5 of the 25 viewpoints. Viewpoints 6, 8, 14, 22 and 24 will have significant visual impacts.

With regards to the impact of the proposal on the North Derry AONB it has been established that the influence of the wind farm on the extensive AONB landscape is limited due to the location of the wind farm between hills such as Keady Mountain and Harkins Hill/Carn Top that prevents views of the turbines across extensive parts of the AONB. However, direct impacts will occur within close proximity (<3km) that have been predicted as substantial. The impact on the remainder of the AONB is slight.

Significant visual impacts will occur for the Ulster Way where it passes through the Springwell Forest area where it would be substantially affected. However, it could also be argued that the proposal would be a significant attraction encouraging more use of the Ulster Way. Similarly, it is also a matter of conjecture as to whether the general public finds wind farms a negative or positive impact.

In conclusion, when the overall level of significance of landscape and visual impacts are considered the proposal is acceptable in terms of landscape impacts, visual impacts on towns, Class A roads, Class B roads and minor roads. The proposal affects a very short length of the extensive Ulster Way. Extensive areas of coniferous forestry significantly restrict views of the proposals. Overall, therefore, the proposal is acceptable and the surrounding landscape and its visual resources have the ability to accommodate the changes of the type associated with this development.

In conclusion the significant landscape and visual impacts occur at close proximity to the proposed wind farm. With distance from the wind farm the assessment has established that there is a greatly decreased level of landscape and visual impact.

## Section 7.2 Ecological Impacts – Flora, Fauna & Habitats

Habitat survey methodology has been undertaken in accordance with industry standard Joint Nature Conservation Committee Phase 1 Habitat Survey (JNCC 2003). A Phase 1 survey provides a rapid assessment of habitat presence and quality. Whilst it is focussed upon categorisation of parcels of land based on their vegetation, the potential value of areas to fauna is also considered.

EU Directive 92/43/EEC, on the Conservation of Natural Habitats and of Wild Flora and Fauna (commonly known as the Habitats Directive), is the overarching nature conservation legislation in force today.

The closest site designated under EU Directives to the proposed Dunmore Wind Farm site is the River Roe and Tributaries *Special Area of Conservation* (SAC). The site includes the Curly River, which flows some 825m south of the nearest turbine location to the SAC. The study area drains to the Curly River.

Sites of National Importance in Northern Ireland are termed **Areas of Special Scientific Interest (ASSI)**. ASSIs are designated by statute under the Nature Conservation and Amenity Lands (Northern Ireland) Order 1985 and the protection afforded to them is strengthened under the Environment (Northern Ireland) Order 2002. Altikeeragh ASSI (171) is situated approximately 2.3km north-west of the proposed site.

**Sites of Local Nature Conservation Importance (SLNCI)** are local designations within Northern Ireland, and derive from the Regional Development Strategy for Northern Ireland 2025. There are six SLNCI's within 5km of the site, they are: Ballyrisk More; Curly River; River Roe; Dunalis Reservoir; Ballyhacket; and Knocknogher SLNCI's. The Curly River is the closest, some 825m south of the closest turbine.

### 7.2.1 Habitat descriptions

No plant species scheduled on the Wildlife (Northern Ireland) Order 1985 were noted in the study area. The site chiefly comprises wet heath/acidic grassland mosaic. The main water courses found at the site are located at the northern and western edges of the site. A small area of mixed plantation woodland extends into the site at the north-western corner of the site.

The study area is comprised mostly of a wet heath and acid grassland mosaic. The block to the east of the bisecting road is wetter than the western block. Both blocks support similar species but at different proportions. The heathland habitat across the site is of reasonable quality, but not characteristic of the Habitats Directive Annex 1 habitat type 4010 (Northern Atlantic wet heaths with *Erica tetralix*).

*Evaluation:* this habitat type considered to be of medium value.

The site is criss-crossed with numerous small drains with the main watercourses occurring at the north and west of the site. *Filipendula ulmaria*, *Angelica sylvestris* and *Pteridium aquilinum* characterise the bank side flora.

*Evaluation:* this habitat type considered to be of low value.

