CORLACKY HILL WIND FARM

Environmental Statement 2016

Volume 1 - Non-Technical Summary

MANAGEMENT SYSTEM CERTIFICATION
ISO 9001 = ISO 14001 = OHSAS 18001
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Preface

This Non-Technical Summary (NTS) has been prepared in support of a planning application by RES Ltd for the proposed Corlacky Hill Wind Farm, approximately 3 km west of Swatragh, County Derry/Londonderry.

A planning application has been submitted to the Department of the Environment (DOE) Planning in accordance with the Planning (Environmental Impact Assessment) Regulations, 2012. The regulations require an Environmental Impact Assessment (EIA) to be carried out and the results of the EIA to be included in an Environmental Statement (ES) to accompany the planning application.

This document is Volume 1 of the ES. The ES comprises:

- Volume 1: Non-Technical Summary (NTS)
- Volume 2: Main Report
- Volume 3: Figures (Maps & Illustrations)
- Volume 4: Technical Appendices

The aim of the NTS is to summarise the content and main findings of the ES in a clear and concise manner to assist the public in understanding what the environmental effects of the Proposed Wind Farm Development are likely to be. The full ES provides a more detailed description of the Proposed Wind Farm Development and the findings of the Environmental Impact Assessment (EIA) process.

The ES has been prepared by RES in consultation with DOE Planning, various consultees and in collaboration with the subject specialists outlined below.

Technical Specialism	Author
Landscape and Visual	Shanti McAllister Landscape Planning & Design
Archaeology and Cultural Heritage	Gahan and Long
Ornithology	David Steele
Vegetation and Peatland	Ross Environmental Associates Blackstaff Ecology
Terrestrial Fauna	Blackstaff Ecology
Fisheries	Paul Johnston Associates
Geology and Water Environment	McCloy Consulting Mott McDonald
Socioeconomics	Oxford Economics
Planning Policy; Noise; Transport; Shadow Flicker; Electromagnetic Interference and Aviation	RES

The full ES, together with supporting documents submitted as part of the planning application (Design and Access Statement and Pre-Application Community

Consultation Report) will be available for viewing during normal opening hours at the addresses below:

Viewing Location	Address
Maghera Library	1 Church Street Maghera BT46 5EA
Tirkane Post Office	132A Tirkane Road Maghera BT46 5NH

An electronic version of the ES and supporting documents will be available to download from www.corlackyhill-windfarm.co.uk CD copies of the ES and paper copies of the NTS are available free of charge from RES on request. Paper copies of volumes 2 to 4 of the ES are available at a cost of £50 each. Please contact:

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1. Introduction

RES is applying to the Department of the Environment (DOE) Planning for permission to construct, operate and decommission a wind farm known as Corlacky Hill Wind Farm, referred to in this document as the Proposed Wind Farm Development. The application follows a detailed assessment of the environmental and technical aspects of the site's suitability for development.

The Proposed Wind Farm Development is located within the townlands of Corlacky, Knockoneil, Half Gayne and Tirkane. The site entrance is approximately 3 km west of Swatragh, County Derry. The location of the site is shown in Figure 1: Site Location.

The proposal comprises the construction of 11 turbines, each up to 3.3 megawatts (MW) in capacity with a maximum height to blade tip of 149.9 m, and associated infrastructure including external electricity transformers, underground cabling, a newly created site entrance, access tracks, turning heads, crane hardstandings, control building and substation compound, energy storage containers and a number of off-site areas of widening to the public road. During construction and commissioning there would be a number of temporary works including a construction compound with car parking, an enabling works compound, temporary parts of crane hardstandings, welfare facilities and three temporary guyed lattice type meteorological masts. The proposed layout is illustrated in Figure 2: Infrastructure Layout

Based on nominal 3.3 MW capacity turbines the wind farm would be capable of 36.3 MW total capacity and would produce electrical energy equivalent to the average requirements of approximately 29,000 homes every year.

The Applicant

RES is one of the world's leading independent renewable energy project developers with operations across Europe, the Americas and Asia-Pacific. At the forefront of renewable energy development for over 30 years, RES has developed and/or built more than 9,000 MW of renewable energy capacity worldwide. In the UK alone, RES currently has more than 1,000 MW of projects either constructed, under construction or consented. RES is active in a range of renewable energy technologies including both onshore and offshore wind, solar, wave and tidal as well as enabling technologies such as energy storage and demand-side management. RES has been developing wind farms in Ireland since the early 1990s.

RES has developed 16 onshore wind farms in Northern Ireland totalling 229 MW, which equates to 36% of Northern Ireland's onshore wind capacity. RES currently operates over 83 MW of wind capacity across Northern Ireland, has secured planning permission for a further 112 MW awaiting construction and has 92 MW in the planning system.

The Application Site

There are a number of key technical and environmental factors that influence the suitability of a site for a wind farm. The following are key attributes that contribute to a viable site, which the application site possesses:

- Good wind speeds
- A site which complies with planning policy and in particular, avoids unacceptable effects on areas designated by statutory agencies; maintains appropriate distances from dwellings to avoid unduly impacting local amenity and; avoids impeding or interfering with major electromagnetic transmission and airport communication systems
- Sufficient area to accommodate the number of wind turbines required for economic viability
- Adequate vehicular access for wind turbine components (abnormal loads)
- Suitable terrain and topography, which affect wind flow across a site and need to be considered in relation to turbine performance, specification and life-span
- Suitable ground conditions for the construction of wind turbine foundations, erection of the machines and the provision of access tracks and cables.

The site is positioned on an east-facing upland area below Carntogher Mountain at the point where the eastern end of the Sperrin Mountain range meets the southern end of the Binevenagh range of hills, at the eastern edge of the Sperrin Area of Outstanding Natural Beauty (AONB).

The nearest settlements are Maghera town, which is located approximately 6.5 km to the south east of the Proposed Wind Farm Development, and the small village of Swatragh, which is located approximately 3 km to the east. There are relatively high levels of rural settlement in the surrounding countryside, and a number of smaller towns and villages located between 5 and 10 km to the north and east of the Proposed Wind Farm Development, including Garvagh, Kilrea, and Glenullin.

The site is currently used for rough sheep grazing and primarily comprises wet marshy grassland and areas of largely degraded blanket bog and wet heath, dissected by several deeply incised water channels. It is open and exposed with only a few shelter belts of coniferous trees planted on lower lying parts in the northwest, northeast and south. It is typical in character to the surrounding upland areas.

The site is bounded by the Corlacky Road to the east which is part of the tertiary network with very few dwellings along its length. Knockoneill Road, which is similar in character, is located close to the site's northern boundary. Corlacky Road is part of the Carntogher History Trail which is a local tourist attraction and driving route providing access to a number of historic sites in the countryside surrounding Maghera town.

The Need for the Proposed Wind Farm

A key policy driver for the development of renewable energy in Northern Ireland is the need to increase security of supply. There are also potential adverse impacts on local populations and the economy through high volatile fuel costs, contributing to fuel poverty and high energy costs for businesses and industry. In addition, increasing focus on renewable energy can deliver environmental and climate change gains, reductions in carbon emissions, as well as investment and employment opportunities. With a lack of indigenous fossil fuels and no nuclear power stations, Northern Ireland is keen to develop the full range of its available renewable energy resources to optimise the contribution that renewables make to the overall energy mix.

Northern Ireland's current renewable energy target is that 40% of electricity consumption should be met from renewable sources by 2020 (DETI 2010). The 40% target is the equivalent of 1600 MW. Wind energy will be the main focus of renewable electricity development on the island of Ireland, and certainly in Northern Ireland, through to 2020.

If approved, the Proposed Wind Farm Development could account for up to 36.3 MW, a material contribution to achieving the 40% renewable energy target for 2020. This is the equivalent of approximately 29,000 homes.

