

Brockaghboy Wind Farm

Environmental Impact Assessment

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Volume 3:
Non Technical Summary



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December 2007

Brockaghboy Wind Farm Environmental Impact Statement

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Introduction

Volume 3 - Non-Technical Summary

This non-technical summary is the third volume of the Environmental Impact Statement (EIS) for the proposed 60MW Brockaghboy Wind Farm development, 7.5km southwest of Garvagh, Co. Londonderry.

The information contained in this report has been prepared by TCI Renewables to help the Planning Service assess the environmental impacts of the above proposal in a clear and concise manner.

It will also provide interested stakeholders with the essential information about the proposed Brockaghboy Wind Farm.

The Planning Application

The proposed development application is for twenty (20) wind turbines, associated transformers, two permanent 80 metre anemometer masts, site access tracks and gates, a site control room compound and substation, electrical cabling, a temporary storage compound, five site entrances, road improvement works at the site entrances and all ancillary works on land approximately 750m East of Dowlins Bridge, Drumbane Road, Garvagh, Coleraine, Co. Londonderry.

The Applicant

This wind farm development application is being lodged in the name of *Brockaghboy Windfarm Ltd* a subsidiary of TCI Renewables Ltd.

TCI Renewables (Total Communications Infrastructure)

As a leading independent renewable energy business, TCIR undertakes project financing, development, construction and the operational management and maintenance of renewable energy facilities throughout Northern Ireland, England, Canada and North America.

Section 1.0 Wind Energy Overview

Wind energy has become the most advanced renewable energy technology being used in the United Kingdom and Northern Ireland. There are five major reasons why wind energy is being harnessed in Northern Ireland.

- Wind energy produced clean, safe renewable electricity with no atmospheric pollution.
- Northern Ireland has some of the highest mean wind speeds of any area in the European Union.
- Technology advances mean low-cost electricity
- Wind energy can help reduce the reliance on imported coal, oil and gas for electricity generation
- The building of wind farms creates a sustainable industry, rural diversification and regional economic growth.

UK Climate Change Policies

The UK government now sees the growth of renewable energy as a direct and immediate response to the hazards of climate change and have set a 20% renewable energy target by 2020 to achieve a reduction in greenhouse emissions from the burning of fossil fuels responsible for global warming.

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 to encourage the development and the future growth of the wind energy industry.

Planning Policy in Northern Ireland

The proposed 60MW Brockaghboy wind farm falls within the Coleraine Borough Council. There are no references to wind energy in planning or development documents. Guidance comes from the following documents:

- Draft Northern Area Plan 2016
- Planning Policy Statements
- Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 1999
- A Planning Strategy for Rural Northern Ireland, and
- 2025 Shaping Our Future

Section 2.0 - Site Description

The location of the proposed development is located approximately 7.5 kilometres south of Garvagh, County Londonderry. The site is comprised of grassland/scrub/heath and bog predominantly grassland used for grazing sheep in the town land known as **Brockaghboy**.

The site can currently be accessed from both the Drumbane and Curraghmore Roads. The approximate central grid reference for the proposed wind farm was recorded using a GPS as: Easting 281300, Northing 410625.

Nine of the proposed wind turbines are located west of Curraghmore Road, seven are located between Curraghmore Road and Drumbane Road and the final three are on the eastern side of Drumbane Road. The portfolio is made up of eight different land owners.

The topography of the area slopes downhill from west to east, with a ground height variation of approximately 345m ASL (western side) down to 245m ASL (eastern side).

The map below shows the final turbine layout for the proposed Brockaghboy wind farm. This layout was optimised to maximise electricity generation using twenty wind turbines, meet manufacturers' warranty conditions, meet planning service criteria whilst meeting noise guidelines set by the Department of Trade and Industry.