The small area of mixed plantation woodland extending into the site at the north-west is dominated with a canopy of semi mature *Larix decidua* and *Acer pseudoplatanus*.

*Evaluation:* this habitat type considered to be of low value.

No protected, rare or vulnerable plant species were recorded. Two habitat types which are listed as priority habitats under the UK Biodiversity Action Plan (BAP) occur as poor examples within the site namely, Purple Moor-Grass & Rush pasture and Upland Heathland. These habitats have also been recorded under the Northern Ireland Habitat Action Plan. Both action plan targets centre on enhancing and maintaining habitats within ASSI's and NATURA sites which is not applicable in this case.

### **7.2.3 Fauna Impact assessment**

No species listed in The Wildlife (Northern Ireland) Order 1985 list were noted in the study area. The ruined farm building to the north-west of the site were inspected from the ground with close-focussing binoculars for signs of use by bats. No faunal species listed as a Northern Ireland Priority Species were noted using the study area.

The wildlife found within the study area is considered to be of low value.

### **7.2.4 Mitigation**

Where necessary, vegetation will only be cleared between September and February, to avoid disturbance to breeding birds from early April to mid July in accordance with the Wildlife (Northern Ireland) Order 1985. The access tracks for construction and maintenance should follow the shortest possible route to the turbines in order to limit impact to the wet heath/acidic grassland mosaic habitat. Any peat generated must not be taken off site and any excess runoff should be captured and attenuated in holding ponds, prior to release into the existing watercourse network.

## **Section 7.3 Ecological Impact – Birds**

To date no species listed in Annex I of the EU Birds Directive (CEC, 1979) or the Birds of Conservation Concern in Ireland (BoCCI; Newton *et al.*, 1999) Red List were recorded after 6 months of the full year field assessment undertaken by Nick Veale from RPS Consultants.

Vantage Point Surveys monitored birds flying throughout the entire site area during the bird breeding season from March through to September 2007 and the winter season from September through to February is currently being monitored. This allows a visual assessment of the bird species present at the site. In total, 19 species of birds were recorded during the course of the 126 hours of observations to date.

To date no species listed in Annex I of the EU Birds Directive (CEC, 1979) or the Birds of Conservation Concern in Ireland (BoCCI; Newton *et al.*, 1999) Red List were recorded. The study area is considered to be of moderate local value for birds.

### **7.3.1 Mitigation**

Vegetation should be cleared between September and February, to avoid disturbance to breeding birds in the spring and summer months in accordance with the Wildlife (Northern Ireland) Order 1985.

#### **Disturbance/ Displacement**

Temporary construction activities and moving vehicles may decrease the use of the site by breeding and foraging birds on areas adjacent to the site. The low habitat value of the site are of limited and local ecological value to bird species either in a local or regional context and are already highly disturbed by intensive farming practices. A minor adverse impact is predicted.

#### **Direct Habitat Loss**

The proposal will result in only a small and localised loss of vegetation, therefore an overall minor adverse impact is predicted.

## Section 7.4 Noise Assessment

This assessment of the acoustic noise impact of the proposed Dunmore wind farm on nearby properties has been made based on the recommendations specified in the DTI publication *The Assessment and Rating of Noise from Wind Farms* (ETSU-R-97).

### Construction Noise

Noise generated during construction phase should be controlled by adopting control principles described in *BS5228* (Noise Control on Construction and Open Sites). This will aid in minimising any potential noise disruption during the construction phase.

Therefore, it is not anticipated that any of the residential properties in close proximity to this site are likely to be affected by noise as a result of construction activities due to their location and the scale of works required.

### Background Noise Monitoring & Turbine Sound Levels

The noise assessment of the proposed wind turbines at Dunmore was undertaken by White Young Green environmental consultants. For the purposes of this assessment, the noise profile is based on 3MW Vestas V90 wind turbines.

A baseline noise survey was undertaken during November 2007. One noise monitoring location was selected in closest proximity to the nearest noise sensitive residential property located within the general area.

Noise monitoring was conducted within the garden at this nearest noise sensitive property known as 194 Windy Hill Road from 14<sup>th</sup> November to 16<sup>th</sup> November 2007. Due to battery failure within the weather protection kit, further monitoring was carried out at this same location from 21<sup>st</sup> November 2007 until 26<sup>th</sup> November 2007. Rainfall data was also recorded and synchronised with the noise and wind speed data.