2. Description of the Proposed Development

The main elements of the Proposed Wind Farm Development are as follows:

- 11 three-bladed horizontal axis wind turbines of up to 149.9 m tip-height
- turbine foundations
- hardstanding areas at each turbine location for use by cranes erecting and maintaining the turbines
- electricity transformers
- approximately 7.4 km of new access track
- three temporary meteorological ('met') masts
- a wind farm substation compound containing a control building
- energy storage containers
- an on-site electrical and control network of underground (buried) cables
- a temporary construction compound
- a temporary enabling works compound
- permanent and temporary drainage works
- tree felling
- associated ancillary works
- a new site entrance from the public road
- two areas of off-site junction widening works, strip widening and eight passing bays along the public road network.

The wind farm layout is shown in Figure 2: Infrastructure Layout.

The actual area of permanent land take is limited to the control room and substation compound, energy storage area, wind turbine towers, permanent crane hardstandings and on-site access tracks, which collectively account for approximately 6.4 ha, which is approximately 6.8% of the area within the planning application boundary. In addition there will be an estimated 1.2 ha of hardstanding required on a temporary basis during construction.

Prior to construction the locations of the proposed wind turbines would be subject to micrositing, which allows for a small degree of flexibility in the exact locations of turbines and routes of tracks and associated infrastructure (80 m deviation in plan from the indicative design). Any repositioning would not encroach into environmentally constrained areas. Therefore, 80 m flexibility in turbine positioning would help mitigate any potential environmental effects: e.g. avoidance of unfavourable ground conditions or archaeological features not apparent from current records. The micrositing allowance has been taken into account in the EIA.

Wind Turbines

The wind turbine industry is evolving at a remarkable rate. Designs continue to improve technically and economically. The most suitable turbine model for a particular location can change with time and therefore a final choice of machine for

the Proposed Wind Farm Development has not yet been made. The most suitable machine will be selected before construction, with a maximum tip height of 149.9 m.

For visual and acoustic assessment purposes, the most suitable candidate turbine available in the market place (currently of 3.3 MW nominal capacity and with an overall tip height of 149.9 m) has been assumed. Exact tower and blade dimensions vary marginally between manufacturers. A diagram of a typical 149.9 m tip height turbine is given in Figure 3: Typical Wind Turbine Elevation.

It is proposed to install infrared lighting on the turbines in a pattern that is acceptable to the Ministry of Defence (MoD) for aviation visibility purposes. Infrared lighting allows military aircraft with night vision capability to detect and avoid wind farms. Infrared lighting cannot be detected with the naked eye, thereby reducing visual impact.

Each turbine would have a transformer and switchgear. Depending on the turbine supplier, the transformer and switchgear may be located inside or outside each turbine.

The wind turbines would be erected on steel re-enforced concrete foundations. During the erection of the turbines, crane hardstanding areas would be required at each turbine base consisting of both permanent and temporary elements. After construction is complete, the temporary crane pad areas will be reinstated.

Temporary Met Masts

For ongoing wind speed monitoring and assessment of the performance of the Proposed Wind Farm Development, three temporary meteorological masts will be required. The proposed locations of the temporary wind monitoring masts are shown in Figure 2: Infrastructure Layout. The masts will be of lattice type and will be erected and held in place by guy ropes.

Site Tracks

A new site entrance is proposed on the eastern edge of the site with access off the Corlacky Road.

Approximately 7.4 km of access tracks are required within the site to enable the turbine components and construction materials to be transported to their locations, and to enable ongoing access during the operational period for maintenance visits.

The on-site access track layout has been designed to minimise environmental disturbance by avoiding sensitive habitats and deeper areas of peat where possible and keeping the length of track commensurate with the minimum required for operational safety. The track route also takes cognisance of the various identified environmental constraints.

Ten new watercourse crossings will be required as part of the track layout. These crossings would be designed to ensure that fish and mammal movements are not

restricted, in addition to ensuring the crossing size is adequate for potential flood flows.

Consideration has been given to the use of floated track, as opposed to excavated track, in areas where peat depth is greater than 1 m. Indicative locations are shown on Figure 2: Infrastructure Layout.

Electrical Connection, Control Building & Substation, Energy Storage

Assuming the use of the currently available models, each wind turbine would generate electricity at 690 V and would have an ancillary transformer located either within or outside the base of the tower to step up the voltage to the required on-site distribution voltage. Each turbine would be connected to any adjacent turbines by underground cables.

The wind farm control building and substation is proposed to be located on the eastern part of the site as shown in Figure 2: Infrastructure Layout. All power and control cabling on the wind farm will be buried underground in trenches located, where possible, along the route of site access tracks.

The control building will be designed and constructed to the standard required by NIE for the accommodation of substation equipment. Where possible, local building materials and finishes will be used to ensure that the appearance is in keeping with other buildings in the area. The building will be staffed by maintenance personnel on a regular basis.

Four permanent containers housing an energy storage device, inverters and other ancillary equipment will be positioned adjacent to the control building and substation compound.

Construction Management

A Construction and Decommissioning Method Statement (CDMS) will be prepared once planning consent has been gained. This will be submitted to DOE Planning prior to any construction works taking place. This will describe the detailed methods of construction and working practices, work to reinstate the site following completion of construction activities and methods to reinstate the site post operation. The CDMS will:

- provide a mechanism for ensuring that measures to prevent, reduce and where possible offset potentially adverse environmental impacts identified in the ES are implemented;
- ensure that good construction practices are adopted and maintained throughout the construction;
- provide a framework for mitigating unexpected impacts during construction;
- provide a mechanism for ensuring compliance with environmental legislation and statutory consents;
- provide a framework against which to monitor and audit environmental performance.

The wind farm drainage system will be designed to mimic natural conditions to mitigate against increased flashiness in water courses and reduced groundwater recharge. The drainage system will protect the status of water courses and ground waters.

Construction will be carried out according to Northern Ireland Environment Agency (NIEA) and Construction Industry Research and Information Association (CIRIA) guidance for site works. Pollution control measures during the construction phase will be included in the CDMS.

It is anticipated that the construction would take 18 months. Construction work will take place between the hours of 0700-1900 Monday to Saturday. Outside these hours, work at the site shall be limited to turbine erection, testing/commissioning works and emergency works. Deliveries may occur outside these times to minimise disruption to local residents.

A programme of reinstatement would be implemented upon completion of construction. This would relate to the construction compound, temporary areas of the crane hardstandings, cable trenches and track shoulders where appropriate. There remains a potential to use cranes during the operational phase of the Proposed Wind Farm Development, therefore the main crane hardstanding will remain uncovered.

Operation

The expected operational life of the Proposed Wind Farm Development is 25 years from the date of commissioning. Wind turbines and wind farms are designed to operate largely unattended. Each turbine would be fitted with an automatic system designed to supervise and control a number of parameters to ensure proper performance (e.g. start-up, shut-down, rotor direction, blade angles etc.) and to monitor condition (e.g. generator temperature). The control system would automatically shut the turbine down should the need arise. Sometimes the turbines would re-start automatically (if the shut-down had been for high winds, or if the grid voltage had fluctuated out of range), but other shut-downs (e.g. generator over temperature) would require investigation and manual restart.

The Proposed Wind Farm Development itself would have a sophisticated overall Supervisory Control and Data Acquisition system (SCADA) that would continually interrogate each of the turbines and the high voltage (HV) connection. If a fault were to develop which required an operator to intervene then the SCADA system would make contact with duty staff via a mobile messaging system. The supervisory control system can be interrogated remotely. The SCADA system would have a feature to allow a remote operator to shut down one or all of the wind turbines. This is monitored 24 hours a day, 7 days a week.

An operator would be employed to operate and maintain the turbines, largely through remote routine interrogation of the SCADA system. The operator would also

look after the day-to-day logistical supervision of the Proposed Wind Farm Development and would be on-site intermittently.

Routine maintenance of the turbines would be undertaken approximately twice yearly to ensure the turbines are maintained to Industry Standard. This would not involve any large vehicles or machinery.

A Habitat Management Plan will be implemented during the construction and operational phases of the Proposed Wind Farm Development, working with the site landowners, which will provide for the restoration and enhancement of currently degraded blanket bog and wet heath habitats on site.