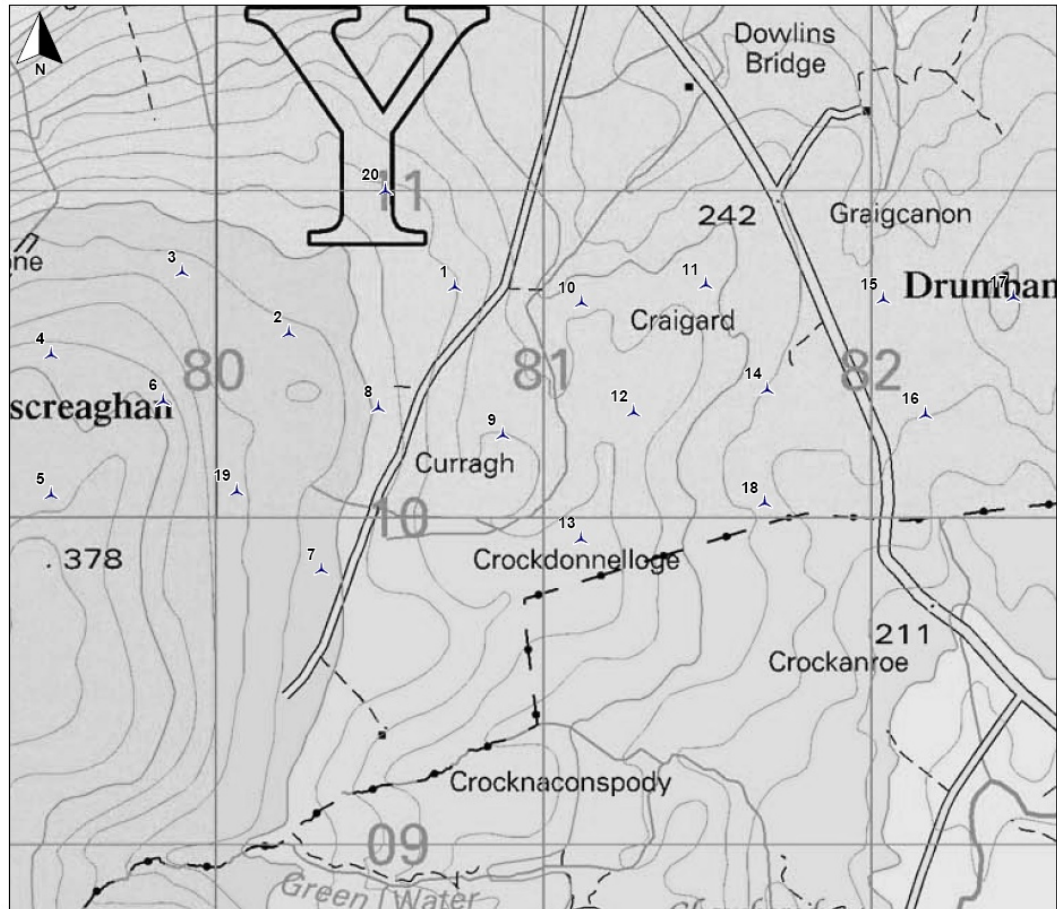


Figure 2.0 Proposed Brockaghboy wind farm layout

Landscape Character

The site is located on an elevated position in the northeast corner of the Sperrin Mountains; however it is separated from the main body of the Sperrins by the summits of Carn Hill and Craigmore. The landscape consists mainly of rough pasture, open moorland and scrub hilltops. Land use is predominantly pastoral. This transitional landscape typically has many small-holdings and derelict cottages, but there are no settlement clusters and few roads.

The visual character of the development area has the following key characteristics:

- Broad, rounded ridges with sweeping slopes and rocky outcrops leading to steep, pointed summits.
- Deep, branching gullies and open, fast-flowing moorland streams.
- Open moorland wilderness, exposed to the elements, with a gradual transition to scrub and pasture on the lower eastern slopes.
- Carpet of open moorland pasture and heather with extensive bog and areas of damp grassland on flatter land and lower slopes.
- Prominent town land boundaries are visible as earth banks and stone walls and form a striking landscape pattern on some slopes.
- Winding moorland roads and straight tracks leading across contours.

Landscape Designations

The 8.1ha site is located within the north eastern periphery of the Sperrin Area of Outstanding Natural Beauty (AONB).

A balance is needed between conserving designated areas and the need for renewable energy projects to contribute towards UK energy targets. The proposed 60MW Brockaghboy wind farm is located on the north eastern edge of the designation and will occupy a mere **0.008%** of the 101006 ha total AONB designation.

This wind farm will generate sufficient clean, renewable electricity to power approximately 35,000 homes and would be fully decommissioned after the 20 years.

Section 3.0 The Proposed Development

The proposed development consists of twenty (20) 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:

The Turbines

The turbines would be horizontal axis wind turbines, incorporating a tapered tubular tower, rotor with three blades attached to a nacelle housing containing the generator, gearbox and other operating equipment.