The measured background noise levels were used to determine indicative noise limits at the nearest residential property to the wind farm site as specified by DTI's Noise Working Group. The DTI Guidelines recommend that the allowable noise limits be set at 5dB(A) above the measured background noise during both daytime and night-time, with the exception of the daytime limits (in low noise environments) – 35 – 40 dB(A) or at night-time – where there is a fixed limit of 43 dB(A). This night time noise limit is based on sleep disturbance criteria of 35 dB(A) (an allowance of 10dB(A) has been made for attenuation through an open window).

Using the Sound Power Level data provided White Young Green Environmental Ltd. have determined that the Vestas V 90 3 MW wind turbines are suitable for use on any of the modes within this proposed wind farm at the Dunmore site.

White Young Green Environmental Ltd. has carried out a preliminary noise assessment in accordance with the recommended ETSU-R-97: *The Assessment and Rating of Noise from Wind Farms*, Department of Trade and Industry (1996) methodology and referenced the results obtained against the recommended limit values. From the calculations of the proposed wind turbines, the results indicate that the predicted noise levels should be within 5 dB of the background and should not exceed the 43 dB limit as prescribed within ETSU-R-97 guidance.



## **Section 7.5 Hydrology**

The assessment of water courses, surface water quality and mitigation was undertaken by David O'Hagan from Doran Consulting.

The hydrology of the site is not considered to be adversely impacted by the proposed development.

Minimal effects on the hydrology are expected during the construction phase of the development. Any field drainage encountered and disturbed during construction will be repaired prior to reinstatement and agreed with the land owner.

Minimal effects on the hydrology are expected during the operational phase of the development with a slight increase in impermeable areas contributing to surface runoff.

The main potential impacts are during the construction phase, which can be controlled by adopting standard mitigation measures.

### **Mitigation Measures**

During construction of the turbine foundations, temporary drainage and silt traps will be installed.

Domestic sewage will be stored in conservancy tanks, which will be emptied on a regular basis.

Spill kits will be stored on site containing absorbents and booms to address any fuel spillages as a result of refuelling vehicles. The storage of fuel on site will be restricted any requirement to store fuel will be within appropriate containment facilities.

Any concrete required is likely to be mixed off site, in the unlikely event there is a requirement for onsite mixing this will be carried out within containment to prevent release into the environment.

All contractors will be trained in the handling of hazardous substances, pollution prevention and in the use of pollution prevention equipment. All construction works will be undertaken with reference to relevant Pollution Prevention Guidelines (PPG).

In the event that a storm drainage system is required, a Sustainable Drainage System (SuDs) will be incorporated into the scheme.

## Section 7.6 Geology & Hydrogeology

Doran Consulting has prepared the Geology and Hydrogeology section of the Environmental Impact Statement. The section comprises three distinct phases in analysing the potential geological and hydrogeological impacts of the proposed development: Existing conditions, assessment of emissions and proposed mitigation measures.

The 1:50,000 solid Geology Map of the area (Limavady Sheet 12 and part of sheet 6), published by the Geological Survey of Northern Ireland indicates the site is underlain by bedrock of the Upper Basalt Formation of the Antrim Lava Group.

The 1:50,000 Drift Geology Map of the area (Limavady Sheet 12 and part of sheet 6) published by the Geological Survey of Northern Ireland, indicates rock at or relatively near the surface at a number of locations throughout the site and generally in association with elevated topography.

The drift geology map further illustrates that the majority of the site is underlain by peat, with minor occurrences of Glacial Till (Boulder Clay) predominantly in the northern part of the site.

The bedrock rock is anticipated to be suitable as a foundation bearing stratum. It is likely that excavation will be required into the rock to form the turbine foundation using hydraulic breakers.

In slope stability terms the underlying bedrock is competent and the risk of inducing slope instability at the site is considered to be low.

In summary the geology/hydrogeology is not considered to be adversely affected by the proposed development.

As there are not expected to be any adverse effects on soils or groundwater during the operational phase.