Decommissioning

One of the main advantages of wind power generation over other forms of energy production is the ease of decommissioning and the simple removal of components from the site. The residual impact on the site is limited to the continued presence of the foundations and access tracks. All above ground structures can be removed from the site.

If the Proposed Wind Farm Development obtains planning approval it is expected that a planning condition would be set to provide for the decommissioning of the site in accordance with a scheme agreed in writing with DOE Planning.

The Proposed Wind Farm Development will be decommissioned in accordance with best practice and/or in compliance with any planning conditions. Current best practice includes the removal of all above ground structures; the removal of all underground structures where required; and reinstatement of disturbed areas all of which will be subject to any necessary consents. Landowners will be given the option to retain the access tracks for their own purposes.

3. The Environmental Impact Assessment (EIA) Process

The purpose of EIA is to provide adequate environmental information to enable stakeholders to understand the potential environmental effects of a project. The EIA identifies and assesses the potential environmental effects associated with the construction, operational and decommissioning of the Proposed Wind Farm Development. The assessment and potential effects are recorded in the ES.

Consultation

Public Consultation

RES is committed to finding effective and appropriate ways of consulting with all its stakeholders, including local residents and community organisations, and believes that the views of local people are an integral part of the development process. RES began the engagement process with the local community eight months prior to the submission of the planning application, to facilitate a constructive consultation process which helped RES to understand and address any concerns as the project developed.

A public exhibition was held in December 2015 which included detailed information about the proposals, including: a map of the proposed layout; photomontages representing how the proposed layout would appear from a range of viewpoints; Zone of Theoretical Visibility (ZTV) drawings. (A ZTV is a map-based diagram of where and how many wind turbines, or wind farms, would theoretically be visible from all parts of a given area.) RES staff were available to answer questions and feedback was encouraged.

A Pre-Application Community Consultation (PACC) Report has been produced and is available for viewing at the locations listed in Section 1 of this NTS.

EIA Consultation

RES and the various chapter authors have undertaken pre-application consultation with relevant consultees, which has informed the EIA process and is detailed in each of the technical chapters within the Volume 2 (Main Report) of the ES.

Wind Farm Design Evolution & Alternatives

In accordance with EIA process and best practice the project team employed an iterative approach to the design of the Proposed Wind Farm Development. The design evolved throughout the EIA process as different constraints and adverse/ beneficial effects were identified and evaluated. This approach allowed mitigation measures to be integrated into the design in order to alleviate or remove significant effects of the proposed development. It also allowed measures to enhance beneficial effects of the proposed development to be incorporated into the design.

Following consultation and baseline characterisation of the Site, the following key environmental topics were identified:

- Landscape and visual
- Archaeology and cultural heritage
- Peatland and vegetation
- Fauna, including ornithology and fisheries
- Geology and water environment
- Noise and shadow flicker
- Traffic and transport.

The topics listed above were considered through the design with the aim of designing out significant effects. Where it was not possible to mitigate by design, the issues were considered further as part of the EIA.

A key tool in this process was the combined constraints drawing, which identifies constraints to development and sensitive features on the site. This drawing was iteratively updated as new information from surveys, site visits and consultation was received.

Turbine Layout Evolution

Landscape & Visual

A landscape consultant was involved throughout the design process to provide advice regarding the scale of the development and turbine height.

Zone of Theoretical Visibility (ZTV) visualisations were prepared in order to indicate where all, or part of, the Proposed Wind Farm Development is likely to be visible from. The ZTV is first used to assist the identification of areas with theoretical visibility and the location of viewpoints as part of the baseline landscape and visual assessment. It is then used to aid the assessment of visual effects because the turbines would be the most visible element of the Proposed Wind Farm Development, particularly during the operational period.

A provisional list of viewpoints created for the landscape and visual, and cultural heritage assessments were used to identify any potential landscape and visual issues with the turbine layout, as well as from the effects of the Proposed Wind Farm Development as a whole.

At an early stage of the EIA process provisional wirelines were prepared for turbines with 140 m and 150 m tip heights and it was established by the landscape consultant that the landscape and visual effects of using the taller turbines rather than the shorter ones would be negligible. From all the identified viewpoints the increase in turbine height did not equate to a significant or discernible increase in the levels of visibility of the Proposed Wind Farm Development. A ZTV visualisation was also prepared to compare a 140 m blade tip height with a 149.9 m blade tip height. This showed that the taller turbines would only result in a theoretical increase in visibility of 1.04%, a percentage which would not be discernible in practice.

Environmental Constraints & Assessments

Following baseline surveys, the combined constraints drawing incorporated the following, which are shown in **Figure 4: Combined Constraints and Infrastructure**:

- The hydrology consultant recommended watercourse buffers of 50 m, 20 m and 10 m depending on the sensitivity of the watercourse, which were agreed as appropriate by the fisheries consultant. Upstream abstraction constraints were added to identified private water supplies
- A 25 m buffer was applied to a former badger sett, which was identified through the baseline survey
- Bat buffers of 31.2 m were added to watercourses, as advised by the ecological consultant. The 31.2 m distance is in plan, and achieves a 50 m buffer between the blade tip and the watercourse feature, in line with Bat Conservation Trust guidance
- Locations of devils bit scabious and bog myrtle, the main food plants of the marsh fritillary butterfly and the argent and sable moth respectively, were mapped and avoided
- Areas of active blanket bog and non-degraded blanket bog, and species poor flush were mapped as constraints and avoided, as recommended by the vegetation and peatland consultant
- Following baseline peat probing and peat slide risk assessment, areas of peat depth greater than 3 m were avoided to limit excavation and spoil generation. Areas identified as medium peat slide risk were mapped. Three turbines were removed to avoid potential impacts on blanket bog and peat stability
- 165 m buffers were applied to nearby public roads in line with the Best Practice Guidance to PPS18 which recommends a set-back distance of at least tip height plus 10% between turbines and roads.

Before the turbine layout could be confirmed, noise and shadow flicker assessments were carried out. Both assessments conclude that with appropriate mitigation in place, there would be no significant effects on any surrounding residential properties.

The final turbine layout consists of 11 turbines of 149.9 m tip height.

Infrastructure Design Evolution

The infrastructure design evolved through the EIA process. The following principles were taken into consideration when designing the supporting infrastructure:

- Avoidance of environmental and technical constraints
- Design of the track layout to follow natural contours as far as possible, in order to avoid unnecessary amounts of excavation and reduce adverse hydrological impacts
- Minimisation of the overall length of access track
- Minimisation of the number of watercourse crossings, as far as possible

- Avoidance of steep slope areas to minimise earthworks
- Incorporation of measures to improve the visual appearance of the scheme, including reinstatement of temporary infrastructure following the construction period, reinstatement of road widening areas
- Consideration given to the use of floated track in areas of priority habitat where peat depths exceeded 1 m
- Use of bottomless culverts at two watercourse crossing locations following the advice of the fisheries and water environment consultants.

Environmental Effects

The following sections summarise the technical chapters of the ES. The term 'Site' refers to the Preliminary Site Boundary of the wind farm, which is shown in Figure 4, and is a larger area than the final planning application boundary.

Landscape and Visual

The Landscape and Visual Impact Assessment (LVIA) methodology was specifically developed for wind farm development in Northern Ireland in accordance with best practice guidance. The LVIA considered a 30 km radius study area and involved a combination of existing desktop information (maps, planning policy and existing landscape character assessment documents), detailed site surveys of the study area and computer modelling.

Potential landscape and visual effects are assessed as separate but linked issues. The magnitude of landscape effects is derived from the extent to which physical changes cause changes in landscape character and value. Visual effects relate to changes in the composition of views and people's perception of/responses to these physical changes. Viewers can be local residents, tourists, walkers, recreational route users farmers, road users etc.

For both landscape and visual effects the Significance of effect is derived from the assessment of landscape value, sensitivity and magnitude of change and also by using a combination of common sense and professional judgement in relation to site circumstances.

An assessment was carried out of the potential cumulative effect arising from the Proposed Wind Farm Development in combination with other wind farm developments, including operational, consented and proposed projects. In accordance with GLVIA[1] best practice guidelines existing and consented wind farms are considered to be part of baseline landscape and visual character as well as in the cumulative assessment. The assessment of effects of the Proposed Wind Farm Development takes consideration of their presence, or anticipated presence.