The towers will be fixed to the ground by a substantial concrete foundation to incorporate the tower base and foundation loading.

The switchgear for the turbines will be contained within the base of the tower. The turbines will operate automatically with remote control operations.

The final selection of turbine is subject to competitive tender after planning 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 12 months on site, 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 throughout the turbine transportation process. 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:

- 80 tower sections (4 per tower)
- 60 blades - length up to 45m
- 20 Nacelles
- 20 Rotors

Total Maximum Height = Up to 125m from ground to tip of the blade

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

Communications with the Road Service has allowed TCIR to establish all potential constraints and Road Service requirements for haulage routes. Concrete and stone delivery routes cannot be confirmed at this stage as the supplier has not yet been determined.

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 Drumbane Road (one to the east to allow access to turbine locations 15-17 and one to the west to allow access to turbine locations 9-14 & 18). Additionally an entrance will be created off Curraghmore Road to accommodate turbines 1-6 & 19-20. Turbines 7 & 8 will have short tracks up to the turbine directly off the Curraghmore Road. The land at the site entrances 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 turbine delivery vehicles, cranes, stone lorries and cement trucks.

Cabling and Grid Connection

All twenty wind turbines would generate electricity at between 400V and 1000V. 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 to Kells Main, a new build substation will be erected along this line and a new 14km overhead 110kV line constructed to the wind farm. This will carry the load from the wind farm onto the NIE network.

The exact location of the "new build line" is subject to survey, planning, design and connection by NIE independent of this wind farm application.

The grid connection circuit will comprise the following components:

- New 110 kV Switching Substation, 14 km 110 kV overhead line, 110 kV circuit breakers (4 No.) and associated equipment, Metering substation, SCADA, protection panel
- 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.

Wind Farm Operations

The routine operation and monitoring will be carried out with the assistance of a computerised control system (SCADA system).

Initial responsibility for operations and maintenance (O&M) will fall under warranty conditions from the turbine manufacturer. However, after this warranty period has elapsed, an O&M 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.

Wind Farm Maintenance

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 Phase

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.

The decommissioning process would take approximately 26 weeks to complete. A decommissioning program would be agreed with the relevant authorities prior to commencement of the required works.

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.

Section 4.0 Site Selection

The selection of the Brockaghboy 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 and noise compliance.

TCIR were approached by one local landowner Patrick O’Kane in April 2005 in response to an advertisement in *Farming Life* publication requesting potential sites for wind farms throughout Northern Ireland. The initial site was surrounded by a significant land bank of similar ground and conditions and as a result several inquiries were made regarding ownership. Numerous meetings took place with landowners at *Glenullin Resource Centre* with eight landowners agreeing to be part of the project. It was determined that the site could meet almost all the required criteria for a wind farm.

In order to maximise energy yield, it was considered appropriate to limit the scale of the development to twenty 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. The wind farm will produce sound levels well within the recommended ETSU guidelines at the nearest occupied residential properties. The Brockaghboy 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 existing roads and tracks, field boundaries and contours within the landscape.

Turbine Selection

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.

Operational Phase

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.

Section 5.0 Benefits of the Proposed Development

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

Environmental Benefits

- Clean, zero-emission electricity
- Securing and safeguarding Northern Ireland's energy supply system

Economic and Community Benefits

- Contracts for local companies for 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
- Purchase and delivery of construction materials (e.g. concrete for the turbine foundations, stone and gravel for access tracks, and temporary fencing).
- Rental income generation for the landowners
- Coleraine Borough Council rates in the order of £200,000 per annum

Section 6.0 Environmental Assessment of the Proposal

Section 6.1 Landscape and Visual Assessment

The landscape and visual assessment of the proposed Brockaghboy Wind Farm was undertaken by RPS Consultants. The methods used in the Brockaghboy Wind Farm Landscape and Visual Assessment were derived from the *Guidelines for Landscape and Visual Impact Assessment* (LVIA).

The existing landscape and visual context of the development 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

Using terrain-modelling techniques combined with the wind turbine height specifications, a 15km ZVI map is created (Appendix B02 Volume 2) 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.

Wireframes & Photomontages

Fourteen representative viewpoints were selected around the proposed Brockaghboy 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.

Impacts on Planning Designations

The proposed wind farm lies within the Sperrin AONB and Countryside Policy Area. The ZVI indicates that only a small portion of the AONB is potentially affected by the proposed wind farm.