The main impacts are during the construction phase, which can be controlled by adopting standard mitigation measures. A more detailed geo-technical assessment would be carried out prior to construction to confirm foundation design.

There are not expected to be any adverse effects on soils or groundwater during the operational phase, as it is not intended to carry out any process industries or store or transport any hazardous materials on site.

### Mitigation Issues

The following standard measures shall be carried out during construction:

Areas stripped of earth or vegetation shall be kept to a minimum (aggregate should be imported rather than quarried on-site).

Spill kits will be stored on site containing absorbents and booms to address any fuel spillages as a result of refuelling vehicles. The storage of fuel on site will be restricted any requirement to do so will be within appropriate containment facilities.

Cement shall be mixed within containment, tools washed in the same area and water recycled (in the cement mix)

All contractors responsible for handling hazardous substances will be trained in procedures for proper storage and handling of such substances prior to commencing work on site.

All construction works will be undertaken with reference to relevant Pollution Prevention Guidelines (PPG).

### Operational Phase

As there are not expected to be any adverse effects on soils or groundwater during the operational phase, no mitigation measures are required.

## Section 7.7 Turbine Haulage & Road Access

In order to facilitate the transportation of turbine components, construction plant, equipment and deliveries to the Dunmore site, a traffic management plan will be prepared in cooperation with the Roads Service.

A desktop assessment conducted in September 2007 identified a number of potential haulage routes for the delivery of wind turbine components to the Dunmore site. Further site investigation works were carried out in October 2007 to survey and measure road and intersection widths to ensure successful transportation and least disruption would take place to existing road users. At present it is proposed that the turbine components would arrive into Lisahawley port but this is subject to the turbine manufacturer and size of the components in question. If another port were to be used, the haulage route would be reassessed from that point.

The proposed haulage route for turbine components is as follows:

- Follow from port of destination in Lisahawley to A2 Londonderry to Limavady Main Road
- Follow this road for 28km approximately towards Artikelly
- Proceed through Artikelly onto the B201 east towards Coleraine
- Continue for approximately 7.5km to Dunmore
- Turn right onto Bolea Road and continue approximately 0.5km to site entrances.
- Entrance to turbine 1 being on the right hand side and site entrance to turbines 2-8 being on the left.
- Follow access tracks up to the wind turbine site locations.

An overview map of the haulage route is shown in Appendix A08a Volume 2.

Any haulage constraints identified along the proposed route are detailed in section 13.5 of Volume 1 EIS. No private land take is required at any of the constraint junctions as the land used to execute the turn into Bolea Road is owned by the Dunmore site provider. Maps and photographs of the potential constraint junctions are shown in Volume 2, Appendices A08a-A08l inclusive.

### **Construction Traffic**

During the construction phase different vehicles and cranes will arrive on-site. Equipment would be delivered at the commencement of the relevant construction phase and would remain within the compound area unless specified by the Wind Farm Construction Manager.

### **Long & Heavy Load Vehicles:**

Most of the heavy earthmoving equipment and long loads would be of standard dimensions that will not require special considerations. However the 1000 tonne crane used in the erection of the turbine components will require a police escort.

### **Nacelle**

This will be transported on a low loader trailer, which is capable of carrying a load of up to 125 tonnes, with a weight of 14.25 tonnes per axle on 8 axles. Typically the nacelle will weigh approximately 70 tonnes.



Figure 7.7 Nacelle transport vehicle

### Tower Sections

The tower sections of the largest considered wind turbine have a maximum diameter of 4.2 metres; this will be transported on a trailer low loader (see Figure 7.7).

There will be four tower section deliveries for each turbine dependent upon the chosen model (see Figure 7.7.1).



Figure 7.7.1 Tower section transport vehicle

**Turbine Blades:** An extendable trailer as shown in Figure 7.7.2 is used to deliver the turbine blades. This will consist of a single blade unit on a low loader long vehicle, which will house the blades of up to 41m in length.



Figure 7.7.2 Blade transport vehicle

#### **Turbine Haulage Route Mitigation Measures:**

Minimal and temporary traffic disruption will be experienced by local people especially on Bolea Road while turbine components are being transported to the site.