[1] The Landscape Institute and Institute of Environmental Management and Assessment (April 2013) 'Guidelines for Landscape and Visual Impact Assessment 3rd Edition'

The LVIA judges landscape effects on the Glenshane Slopes Landscape Character Area Landscape Character Area (LCA), in which the Proposed Wind Farm Development is located, to be moderately significant because it is a small and highly sensitive LCA. However, the Proposed Wind Farm Development's close relationship with the consented Brockaghboy and Brockaghboy Extension wind farms means that it would not introduce a new element and not significantly alter the existing baseline character.

There are deemed to be no significant landscape effects on other LCAs within the study area because the Proposed Wind Farm Development would appear alongside the two Brockaghboy wind farms as a smaller and more coherent element of panoramic views along the plateau formed by Binevenagh, the Glenshane Slopes and Sperrin Mountains. Furthermore, the summit of Carntogher Mountain, and the wider plateau of uplands, serves to screen views of the Proposed Wind Farm Development from most of the western side of the study area where its effects on landscape character will be negligible.

The majority of landscape character elements within the Glenshane Slopes LCA would remain unaltered by the Proposed Wind Farm Development. The fact that the Proposed Wind Farm Development will be more visible in the eastern half of the study area, where the lowlands are well-vegetated pastoral landscapes with some areas of complex drumlin topography, means that any perceived changes to the existing landscape character would be slight and occur over limited parts of the study area. Overall there would be no fundamental change and the Proposed Wind Farm Development would integrate into the existing landscape with no loss to key landscape character elements or attributes.

The ZTV diagrams indicate that, within a 30 km radius, theoretical visibility of the Proposed Wind Farm Development would cover less than 48% of the study area and this is largely concentrated in the eastern half of the study area. This percentage does not take into account the screening effects of trees and buildings etc. therefore actual visibility would be lower. In the western half of the study area even close range views are likely to be restricted by higher ground along the Binevenagh range of hills and Sperrin Mountains. Clear areas of visibility are likely to be located on the lower slopes of Long Mountain Ridge, which encloses the eastern side of the study area. Clear views may also be expected from the low lying ground around the River Bann, which runs between Coleraine in the north east and Toome in the south east although the ZTV illustrates that the drumlin topography in this farmland may screen views in patches throughout this part of the study area.

22 viewpoints representing typical levels of visibility throughout the atudy area were assessed in detail as part of the LVIA. Two viewpoints, which are close range viewpoints, were assessed as being significantly affected. A further three viewpoints were assessed as being moderately affected because, whilst also located at relatively close range to the Proposed Wind Farm Development, it would not be prominent or

visible in its entirety. The remaining 17 viewpoints were assessed as experiencing no significant visual effects.

In terms of cumulative landscape effects the Proposed Wind Farm Development was not deemed to have a significant effect on the receiving landscape. The consented Brockaghboy wind farms, comprising of 19 turbines, have recently been judged as being an acceptable addition to the Glenshane Slopes LCA and, in most cases the Proposed Wind Farm Development, comprising a further 11 turbines, will not adversely affect this baseline landscape character. In the wider study area wind farms are already a common and frequently occurring element along many upland areas and the close physical relationship between the Proposed Wind Farm Development and Brockaghboy will serve to ensure that the additional cumulative effects of the Proposed Wind Farm Development on landscape character will be minimal.

Of the 22 viewpoints only two were judged to have significant cumulative visual effects on views. These are close range viewpoints where only Brockaghboy and the Proposed Wind Farm Development would be visible. Two further viewpoints are deemed to experience moderately significant cumulative visual effects because the Proposed Wind Farm Development and the Brockaghboy wind farms are the only three wind farms in close proximity to each other and are visible within a wider upland profile. The remaining 18 viewpoints are deemed to experience no significant cumulative visual effects.

On the basis of the LVIA's findings the Proposed Wind Farm Development is deemed to be acceptable because the level of significant landscape and visual effects will be confined to close range views and its effects on landscape character elements will be limited.

Archaeology and Cultural Heritage

A Cultural Heritage impact assessment was conducted for the Proposed Wind Farm Development. The purpose of this was to identify the archaeological potential of the wind farm Site, assess the impact of the Proposed Wind Farm Development upon this and to assess the impact on known archaeological monuments in the wider landscape.

Following consultation with the Department of the Environment Historic Environment Division (DOE: HED), it was agreed that a 5 km search radius for the desktop survey would be adequate to provide a comprehensive assessment of the Proposed Wind Farm Development. Further to this, it was agreed to consider all state care/scheduled monuments and historic gardens within 10 km for potential visual analysis.

The desk top survey identified no known archaeological monuments within the Site. It identified a total of 63 sites within the 5 km radius, five of which are scheduled monuments. In addition it identified 14 industrial heritage sites and five listed

buildings within the 5 km search radius. None of these monuments/features will be physically impacted upon by the Proposed Wind Farm Development.

A site inspection of the wind farm Site was also conducted. This identified no evidence of any previously unknown archaeological monuments within the Site.

Visual Impact Analysis

For visual impact analysis, a 10 km search radius was used to identify monuments of regional importance and a 6 km radius was used for listed buildings. This identified a total of 34 regionally important monuments and 15 listed buildings which were potentially inter-visible with the Proposed Wind Farm Development. Through the use of ZTV mapping, wireframe production and site inspections it was established that only six monuments and one listed building will actually be inter-visible with the Proposed Wind Farm Development. These monuments were subject to detailed visual impact analysis. This analysis found that the introduction of the Proposed Wind Farm Development into the local landscape will have a moderate impact upon four of the identified monuments, resulting in a minor change in their existing environment. For the remaining two sites and the listed building, the visual analysis indicated that there will be a no change scenario.

On the basis that the Proposed Wind Farm Development is located within a surrounding area of high archaeological activity, a mitigation strategy was recommended for the construction phase. The aim of this is to identify any potential archaeological deposits uncovered during the construction phase of the project.

Vegetation and Peatland

The assessment summarises the potential effects that construction, operation and decommissioning of the Proposed Wind Farm Development could have on the peatland vegetation present within the Site and provides details of mitigation measures designed to prevent adverse impacts or reduce them to acceptable levels.

The Site consists of a slope of shallow gradient in the south west corner, which supports blanket peat that has in the past been drained, burnt and mown/flailed in many places. The lower lying parts of the Site towards the northeast have also been drained and mown/flailed and are subjected to extensive sheep grazing. Although there are some areas of mature and vigorous blanket bog in the southwest of the Site within the Carntogher Site of Local Nature Conservation Importance (SLNCI), the majority of the blanket bog habitat on-site is degraded by drainage, sheep grazing and, in some places along the southern boundary of the Site, very severe screefing, compaction and rutting by heavy plant and vehicles.

Smaller areas of wet heath occur in areas where past, historic peat cutting has taken place. These wet heath habitats are now dried out and degraded through both mowing and sheep grazing.

Site vegetation and peat conditions have been used to evolve the layout and design of the Proposed Wind Farm Development. The impact assessment is therefore based on a wind farm design that already includes a number of important mitigation measures.

A series of generic and specific mitigation measures including a Peat Management Plan and a Habitat Management Plan have been proposed to mitigate effects on blanket bog and wet heath vegetation.

The Habitat Management Plan details plans for the restoration, monitoring and subsequent management of restored peatland vegetation associated with construction of the wind farm infrastructure, and details methods to be used to provide compensatory restoration and reinstatement of degraded blanket bog elsewhere within the Site. It has been assessed that approximately 8.4 times the area of habitat lost would be enhanced and restored to 'active' blanket bog as a result of the Proposed Wind Farm Development. In addition, 178 ha will be protected from drainage, flailing, burning and sheep grazing throughout the lifetime of the development. This would be unlikely to happen without the Proposed Wind Farm development, given the current land management practices.