Due to the presence of large blocks of forestry planting to the north and east of the site combined with the sites' location on the eastern side of the Carntogher Mountain, the influence of the proposal on the extensive upland landscape of the Sperrins AONB (and 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 significance of the landscape impact for the remainder of the AONB is therefore moderate.

Mitigation Measures:

The design of the wind farm incorporates the following recommendations:

- sensitive use of local materials for access tracks and crane hardstandings
- careful integration of constructed elements with existing elements
- careful grading and site rehabilitation
- appropriate use and colour of security fencing, gates and site buildings
- appropriate colour of wind turbines; and a,
- high quality of finish to access track edges, gates, fences and general site maintenance designed to complement local styles and materials.

To reduce the visual impact there will be no overhead cables between the wind turbines and the site control room and substation. All cables will be trenched and follow, where possible, the route of the access tracks. The wind turbines will be painted in a neutral, matt colour so as to minimise the visual intrusion on the landscape.

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 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, south and west due to the nature of the topography and vegetation. The direction of most views will be from the east.

When views from towns and villages are considered significant visual impacts will occur for parts of Swatragh and Glenullin where views of the proposal are available. No significant visual impacts will occur from Maghera, Kilrea, Upperlands or Garvagh.

When views from A class roads are considered significant visual impacts will occur for parts of the A29 west of Garvagh. No significant visual impacts will occur for the A29 east of Garvagh, the A6 or A54.

When views from B class roads are considered significant visual impacts will occur for parts of the B64 west of Garvagh. No significant visual impacts will occur for the B64 east of Garvagh, the B75, B186, B188, B190, or the B207.

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 14 viewpoints have been assessed. Significant visual impacts occur for 6 of the 14 viewpoints. 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 on the eastern side of the hills such as Carntogher Mountain that prevents views of the turbines across extensive parts of the AONB. However, a substantial visual effect will occur within close proximity to the turbines.

No significant visual impacts will occur from the *Ulster Way*. However, it could also be argued that the proposal would be a significant attraction encouraging more use of the Walking Trail.

In conclusion the significant landscape and visual impacts occur at close proximity (1-3km) to the proposed wind farm. With distance from the turbines, the assessment has established that there is a decreased level of impact beyond 5-7km. 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.

Section 6.2 Ecological Impacts – Flora, Fauna & Habitats

Habitat survey methodology has been undertaken in accordance with Joint Nature Conservation Committee Phase 1 Habitat Survey (JNCC 2003). A Phase 1 survey provides a rapid assessment of habitat presence and quality.

The closest site designated under EU Directives to the proposed Brockaghboy Wind Farm site is the Carn-Glenshane Pass SAC, a large (1930ha) site. The site is covered by uninterrupted tracts of intact blanket bog in the Sperrin Uplands. Intact blanket bog is a priority habitat as scheduled in Annex 1 to the Habitats Directive. The closest turbine to this Natura site boundary is WTG No. 5, located over 125m northeast and down slope of the SAC.

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. Carn-Glenshane Pass ASSI is contiguous with the SAC.

The Draft Northern Area Plan 2016 lists Brockaghboy as a *Site of Local Nature Conservation Importance* (SLNCI) noted as a fen meadow containing marshy grassland with basic flushes on north facing slopes. This 3.9ha site is located 1.1km north of the study area. Carntogether SLNCI is a 374ha site of upland bog and heath land located 1.8km south of the study area. It extends eastward from the SAC boundary for 2.7km towards Swatragh. No impacts are predicted upon the Carn-Glenshane Pass SAC & ASSI.

6.2.1 Habitat descriptions

The site chiefly comprises upland heath land, acidic grasslands and areas of blanket bog. Marshy grassland occurs occasionally as the slopes zone into lower agriculturally improved areas and hedgerows occur only along the local Curraghmore and Drumbane Roads.

No plant species scheduled on the Wildlife (Northern Ireland) Order 1985 were noted during the surveys undertaken within the study area.

A total of 2.91ha of medium value, acidic grassland will be lost. The impact of locating the roads and turbines within this habitat is not considered to undermine the integrity of this habitat type beyond the roadsides. A minor negative magnitude of impact is predicted for this medium value habitat.

A total 2.81ha of upland heath will be lost. This is a high value Annex 1 habitat type, however, this area is small in comparison to the wider landscape of the Sperrins, and Northern Ireland is estimated to contain approximately 58,500ha (EHS 2003a) of upland heath. An intermediate negative magnitude of impact is predicted for this high value habitat. This yields a large adverse impact on a localised scale.