Turbine deliveries to the site can be made during off peak hours (typically 09:30hrs to 15:00hrs and 18:00hrs to 06:00hrs) at the discretion of the PSNI and the Roads Service. This will ensure that local residents are not inconvenienced during the busiest periods of road use.

Following the examination of the proposed turbine haulage route and previous consultation with DOE Roads Service Departments on various wind farm developments in Northern Ireland, the following mitigation measures are proposed prior to any construction activities commencing:

- A comprehensive turbine haulage survey route will be carried out by Civil Engineers, TCI Renewables and Roads Service to assess existing road conditions needing improvements to accommodate wide loads. Any damage or over-run caused by vehicles during haulage is to be repaired to agreeable standards.
- A Traffic Management Plan will be produced in cooperation with the Roads Service and written into all sub-contracts with turbine suppliers and civil engineering sub-contractors to ensure compliance.
- PSNI will be notified of the movement of long and abnormal loads and applications for the use of police escorts will be made if required to do so.
- An escort vehicle will be used; this is particularly relevant on bends or junctions where long vehicles would need the entire road width upon cornering. This would occur on the B201, A2 and Bolea Road. Escort vehicles would drive ahead and stop oncoming traffic if necessary.
- Personnel with radio transceivers will be positioned at junctions requiring traffic management. This will allow traffic to be held with minimum disruption.

For return journeys, extendible low loaders used for wind turbine delivery should be closed so that they would leave the site at normal length 16 metres approximately.

The transport mitigation measures proposed by the Roads Service and TCIR in cooperation with the turbine haulage contractor will be agreed prior to construction, to minimise the impact on local roads and traffic and to ensure the safety of other road users.

## **Section 7.8 Shadow Flicker**

Shadow flicker from wind turbines occurs when a particular combination of weather conditions coincide in specific locations at particular times of the day and year. It happens when the sun is low in the sky and shines on a building or location from behind a turning rotor. This can cause the shadow of the turbine blades to be cast which appears to “flick on and off” as the turbine rotates.

TCIR have calculated the number of hours per year likely to be experienced under exceptional circumstances using the geometry of the machine and the latitude of the potential site. (See Volume 1, Section 14, Shadow Flicker methodology and calculations).

If shadow flicker does occur at neighbouring properties, the duration of any shadow flicker event would be sufficiently short to have only a temporary effect and not exceed the 70 hour guideline limit.

### **Dunmore Shadow Flicker Assessment**

A desk-top analysis was completed and follow-up site visit was conducted (13/11/07) to evaluate the properties most likely to be affected by shadow flicker.

The site has a single residential property within the potential shadow flicker zone. It is has been calculated that this property may experience some shadow flicker but for no longer than 20 hours per year over 46 days with each occurrence lasting less than 1 hour. A graphical representation of the “worst case” scenario has been presented in Volume 1, Section 7.8, Shadow Flicker Assessment.

The computer-generated assessment of shadow flicker created by the wind turbines at Dunmore, takes no account of natural screening (buildings, trees, topography) and in addition all of the conditions outlined above must also occur to enable shadowing.

### **Mitigation**

If local residents surrounding the Dunmore Wind Farm site experience shadow flicker, the installation of blinds or curtains or the planting of screening vegetation may assist to mitigate any impact.

Post-construction monitoring can be implemented if deemed necessary by the Planning Service.

Measures can be taken to minimise the potential of occurrence of reflectivity from the turbines by carefully selecting both the colour and finish of the turbine blades. It is proposed to use an industry recommended pale grey colour with a semi matt finish for the turbine blades. This colour is considered the best to achieve minimal reflection.

## **Section 7.9 Electromagnetic Interference (EMI) & Aviation**

### **Electromagnetic Interference**

Wind turbines have the potential to interfere with radio waves of various frequencies, e.g. TV, radio and microwave. Extensive consultation has been undertaken with public and private operators in order to establish the electromagnetic environment within and around the Dunmore wind farm site.