After implementation of the mitigation measures proposed in this chapter it is assessed that there would be no significant residual adverse effects on Northern Ireland priority habitats (peat and peatland vegetation, including both blanket bog and wet heathland) as a result of the Proposed Wind Farm Development. Indeed, it is assessed that the Habitat Management Plan would deliver the net beneficial effect of enhancing currently degraded NI priority habitats within the Site, including an area of the Carntogher SLNCI.

Land Based Fauna

The study methodology included both desktop and field survey methods in order to assess the potential impact on local ecological and nature conservation interest. The purpose of an ecological survey is to identify 'valued ecological receptors', those species and habitats that are valued in some way for their ecological function, their contribution to biodiversity or are protected by specific legislation. The following specialist surveys were undertaken during 2014/2015 on the site including suitable buffer zones:

- Bat survey
- Otter survey
- Badger survey
- Common Lizard survey
- Smooth Newt habitat survey
- Marsh Fritillary butterfly habitat survey
- Argent & Sable moth habitat survey

Features of conservation interest and importance were recorded and their locations were one of the key criteria that affected the wind farm layout. The location of the wind farm infrastructure avoids habitats and species of conservation interest where possible, and where this was not possible, mitigation and/or enhancement measures have been incorporated into the design to balance any detrimental impact.

No impact is predicted, as there is no regular usage of the Site, by badger, otter, marsh fritillary butterfly, argent & sable moth or smooth newt. Mitigation is proposed for common lizard. The proposed mitigation measures will assist in the compensation for habitat areas lost under the footprint of the development and enhancement of the local flora and fauna.

The layout of the Proposed Wind Farm Development, in terms of the separation distance between the wind turbines and relevant features, and the maintenance of this throughout the lifetime of the wind farm, will ensure that any potential impacts to bats will be negligible. In conclusion and based on current knowledge this would appear to be a Site posing little risk to bats or bat populations.

It is concluded that with the implementation of appropriate mitigation measures the effects would be reduced to a Neutral Effect that would not adversely affect the ecological integrity of the Site and the wider area. Overall the cumulative impacts on the fauna of the area are considered to be not significant.

Ornithology

The ornithology assessment considered the potential effects of construction, operation and decommissioning of the Proposed Wind Farm Development on the following key bird communities:

- Breeding birds
- Wintering and migrating birds
- Raptors (birds of prey).

Vantage point surveys, breeding bird surveys and wintering bird surveys were carried out in the period 2013-2015.

The assessment was carried out with reference to published SNH guidance on assessing the effects of on-shore wind farms on birds out-with conservation designated areas. All wild birds are subject to a general level of protection through the Wildlife and Countryside Act (Wildlife Order in Northern Ireland) and the EU Birds Directive but only some species should normally be of concern in relation to wind farms:

- Birds listed under Annex 1 of the EU Birds Directive
- Regularly occurring migratory species
- Birds listed under Schedule 1 of the Wildlife and Countryside Act (Wildlife Order)
- Birds listed under non-statutory lists of high conservation concern (red-listed birds).

Wind farms can potentially affect birds in two main ways: (1) by direct mortality of individual birds due to collisions, or (2) by indirect habitat loss due to displacement of birds from a zone around the turbines and other related infrastructure. Direct habitat loss from wind farms is usually relatively small scale compared to other types of developments and in most cases is unlikely to be significant.

The ornithology assessment identified a likely significant effect for just one bird species (snipe). The effect (possible displacement of one territorial pair of snipe by construction activity) is not certain to occur and would in any case be of local significance only. There would be no effect on the conservation status of snipe at the regional (Northern Ireland) or national (island of Ireland) levels. With implementation of mitigation, involving mowing/cutting back vegetation to near ground level within the infrastructure footprint prior to the start of the bird breeding season, it is expected that the likelihood of the effect occurring (residual effect) would be at worst unlikely.

For other bird species that are regularly occurring within the Site and/or the surrounding buffer areas (including red grouse, peregrine, merlin, kestrel and a range of moorland passerine species) the ornithology assessment has not identified any likely significant effects. For some moorland passerine species breeding within the Site (skylark, meadow pipit and stonechat) beneficial effects caused by wind farm construction activity (probably linked to the disturbance of vegetation) are at least possible and perhaps probable.

No cumulative effects were identified for the birds concerned.

Fisheries

The fisheries assessment outlines the potential effects of the Proposed Wind Farm Development on the fish stocks and fish habitats of the receiving watercourses in the Knockoneill/Clady catchment. It provides relevant baseline information on fisheries, gathered during desktop and field survey, enabling the potential effects to be identified and evaluated.

The surveys found that Brown trout and Atlantic salmon are present in the watercourses on the site, albeit the latter is likely to have been artificially stocked. These two species are also widely distributed at significant densities downstream of the Site throughout the Knockoneill and Clady rivers.

It has been determined that potential impacts are primarily related to the sediment run-off to the receiving watercourses with related effects on fish stocks and their habitats. That these impacts have the potential to be significant, however a series of specific mitigation measures have been designed to avoid adverse effects on fisheries with regard to both the construction and operational phases of the project, including buffer zones around watercourses; good construction practice; the implementation of a Sustainable Drainage System (SuDS) and the use of bottomless culverts at the two most sensitive watercourse crossings.

It is concluded that, provided the mitigation measures are implemented as specified, construction and operation of the Proposed Wind Farm Development will have a neutral impact on the fish stocks and aquatic biology of the Knockoneill and Clady rivers. The potential for cumulative effects was found to be very-extremely low.

Geology and Water Environment

The assessment involved a combination of desk study, site visits and consultation with various bodies including the Northern Ireland Environment Agency (NIEA), the Department of Cultural Arts and Learning (DCAL), Mid-Ulster and Causeway Coast and Glens Councils, the Department of Agriculture and Rural Development (DARD) and the Department of Enterprise Trade and Investment (DETI). The assessment identifies the potential impacts in geology, hydrology and hydrogeology, including surface water, groundwater, abstractions, the potential for pollution of watercourses and flooding. It summarises the relevant legislation and guidance and provides appropriate baseline information, enabling the potential effects to be identified.

There are no designated watercourses on the Site. The natural hydrology and undesignated water features consist of source streams of the Knockoneill River and areas of artificially modified peat drains. NIEA River Basin Management Plan boundaries indicate all water features on the Site discharge to the Knockoneill River; consequently the Site and its downstream catchment are situated within the Lower Bann Local Management Area which is within the Lower Neagh Bann Catchment Stakeholder Group and falls under the control of the Neagh Bann River Basin District.

The designated reach of the Knockoneill River draining the Site begins approximately 2 km downstream of the Site at Knockoneill Bridge and is a tributary of the designated Clady River. The Clady River flows in an eastern direction; discharging to the River Bann, which flows north and discharges to Portstewart Bay approximately 30 km north of the Site.

Aspects of the design, construction and operation of the Proposed Wind Farm Development that may potentially impact on the receiving geological and water environment were identified and the pathways for impacts assessed. It was determined that without mitigation the Proposed Wind Farm Development would be likely to cause adverse impacts of moderate significance primarily driven by the sensitivity of fisheries interests on and shortly downstream of the Site. As such, informed by the baseline assessment and pathways identified, mitigation integrated as part of outline design and proposed during construction phase includes the following:

- Avoidance of water features based on baseline constraints mapping
- Design of site elements to minimise impact on the geological and water environment

- Implementation of a comprehensive surface water management plan comprising the use of SuDS (drainage) and silt management in order to prevent pathways for pollution
- Construction phase pollution prevention procedures in accordance with NIEA requirements and guidance.

Monitoring of the effect of the Proposed Wind Farm Development on the water environment and fisheries habitat will be provided through physicochemical and biological water quality monitoring. Implementation of the mitigation proposed eliminates or reduces the potential significance to all receptors to "not significant".

There is no likelihood of significant cumulative impacts over and above any pre-existing effect caused by existing or consented wind development.