A total 0.38ha of degraded blanket bog will be lost. This area is very small in comparison to the extent of this habitat type in the Sperrin Uplands. The national resource of this habitat is estimated at 140,000ha (EHS 2003b). The integrity of the blanket peat affected by this proposal has already been diminished, and the addition of the wind farm will not significantly increase that degradation. A minor negative magnitude of impact is predicted for this high value habitat. This yields a slight adverse impact.

A total 0.5ha of marshy grassland will be lost. This is a low value habitat, and is common and widespread throughout the region and Northern Ireland. A minor negative magnitude of impact is predicted for this low value habitat. This yields a slight adverse impact.

The development is not anticipated to interfere with the ecological structure and functioning of the streams beyond the limits of the culverting, or hedgerows along the existing roads as commuting corridors or shelter habitat.

6.2.3 Fauna Impact assessment

- No species listed under The Wildlife (Northern Ireland) Order 1985 were noted in the study area.
- No signs of otter or badger were recorded throughout the survey period, and none of the holes found were large enough for badger.
- 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 with microhabitats high value.

6.2.4 Mitigation

Mitigation by design has been incorporated into this project resulting in one turbine being relocated from upland heath to acid grassland, and a reduced overall length of new access tracks across the adjacent lands. The nett result is 900m less new track to be created, reducing the footprint in blanket bog by 0.14ha and 0.4ha in upland heath.

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.

All peat cut in the construction process will not be taken off site and any excess runoff will be captured and attenuated in holding ponds, prior to release into the existing watercourse network.

Section 6.3 Ecological Impacts – Birds

The adverse affects on the local bird population by the proposed Brockaghboy wind farm can be displacement and collision. The displacement can firstly be avoidance of the area by foraging/nesting birds deterred by the presence of the turbines and secondly the loss of vegetation by the construction of access roads to the turbines and the area of ground surrounding each turbine. The risk of bird collision with the blades is the other affect.

A suitably qualified ornithologist from RPS Consultants conducted a 72 hour bird survey over 12 months.

The presence of hen harrier hunting over the site for a large part of the year and the presence of red grouse right through the breeding season are of note. The diversity of raptor species is significant although no species were recorded breeding within the site.

Golden plover and both common and jack snipe were recorded wintering on site. Passerines of note were the good numbers of meadow pipit and skylark, both prey items of hen harrier and merlin.

None of the six raptor species recorded bred on site and there was no evidence of hen harrier breeding within 2km.

Displacement due to direct loss of habitat cannot be ruled out particularly for red grouse and common snipe. Access roads breaking up tracks of heather and disturbance by wind farm maintenance vehicles and land owners on these new access roads may well have affects on red grouse. Access tracks built for the proposed wind farm should be designed to have the least impact on habitat loss as possible.

Mitigation measures set against any mortality from collision, disturbance and loss of habitat should take the form of habitat enhancement and land management. Examples of management may include: a ban on hunting within the site; controls on the levels of grazing to a minimum; halt the burning of heather for grazing and disallow the reopening of old turbarry rights and extensions to prevent turf extraction.

6.3.1 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. Mitigation measures set against any mortality from collision, disturbance and loss of habitat should take the form of habitat enhancement and land management.

Examples of management can be: a ban on hunting within the site; controls on the levels of grazing to a minimum; halt the burning of heather for grazing (often in the guise of red grouse management) and disallow the reopening of old turbarly rights and extensions to prevent turf extraction.

An overall minor to moderate adverse impact is predicted to vegetation communities on the site.

Section 6.4 Noise Assessment

The assessment of the noise impact of the proposed Brockaghboy wind farm has been based on *The Assessment and Rating of Noise from Wind Farms* (ETSU-R-97/DTI 1996).

Construction Noise

During the construction period of up to 12 months, a range of different activities would take place within the site. Activities such as the excavation of the turbine bases, access track construction and cable trench digging will create noise. Working hours are proposed between 7am and 7pm (Monday to Saturday).

Using modern equipment and in combination with the distance between the receptors and the construction activities, calculations indicate that it is highly unlikely that construction noise would breach guideline limits set by BS5228 (1997), "Noise Control in Construction and Open Sites".