Important stakeholder consultation work was undertaken in conjunction with: BBC, Cable & Wireless, BT, Ofcom, O<sup>2</sup>, Orange, Vodafone, Three, T-Mobile, National Grid Wireless, Water Service, Ministry of Defence, PSNI, CAA, NATS, Energis and Defence Estates. No objections were raised by these agencies.

However, if television reception problems are identified once the turbines are operational then remediation measures can be implemented. These may include: the restoration (or even improvement) of TV reception by redirecting or replacing domestic TV aerials and installation of digital TV facilities.

### **Mitigation Measures**

No mitigation measures are considered necessary with respect to interference with telecommunications from the eight wind turbines at Dunmore.

### **Aviation**

As part of the consultation process, the applicant consulted the Ministry of Defence (Defence Estates), the CAA (Safety Regulations Group), NATS, Belfast City Airport, Belfast International Airport and Eglington City of Derry Airport.

The site was cleared by the Ministry of Defence; however CAA and NATS referred us to contact the City of Derry Airport. City of Derry Airport raised a query regarding the proposed wind turbines in relation to the runway centreline and line of site to the airport and their chosen radar site. As a result of this TCIR decided to commission a specialist to examine the potential interference upon radar and line of sight at the City of Derry Airport. TCI Renewables commissioned STASYS Lockheed Martin to examine this issue in more detail.

As a result of a meeting, the City of Derry Airport were re-consulted and asked to consider removing the objection to the Dunmore wind farm proposal. TCI Renewables are awaiting a reply from the airport.

## **Section 7.10 Archaeology & Heritage**

Effects on archaeology could potentially occur when the ground is disturbed during the construction phase to create turbine and crane hardstandings and to construct tracks and underground cables.

Gahan & Long undertook an Archaeological Assessment of the site to determine what effects the proposed development may have on the archaeology and heritage around the development site and surrounding area.

### **Assessment**

The sites and monuments records housed within the DOE – Environment and Heritage Service were inspected to identify any known archaeological monuments located within the proposed development area.

One archaeological site, was identified within the development area. The site can no longer be located and will not therefore be directly physically impacted upon by construction of the wind farm.

None of the sites identified within the development area will be directly physically impacted upon by the proposed wind farm. However, it is possible that surviving archaeological material may exist sub-surface within the development area, and therefore during the construction phase of the development archaeological mitigation will be required.

Any potential adverse impacts on the archaeological resource will be fully mitigated through a program of investigation and recording.



## Section 7.11 Air & Climate

### Air Quality

There is likely to be dust generated during the construction phase which may have short term implications for local air quality.

Dust suppression techniques will be used to avoid access track dust impacts, whilst close liaison will be maintained with Limavady Borough Council throughout the construction phase to facilitate awareness and to mitigate any complaints should they arise.

### Climate

Wind power avoids many of the environmental costs of conventional electricity generation, including reduction in air quality and the damage to the natural environment caused by acid rain from pollutants such as oxides of nitrogen (NO<sub>x</sub>) and sulphur dioxide (SO<sub>x</sub>).

Electricity produced from renewable sources can displace electricity that would otherwise be generated from conventional fossil fuel power stations and reduces emissions. For each year of its operation, the Dunmore Wind Farm would also directly prevent the emission of carbon dioxide (CO<sub>2</sub>). As such, the development would contribute both to improved air quality at a local and regional level and would also contribute towards achieving national targets to reduce carbon dioxide.

The estimated pollution reduction results of operating eight 3MW wind turbines at Dunmore are shown below in Section 7.12. These figures are based on the predicted capacity of the wind farm (taking into account the intermittent nature of the wind, the down time of the wind turbines due to scheduled maintenance and other energy losses) and operation of the turbines directly replacing production from coal and gas power stations in Northern Ireland.

**NB:** It should be noted that these figures do not account for the switch from oil to gas for Coolkeeragh power station which will ultimately affect the generation mix resulting in overall lower emission figures for NI by the time the Dunmore Wind Farm would be operating.