Peat

The south-western, higher area of the Site is overlain by peat and there is one area of peat flow shown on the superficial geology mapping initiating in the extreme south-west corner and flowing in a north-east direction. The Maghera Sheet 19 superficial deposits mapping indicates an area of peat flow (mass movement of peat resulting from a bog burst) within the southwest corner of the Preliminary Site Boundary, however this area was avoided by the wind farm layout and as such is outside the wind farm Planning Application Boundary. A Peat Slide Risk Assessment (PSRA) was undertaken for the Proposed Wind Farm Development with findings summarised as follows:

- Peat depth across the site ranged from 0.5 m to 1.5 m with depths increasing to >2 m in the south west of the Site
- Areas of 'Medium' and 'High' were present however the Quantitative Risk Assessment indicated that the risk of instability at these locations is acceptably low providing suitable construction methodologies are established
- The assessment concluded that the overall risk is 'Very Low 'to 'Low'.

Noise

An assessment of the acoustic impact from both the construction and operation of the Proposed Wind Farm Development, was undertaken taking into account the identified nearest residential properties.

The operational noise impact was assessed according to the guidance described in the 'The Assessment and Rating of Noise from Wind Farms', referred to as 'ETSU-R-97', as recommended for use in relevant planning policy. The methodology described in this document was developed by a working group comprised of a cross section of interested persons including environmental health officers, wind farm operators and independent acoustic experts. It provides a robust basis for assessing the noise impact of a wind farm and has been applied at the vast majority of wind farms currently operating in the UK.

ETSU-R-97 makes clear that any noise restrictions placed on a wind farm must balance the environmental impact of the wind farm against the national and global benefits that would arise through the development of renewable energy sources. The assessment also adopts the latest recommendations of the Institute of Acoustics 'Good Practice Guide to the Application of ETSU R 97 for the Assessment and Rating of Wind Turbine Noise'.

Representative baseline conditions (the "background noise level") at nearby residential properties were established by undertaking noise surveys. These measured levels were then used to infer the background noise levels at other nearby residential properties as the ETSU R 97 document recommends. As background noise levels depend upon wind speed, as indeed do wind turbine noise emissions, the measurement of background noise levels at the survey locations were made concurrent with measurements of the wind speed and wind direction. These wind measurements are made at the wind turbine site rather than at the survey locations, since it is this wind speed that will subsequently govern the wind farm's noise generation.

A sound propagation model was used to predict the noise levels due to the Proposed Wind Farm Development at nearby residential properties over a range of wind speeds, taking into account the position of the proposed wind turbines, the nearest residential properties, and the candidate wind turbine type. The model employed (which considered downwind conditions at all times) took account of attenuation due to geometric spreading, atmospheric absorption, ground effects and barriers. It has been shown by measurement based verification studies that this model tends to slightly overestimate noise levels at nearby residential properties.

The relevant noise limits were then determined through analysis of baseline conditions and the criteria specified by the ETSU-R-97 guidelines. The general principle regarding the setting of noise criteria is that limits should be based relative to existing background noise levels, except for very low background noise levels, in which case a fixed limit may be applied. This approach has the advantage that the limits can directly reflect the existing noise environment at the nearest residential properties and the impact that the wind farm may have on this environment. Different limits are applicable depending upon the time of day. The daytime limits are intended to preserve outdoor amenity, whilst the night-time limits are intended to prevent sleep disturbance.

The predicted operational noise levels are within noise limits at nearby residential properties at all considered wind speeds. The Proposed Wind Farm Development therefore complies with the relevant guidance on wind farm noise and the impact on the amenity of all nearby properties would be regarded as acceptable.

A cumulative operational noise assessment has also been undertaken. Considering the mitigation measures identified the predicted cumulative noise levels are within noise limits at nearby residential properties. Compliance with relevant guidance

implies that the cumulative impact on the amenity of nearby properties would be regarded as acceptable.

A construction noise assessment, incorporating the impact due to increased traffic noise and considering the mitigation measures identified, indicates that predicted noise levels likely to be experienced at the nearest residential properties are below relevant construction noise criteria at all residential properties.

Traffic & Transport

An assessment of the potential impact of the Proposed Wind Farm Development on traffic and transport was undertaken, involving consultation with Transport NI.

The proposed access route for abnormal loads (turbine components) will be from the A6 towards Maghera via Knockcloghrim. From Maghera, the route will follow the Tirkane Road to the north west for approximately 3.2 km, before turning north onto the Halfgayne Road. After approximately 3.0 km, the route turns left on to the Corlacky Road. Following this route, north-north west for approximately 1.6 km, the site entrance is located on the left hand side.

Widening works will be required at two junctions along the abnormal roads delivery route to facilitate overrun and oversail of the turbine delivery vehicles: At the Corlacky and Halfgayne Road junction and; at the Halfgayne and Tirkane Road junction. In addition, some strip widening within the roadside verges will be required along the Corlacky Road between the site entrance and the junction with the Halfgayne Road. Eight passing place locations are proposed along the Corlacky Road, between the site entrance and the Corlacky and Halfgayne Road junction, in order to ease traffic movements.

At the end of the construction period and following consultation with Transport NI all widening and passing bay locations will be reinstated as required as soon as reasonably practicable. If the removal of boundary features such as fences, trees or hedgerows is required, these will be sympathetically reinstated and replanted. Reinstatement will also be applied to any street furniture which may be removed on a temporary basis. In the unlikely event that a replacement blade is required during the operational phase of the wind farm, the widenings will need to be reopened temporarily, after which they will be reinstated. Any works will be undertaken following consultation with Transport NI.

It is proposed that Normal HGV load delivery routes (including stone and concrete) will travel to the site entrance on the Corlacky Road from the A road network via a number of routes including the Halfgayne, Tirkane, Drumbane and Gortinure Roads.

Consideration was given to the effect of increased HGV traffic flow on Severance, Driver Delay, Pedestrian Delay, Pedestrian Amenity, Fear and Intimidation, Accidents and Safety and Cumulative Impacts. Furthermore, consideration was given to the environmental effects of any road improvement/widening works.

The abnormal load route and the HGV routes have been assessed as acceptable in the ES. Taking into account the existing vehicle movements on the affected roads, and the proposed type and frequency of vehicle numbers, it is considered that with the appropriate mitigation measures as set out above, there will be no significant impacts.

Shadow Flicker

A shadow flicker analysis of the Proposed Wind Farm Development was performed. Under certain combinations of geographical position, time of day, time of year and meteorological conditions, the sun may pass behind the turbine rotor and cast a shadow over neighbouring buildings' openings (i.e. windows and doors) where the contrast between light and shade is most noticeable. To a person within that room the shadow, depending on its intensity, may appear to flick on and off, giving rise to an effect referred to as shadow flicker.

The Best Practice Guidance to Planning Policy Statement 18 (PPS18) states that at distances greater than 10 rotor diameters from a turbine, the potential for shadow flicker is very low. Therefore the shadow flicker analysis for the Proposed Wind Farm Development was performed on the three properties which lie within 10 rotor diameters (1000 m) of the wind turbines.

There are predictions of shadow flicker at two residential properties within this distance based on worst case scenarios. A total of six hours of shadow flicker annually is predicted at one property, which is not considered significant. The second property, which is financially involved with the wind farm, could experience a total of 77.7 hours of shadow flicker annually.

It should be emphasised that this analysis provides an extremely conservative, worst case, estimate of the extent that houses will be affected by shadow flicker. Due to frequent cloud cover (IPCC 2005 estimates that the site of the Proposed Wind Farm Development experiences cloud cover approximately 75% of the year), turbines not turning at all times, turbine rotors not being aligned with the sun in a way to cast maximum shadow onto habitations, and the presence of existing trees and outbuildings, the actual amount of shadow flicker seen is likely to be greatly reduced.

Should it be necessary, mitigation measures would significantly reduce any effect of shadow flicker such that the impacts would not be significant.

Due to both the distance of the nearest residential properties to the Proposed Wind Farm Development, and the recommendations pertaining to ten rotor diameter proximity, and proposed mitigation if required, it is concluded that the Proposed Wind Farm Development should not cause a material reduction to residential amenity owing to shadow flicker. No additional cumulative effects are predicted.