Background Noise Monitoring & Turbine Sound Levels

The noise assessment of the proposed Brockaghboy wind farm was undertaken by White Young Green using CadNA software. A background noise survey was carried out at the two closest house locations between the 27th November 2007 and 4th December 2007. Rainfall data was also recorded and synchronised with the noise and wind speed data. However, rainfall noise data recorded during periods of rain was disregarded for this assessment.

The measured background noise levels were used to determine indicative noise limits at the nearest residential properties 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 levels except where the background noise level falls below 30dB(A) to 35 dB(A) at which case an absolute limit should be fixed at a level between 35dB(A) and 40dB(A).

The predicted noise levels from the wind turbines indicate that they should be within 5 dB of the background and should not exceed the 43 dB limit as prescribed within ETSU-R-97 guidance. The proposed wind turbines are suitable for use on this site under any of the modes tested in detail for the noise assessment report. As a result there are no requirements for mitigation on the operation of the proposed site.

Section 6.5 Hydrology, Geology & Hydrogeology

The hydrological, geological, and hydrogeological assessment has identified that the site is sensitive in terms of these environments, requiring mitigating measures to be developed to minimise any potential impact from the development during the construction and operational phases.

Soils Environment

The western portion of the site is blanketed primarily by peat deposits, which are typically one metre in depth, assessments have indicated that most of these deposits could be prone to bog slide. The rest of the site is covered by a mixture of poorly draining surface water humic gleys and humic rankers. Mitigating measures, including a more detailed peat stability risk assessment prior to and stability monitoring during construction have been proposed

Water Environment

Surface water courses located within the development boundaries and subsequent receiving water bodies outside the site are at potential risk of quality degradation during the construction phase of the development. A Sustainable Urban Drainage (SuDs) system and water quality monitoring plan would help to mitigate this risk and minimise any potential impacts in the short and long term.

Two different aquifer units were identified at the site both are classified as locally important with the potential for moderate groundwater yields; however they are classed as having an intermediate to low vulnerability. A small spring was located near to the base of Turbine 10 which could provide a pollution pathway into the aquifer; mitigating measures include exclusion zones and a SuDs design.

Section 6.6 Turbine Haulage & Road Access

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

The proposed access route to the site was developed following various field surveys and in consultation with the Department of Environment Roads Service Section Engineers. Due to the involvement of long vehicles in the delivery of the wind turbines it will be necessary to consult with the Abnormal Loads Division; additionally PSNI will also be contacted prior to haulage taking place to ensure optimum safe passage to and from the site.

Haulage to site will consist of the following, turbine blades, towers, nacelles, rotors, steel reinforcement, stone and concrete. Three haulage routes have been identified for the turbine components.

Further site investigation works were undertaken throughout 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 envisaged that the turbine components would arrive into Lisahalley port but this is subject to the turbine manufacturer and size of the components. If another port were to be used, the potential haulage route would require a thorough investigation.

Any haulage constraints identified along the proposed route are detailed in Volume 1, Section 12.5. Photographs and auto-track analysis maps of the potential constraint junctions are shown in Volume 2, Appendices A08a to A10i 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 to the site.

Nacelles: 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.

Tower Sections: The tower sections have a maximum diameter of 4.2 metres; this will be transported on a trailer low loader. There will be four tower section deliveries for each turbine.

Turbine Blades: An extendable trailer 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 45m in length.

Turbine Haulage Route Mitigation Measures:

Temporary traffic disruption will be experienced by local people while turbine components are being transported to the site. Turbine deliveries 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.

A comprehensive turbine haulage survey will be carried out by Civil Engineers, TCI Renewables and Roads Service to assess any 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. 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.

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 all road users.

Section 6.7 Shadow Flicker & Reflectivity

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. TCIR have calculated the number of shadow flicker hours per year likely to be experienced under exceptional circumstances using the geometry of the machine and the latitude of the potential site.

The site has a single residential property within the potential shadow flicker zone. It has been calculated that this property had the potential to experience some shadow flicker in the worst case scenario model. In reality the property is a single storey dwelling surrounded by thick tree cover, large outbuildings and no windows or doors directly facing the wind farm, and as a result shadow flicker is highly unlikely to occur at all. A graphical representation of the "worst case" scenario has been presented in Volume 1, Section 13, Shadow Flicker methodology and calculations).

Mitigation

If the effect of shadow flicker occurs at local properties, the installation of blinds or the planting of screening vegetation may assist to alleviate the problem. Measures can be taken to minimise the potential of occurrence of reflectivity from 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 and is widely used in the Northern Ireland wind farm market.