## Section 7.12 Socio-Economic Benefits

The main environmental benefits which would result from the operation of the Dunmore Wind Farm would be:

- The generation of clean, renewable electricity equivalent to the combined average domestic consumption of more than 12,900 homes (based on a 4700kWh/year average load figure).
- The CO<sub>2</sub> emission offset would be between 22,558 and 52,434 tonnes of CO<sub>2</sub> per annum depending on the source of electricity generation it is displacing. Over the expected twenty year life of the wind farm this would equate to an offset of up to a million tonnes of CO<sub>2</sub>.
- The annual saving of approximately 610 tonnes of sulphur dioxide.
- The annual saving of approximately 183 tonnes of nitrogen oxides.
- No environmental damage or degradation associated with the extraction and transport of fossil fuels, or the disposal of waste products.
- The turbines will produce the equivalent amount of electricity as is used in its fabrication, installation, operation, and eventual decommissioning, within 3-5 months of operation.

There will be direct economic benefits during the construction phase, through the provision of construction jobs and locally sourced manufacturing content.

The operation of the wind farm represents an educational opportunity for schools, local community groups and the public. It would assist in raising awareness of wind energy generation, energy conservation issues and generational sustainability.

There is no evidence to suggest that a wind farm has a detrimental effect on tourism. Wind farms themselves serve as tourist attractions, with increasing numbers throughout Northern Ireland visiting wind farms. For example, the developers of the Altahullion Wind Farm have set aside a single turbine especially for tourism and as an educational resource where members of the public can walk right up to the turbines.

The UK's first commercial wind farm in Delabole, Cornwall received 350,000 visitors in its first eight years of operation.

In Scotland, a Mori poll was undertaken in 2002 regarding wind farms in the Argyll area. Eighty per cent (80%) of tourists said they would be interested in visiting a wind farm if it were open to the public with a visitor centre.

The interest and support for renewable energy and wind power in particular is already evident in the number of visitors to existing wind farms across Northern Ireland.

## Section 7.13 Public Information

Public information about the wind farm was posted to key government agencies, community groups and key stakeholders. Anyone requiring additional information was invited to make contact with the Project Development Team.

A Dunmore Wind Farm information leaflet was designed and printed (x 1000) for distribution in the immediate area surrounding the wind farm site (approximately 3km radius). The leaflet contains details of the proposed development, information on wind energy technology and TCI Renewables' contact details.

Information leaflets were also left at strategic places around the wind farm site and within the wider area. TCIR attempted to choose locations that would offer a good geographical spread, high visitor numbers and cross community access. Approximately 30 leaflets were left at each of the following locations;

- Bolea Post Office
- Costcutter Supermarket, Articlave
- XL Stop 'n' Shop supermarket, Artikelly

TCIR Development staff visited homes within a 3km radius of the wind farm site to inform local residents about the proposal. An information pamphlet was left at every house with contact details and a 'Further Information Response Form' to allow residents to request more detail.

To date only 6 residents have requested further information to be sent regarding the proposed development via either the e-mail contact or via postal returns forms.

TCI Renewables arranged an information afternoon / evening at the Earls Room in the Roe Valley Radisson Hotel, Limavady. This was held on the 29<sup>th</sup> October 2007 from 1pm – 7.30pm. This comprised project information display boards, project drawings and visual media. There were also questionnaires and support letters available for visitors to leave any comments and suggestions.

The exhibition was advertised in two local newspapers;

- The Northern Constitution
- The Chronicle

Invitations to the exhibition were sent out to all Limavady and Coleraine Councillors and the landowner prior to the event. Adverts were also left in the Costcutter Supermarket in Articlave and the Stop 'n' Shop supermarket in Artikelly.

The exhibition was visited by the First Minister for Northern Ireland Dr Paisley and Mr Gregory Campbell MP MLA for East Londonderry. Several local councillors also attended the event including DUP Alderman George Robinson, DUP Councillor Adrian McQuillan and Limavady Town Clerk and Chief Executive Liam Flanigan.

The exhibition was well attended by local residents and approximately a third of those who attended also filled in a questionnaire. The results were positive with 78% approving of the Dunmore Wind Farm proposal:

At the time of this planning application (November 2007) TCIR have not received any requests for additional information from interest groups, national bodies, council or local political representatives.

Project information will also be loaded onto the TCI Renewables website.