Socioeconomics

A socioeconomic assessment of the Proposed Wind Farm Development was carried out. It concluded that should the proposed development go ahead, it will deliver substantial benefits to the economies of Northern Ireland and Mid Ulster, in economic and environmental terms. It will provide significant job creation and activity in the construction sector (with a commitment to use local labour where possible); increase tax and rates revenue for local and central government; contribute to renewable energy targets; and has the potential to transfer the knowledge, expertise and skills gained and developed to other wind farms, possibly acting as a catalyst for further investment in the area.

The Proposed Wind Farm Development is estimated to result in a capital spend of £32.33m. Of this, an estimated £10.72m will be realised within Northern Ireland. The 18 month construction phase is estimated to create or sustain between 101-109 direct job years[2] of employment, with associated direct wages of between £2.40-£2.59m and direct Gross Value Added (GVA)[3] of £3.90-£4.20m. The estimated total (direct, indirect, and induced) benefits from the construction phase include the creation or sustainment of between 182-196 job years, £3.98-£4.30m of wages and £7.22-£7.79m of GVA for the Northern Ireland economy.

Curryfree Wind Farm in County Derry, which was developed and built by RES in 2010, resulted in expenditure of over £1.1m within 10 km of the wind farm during the construction phase.

RES has committed to a community fund package of £5,000 per MW per year for the wind farm lifetime. This will be split by £2,000 per MW of a community fund, and £3,000 per MW into a Local Discounted Electricity Scheme. The total package will therefore contribute £4.54m over the lifespan of the project.

The operational phase of the Proposed Wind Farm Development is estimated to create or sustain one direct job per year, £0.04m of direct wages and £0.27m of direct GVA per annum. Given that the operational lifetime of the Proposed Wind Farm Development will be 25 years, this equates to 25 direct jobs, £1.12m of direct wages and £6.64m of direct GVA.

The estimated total (direct, indirect and induced) benefits from the operational phase of the Proposed Wind Farm Development include the creation or sustainment of seven jobs per year and £0.18m of wages per annum. It will also add £0.63m to Northern Ireland's GVA per annum. Over 25 years, this equates to 168 total jobs, £4.38m of total wages and £15.76m of total GVA.

[2] **Job years**: For the construction phase 'job years' refers to the amount of activity that is required. E.g. two people could be employed for six months – this would equate to two jobs, but would actually only mean activity would take one job year of work to complete. Alternatively one person could be employed for two years - this would only equate to one job, but is actually two job years of employment.

[3] **Gross value added** (GVA) measures the value of goods & services produced in an area, industry or sector of an economy and is equal to output minus intermediate consumption.

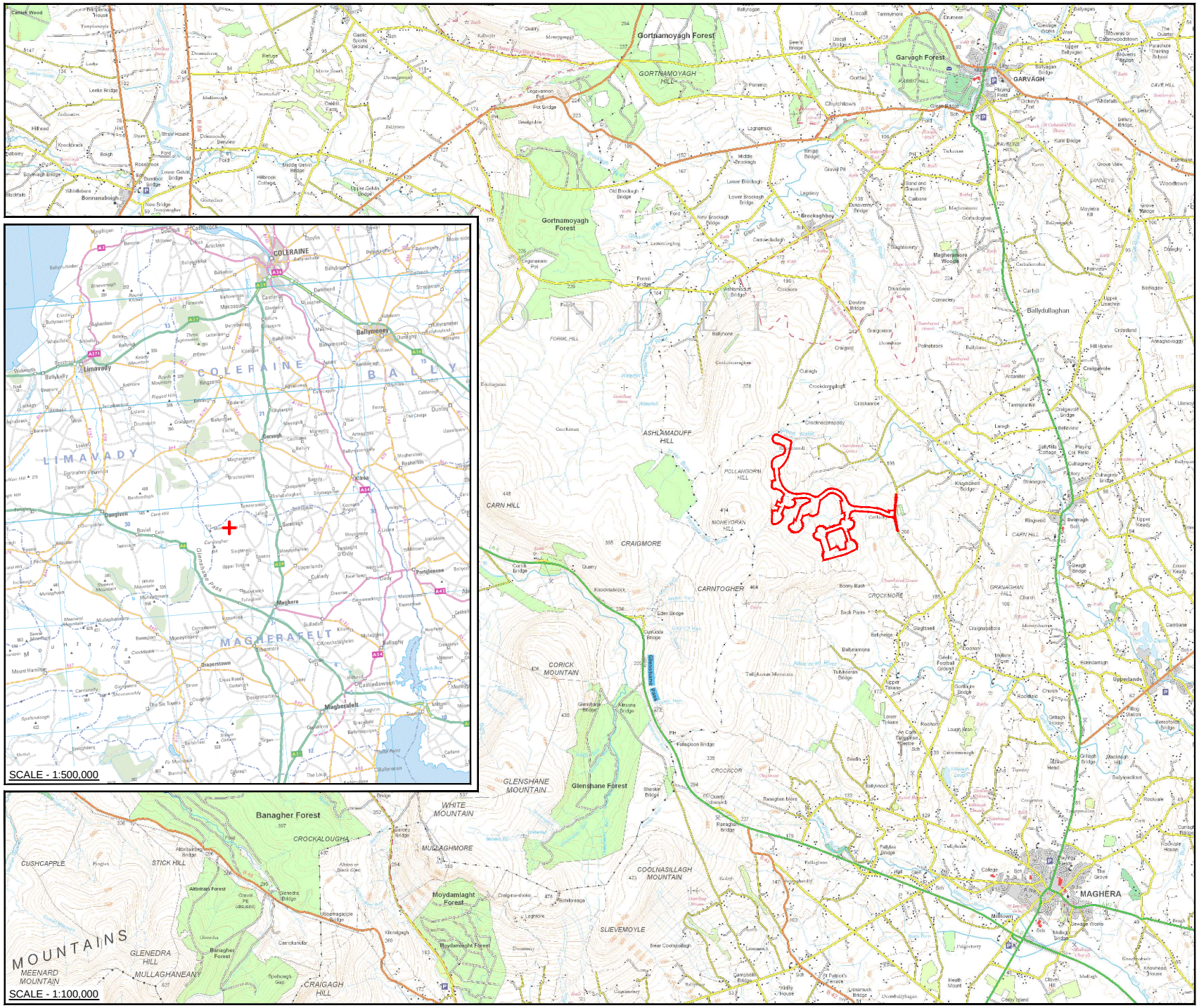
The Proposed Wind Farm Development is estimated to increase rateable value by £617,100 per annum or £15.43m over the course of the project, based on the current average rateable value of £17,000 per MW for similar properties in the valuation list. It should be noted that there is a difference in the rateable value charged on which the above figures are based, and the business rates revenue collected by the local Councils and the NI Assembly – allowing for regional and district rate poundages. By applying the Non-Domestic Rate Poundage for Mid Ulster, the above rateable values would leave additional business rates revenue of £336,580 per annum and £8.41 million over the 25 year lifetime of the project.

4. Conclusion

The potential effects of the Proposed Wind Farm Development have been assessed in accordance with regulatory requirements and good practice. The ES incorporates technical assessments of the Proposed Wind Farm Development based on the requisite legislation and the relevant planning policy framework. The ES has demonstrated that significant environmental effects associated with the construction, operation and decommissioning of the Proposed Wind Farm Development have been avoided or minimised through the use of the iterative design process and with the application of mitigation measures.

The Proposed Wind Farm Development will provide a number of benefits. The scheme will result in a reduction in greenhouse gas emissions from the electricity generating industry by harnessing wind as an alternative to the burning of fossil fuels, in line with the government's energy goals. It will also make a significant contribution to the Northern Ireland government target that 40% of electricity consumed should be sourced from renewable energy by 2020 (DETI).