Section 6.8 Electromagnetic Interference (EMI) & Aviation

Electromagnetic Interference

Extensive consultation has been undertaken with public and private operators in order to establish the electromagnetic environment within and around the Brockaghboy wind farm site.

Important stakeholder consultation work was undertaken in conjunction with: BBC, Cable & Wireless, BT, Ofcom, O², 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.

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 twenty wind turbines at Brockaghboy. All consultees gave the proposal clearance on EMI grounds.

Aviation

Consultations were undertaken with the Ministry of Defence (Defence Estates), the CAA (Safety Regulations Group), NATS, Belfast City Airport, Belfast International Airport and Eglinton City of Derry Airport. The site was cleared by all consultees without objection.

Section 6.9 Archaeology & Heritage

Gahan & Long carried out an archaeological assessment of the site. 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.

Two archaeological sites were identified within the development area. The site is identified as a standing stone dating to the pre-historic period. This is a sub-rectangular block of stone 1.1m high and 0.5m wide. It has been exposed in an old peat cutting.

The second site is identified as huts. These are described within the OS field reports as 'beehive huts' reported close to the former edge of Drumdullaghan Lough. This site could not be located and no further details are currently available. None of these sites will be directly physically impacted upon by construction of the wind farm.

In addition, Dowlins Bridge is located along the development boundary. This site too, will not be physically impacted upon by the proposed wind farm.

It is possible that archaeological material may exist sub-surface within the development area, and therefore during the construction phase of the development archaeological mitigation measures will be required. Please refer to Section 15 Archaeology in Volume 1 of the ES for further information and mapping.

Section 6.10 Air & Climate

Local 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 Coleraine 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 problems of carbon-based 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_x) and sulphur dioxide (SO_x).

Electricity generated from wind farms can displace electricity that would otherwise be generated from fossil fuel power stations.

Section 6.11 Socio-Economic Benefits

The environmental benefits from the operation of the Brockaghboy Wind Farm would be:

- The generation of clean, renewable electricity equivalent to the combined average domestic consumption of almost 35,000 homes (based on a 4700kWh/year average load figure).
- The CO₂ emission offset of more than 140,000 tonnes per year. Over the expected twenty year life of the wind farm this would equate to an offset of more than 2.8 million tonnes of CO₂.
- The annual saving of approximately 1600 tonnes of sulphur dioxide and the annual saving of approximately 490 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 such as stone, cement, concrete and plant. 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.

Wind farms themselves serve as tourist attractions, with increasing numbers throughout Northern Ireland visiting wind farms.

Section 6.12 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 Brockaghboy Wind Farm information leaflet was designed, printed and distributed within a 5km radius surrounding the wind farm site. A *Further Information Response Form* to allow residents to request more detail was also included with every leaflet.

Approximately 30 leaflets were left at Maghera Post Office, MACE Supermarket in Swatragh and Garvagh Post Office. At the time of submission, only one resident requested further information.

A press release and advertisement for a two day public exhibition at the Glenullin Resource Centre went to press at the end of October 2007. This was printed in the *Mid Ulster Observer*, *The Co. Derry Post*, *The Coleraine Chronicle* and *The Coleraine Times*. Personal invitations to the exhibition were posted to all Coleraine Councillors, MLA's and the landowners prior to the event. Adverts were posted in the Swatragh MACE store and the Post Office in Garvagh.

The exhibition - held on the 14th and 15th November 2007 from 1pm – 8.00pm - comprised project information, design drawings, mapping and visual media including photomontages. There were questionnaires and support letters available for visitors to leave any comments. More than 90 people attended over the two days with more than 98% in favour of the wind farm proposal.

At the time of this planning application (December 2007) TCIR have not received any requests for additional information from interest groups, national bodies, council or local political representatives. Project information will be updated and uploaded onto the TCI Renewables website and press releases issued at key stages of the project development.

Section 6.13 Safety Assessment

Throughout the construction phase of the development, the relevant statutory requirements will be adhered to by all site personnel and construction workers. All potentially hazardous areas will be fenced off and unattended machinery would be stored on-site and immobilised to prevent unauthorised use.

Any hazardous materials will be managed in accordance with duty of care.

In addition, temporary construction safety signs would be erected and placed in appropriate locations at all site entrances and on the local road network.