The response to the Dunmore Wind Farm proposal has been positive and the company remain confident that support will grow as people learn more about the details of the proposal. The developer will continue to issue press releases to key stakeholders throughout key stages of the wind farm development to disseminate information and inform the interested parties.

## **Section 7.14 Safety Assessment**

There are a number of potential risks that might be associated with the construction and operation of the wind farm. However, the design of the wind turbines, their location and proposed construction methods would combine to ensure these risks do not constitute a risk to public safety.

Throughout the construction phase of the development, the relevant statutory requirements will be adhered to. All hazardous areas will be fenced off and unattended machinery would be stored on-site and immobilised to prevent unauthorised use. Any potentially hazardous materials will be managed in accordance with Duty of Care. In addition, temporary construction safety signs would be erected and placed in the most appropriate locations.

### **Public health and safety issues**

The land on which the wind farm is sited is privately owned, and there will be no unauthorised access to the wind farm site. Public health and safety measures should be confined to working personnel and the landowner.

No restrictions will be placed on the landowners' access to the turbines during the operational life of the wind farm, although access to the turbine towers and transformer housing will be strictly forbidden and doors locked at all times, except when attended by an authorised maintenance worker.

The turbine models being considered for this site would operate automatically and have sensors to detect any instabilities or unsafe operation during periods of severe winds. Should a technical fault be diagnosed via computer control system, the individual turbine or wind farm would shut down.

No significant adverse impacts have been identified on public health and safety issues and as a result no mitigation measures are considered necessary other than the implementation of all relevant standard health and safety legislation and by regulating public access.

## **Section 8.0 Conclusions**

This non-technical summary has outlined the findings of the EIA for the Dunmore Wind Farm. Full details are set out in the Environmental Statement and the accompanying technical appendices.

The Dunmore wind farm site was chosen as a site with good development potential in terms of wind resource, topography, grid access, distance from dwellings, noise compliance and accessibility with due regard to the planning constraints identified during the preparation of the environmental assessment

The Environmental Impact Assessment has addressed a wide range of potential impacts. The assessment has demonstrated that any potential adverse effects of the Dunmore Wind Farm can be mitigated and that there are real and lasting benefits resulting from this development.

Whilst the wind farm will have some residual effects, most have been addressed and mitigation measures are in place. The principal residual effect is predicted to be the visual impact of the eight wind turbines on the landscape.

A balance is needed between conserving designated areas and the need for renewable energy projects to contribute towards UK energy targets. The Dunmore wind farm will occupy only 0.02% of the 14100 ha AONB designation and will generate enough electricity to power the equivalent of approximately 12,900 houses.

The Dunmore Wind Farm consisting of 8 No. wind turbines will make a positive contribution to sustainable energy generation in Limavady Borough Council and Northern Ireland. The eight turbines will help lead to a reduction in the production of greenhouse gases and provide a renewable supply of electricity to secure energy supplies in this region.

Additionally the project will contribute to the local and regional economy through construction, operation and financial activities, coupled with the environmental and cost benefits to purchasers of renewable energy.

This Environmental Statement has shown that no environmental, cultural or societal interest of acknowledged importance will be significantly, adversely affected by the development of this project.

**For these reasons Dunmore Wind Farm is submitted for planning approval.**

## **Further Information:**

All three volumes of The Environmental Statement can be purchased from:

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The price is £80.00 (including postage and packaging) for a bound paper copy of Volumes 1, 2 and 3.

Paper copies of Volume 1 only, will cost £35.00 including postage.

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The Non-Technical Summary (Volume 3) is available separately for £5.00 including postage.

Electronic copies of the three volumes of the EIS are available on CD for £5.00 each (including postage and packaging).

Additionally the EIS is available to buy from Limavady Post Office

38-40 Main Street  
Limavady  
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BT49 0EU

The price is £60.00 for a bound paper copy of the entire statement i.e. Volumes 1, 2 & 3 (as postage and packaging is not required) or the Non Technical Summary is available for £5.00.

Alternatively, the Dunmore Wind Farm Environmental Impact Statement can be inspected free of charge at:

Planning Service  
Millennium House  
17-25 Great Victoria Street  
Belfast  
BT2 7BN  
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(Strictly by appointment only)

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