Public health and safety issues

The proposed wind farm land is privately owned. A small portion of the development area is currently used by walkers as part of a voluntary walkway provided by the landowners. As a result, mitigation measures have been considered in both the project planning and wind farm operation to ensure safety to the general public in regard to potential ice fall/throw from the turbine blades.

However, the climate in Northern Ireland is such that the likelihood of such incidents occurring would be rare. In addition the period of the year when icy conditions are most prevalent would be late winter, this would be the time of year when there would be a very limited number of walkers on the site area, given the inclement weather and limited daylight hours.

All turbines are located more than 180 metres from the nearest road which is considered to be a sufficient distance to maintain a safe clearance.

Fencing and warning signs will be erected for the protection of personnel and the public.

As the walkways are provided voluntarily by landowners and are not privately owned, public access (by foot) can be restricted in periods of icy weather.

No restrictions will be placed on the landowners' access to the turbines during the operational life of the wind farm. Access to the turbine towers will be strictly forbidden and doors locked at all times.

Section 7.0 Concluding Statements

The Brockaghboy wind farm site was chosen 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 full EIS has addressed a wide range of potential impacts. The assessment has demonstrated that any potential adverse effects of the Brockaghboy wind farm can be mitigated and that there are real and lasting benefits resulting from this development.

The Brockaghboy wind farm is located on the north eastern peripheral edge of the Sperrin AONB designation and will occupy only 0.008% of the 101006 ha total AONB designation.

This project will generate enough clean, renewable electricity to power the equivalent of approximately 35,000 homes. The development proposal is not a permanent and it can be fully decommissioned after 20 years of operation.

The 60MW Brockaghboy Wind Farm will make a substantial positive contribution to sustainable energy generation in Northern Ireland and help lead to a reduction in the production of greenhouse gases and provide a renewable supply of electricity to secure energy supplies in the province.

The wind farm will provide local companies with the opportunity to tender for contracts for the civil works, including earthmoving, access tracks, culvert design, stone and gravel laying, concrete and steel fabrication for the foundations, electrification of the wind farm as well as operations and maintenance.

The landowners will generate a sustainable rental income for 20 years that will assist farming diversification, and provide their families with financial security.

Based on rates valuation information supplied by the Department of Finance, the Coleraine Borough Council would receive rates in the order of around £200,000 per annum providing Council with approximately £4 million of new revenue over the lifetime of the project.

The wind farm owner will also establish a community fund to support initiatives that encourage local sustainability projects. The Fund will be managed by local people or a local organisation and may provide people with specific skills for new local activities.

Provided the recommended mitigation measures are adopted there are no impacts predicted to arise that are considered unacceptable within the context of the planning policy framework for assessing wind farm proposals in Northern Ireland.

Furthermore, this report concludes that the proposed 60MW Brockaghboy wind farm is supported by climate change and renewable energy Government policies.

For these reasons the proposed Brockaghboy Wind Farm is submitted for planning approval.

Further Information:

All 3 volumes of the Environmental Statement can be purchased from:

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TCI Renewables
Unit 2 - The Old Throne Hospital
244 Whitewell Road
Belfast BT36 7ES

T: 00 +44 (0)28 9037 0344

E-mail: gary.preston@tcirenewables.com

The price is £80.00 including postage and packaging for a fully bound paper copy of Volumes 1, 2 and 3. Paper copies of Volume 1 only, will cost £35.00 including postage. Paper copies of Volume 2 only will cost £40.00 including postage. The Non-Technical Summary (Volume 3) is available separately for £5.00 including postage and packaging.

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

Additionally the EIS is available to buy from Glenuillin Resource Centre in Brockaghboy.

1 Glen View
Brockagh Road
Garvagh
Co. Londonderry
BT51 5DZ

The price is £60.00 for a bound paper copy of Volumes 1, 2 & 3 (including postage and packaging). The Non Technical Summary is available for £5.00.

Alternatively, full copies of the Environmental Statement can be inspected free of charge at:

Planning Service Headquarters
Millenium House
17-25 Great Victoria Street
Belfast
BT2 7BN
(028) 9041 6700
(Strictly by appointment only)

Coleraine Borough Council
66 Portstewart Road
Coleraine
Co. Londonderry
BT52 1EY
(028) 7034 7034
(Viewing by appointment only)

Glenuillin Resource Centre
1 Glen View
Brockagh Road
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