Figures



CORLACKY HILL WIND FARM

FIGURE 1

SITE LOCATION

KEY:

- PLANNING APPLICATION BOUNDARY
- SITE CENTRE

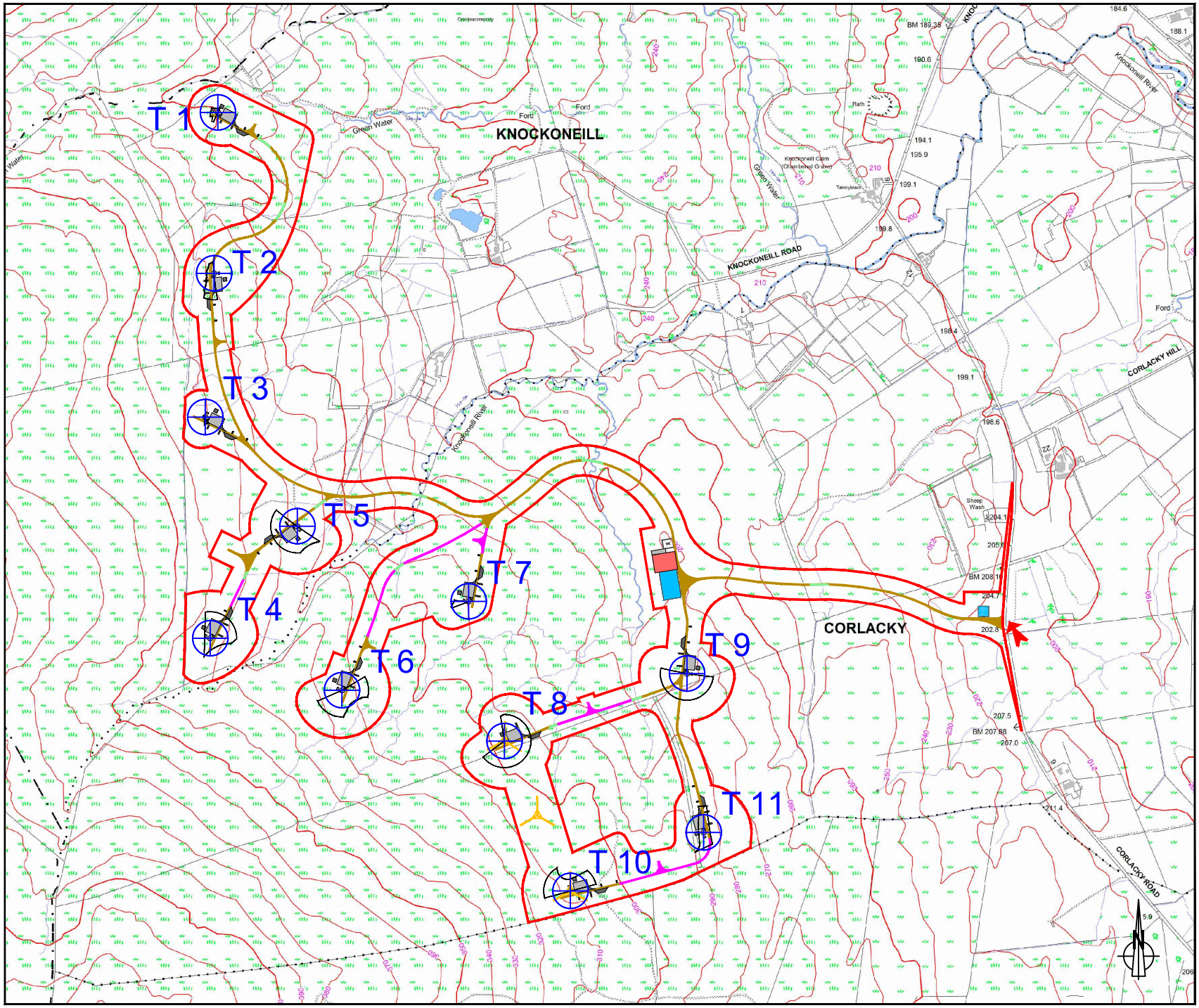
LAYOUT DWG	N/A	T-LAYOUT NO.	N/A

DRAWING NUMBER

03163D2516-01

SCALE - AS SHOWN @ A4

NON TECHNICAL SUMMARY 2016



CORLACKY HILL WIND FARM

FIGURE 2

INFRASTRUCTURE LAYOUT

INFRASTRUCTURE KEY:

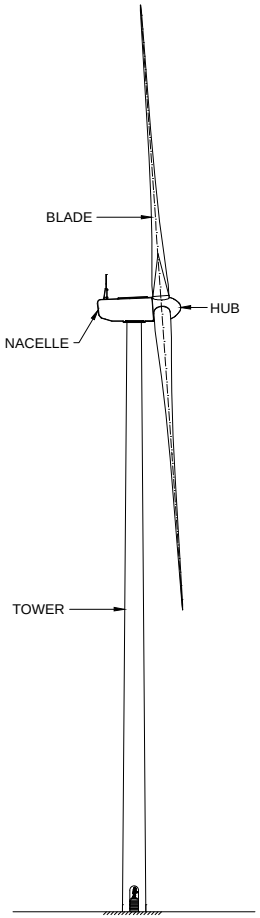
- PLANNING APPLICATION BOUNDARY
- Txx WIND TURBINE LOCATION
- TURBINE MICROSITING
- METEOROLOGICAL CALIBRATION MAST LOCATION (TEMPORARY GUYED LATTICE TYPE. INDICATIVE GUY WIRE FOOTPRINT SHOWN)
- NEW SITE TRACKS
- INDICATIVE FLOATED TRACK
- CRANE HARDSTANDING AREA
  - PERMANENT
  - TEMPORARY
- ENABLING WORKS COMPOUND
- TEMPORARY CONSTRUCTION COMPOUND WITH PARKING
- CONTROL BUILDING & SUBSTATION COMPOUND
- ENERGY STORAGE
- WATERCOURSE CROSSING
- SITE ENTRANCE LOCATION

LAYOUT DWG	03163D1001-05	T-LAYOUT NO.	pNIRcoh040

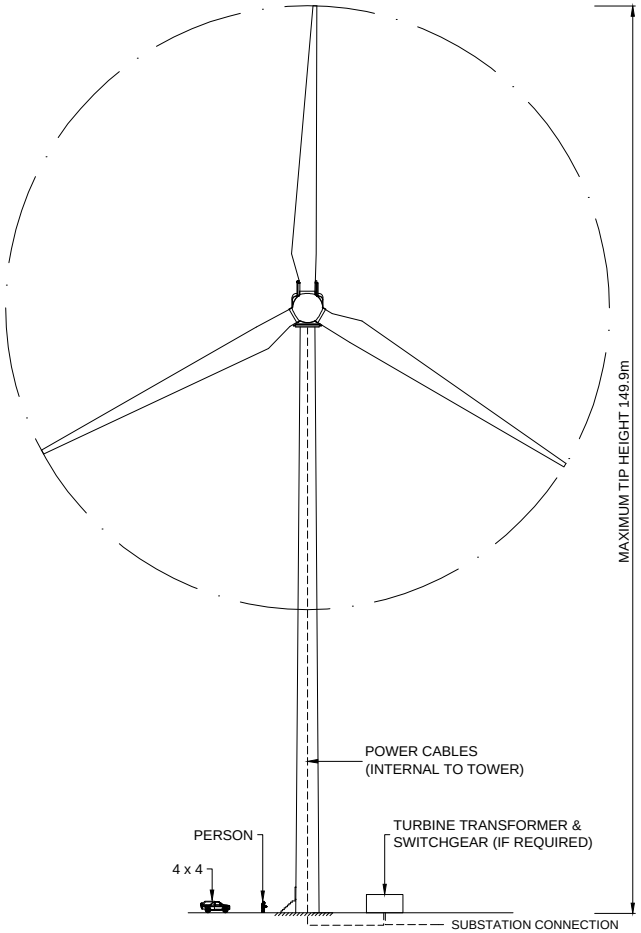
DRAWING NUMBER: 03163D1003-01

SCALE - 1:15,000 @ A4

NON TECHNICAL SUMMARY 2016



SIDE VIEW



FRONT VIEW

PHOTOGRAPH OF TYPICAL TURBINE

CORLACKY HILL
WIND FARM

FIGURE 3

TURBINE ELEVATION

LAYOUT DWG	N/A	T-LAYOUT NO.	N/A

DRAWING NUMBER
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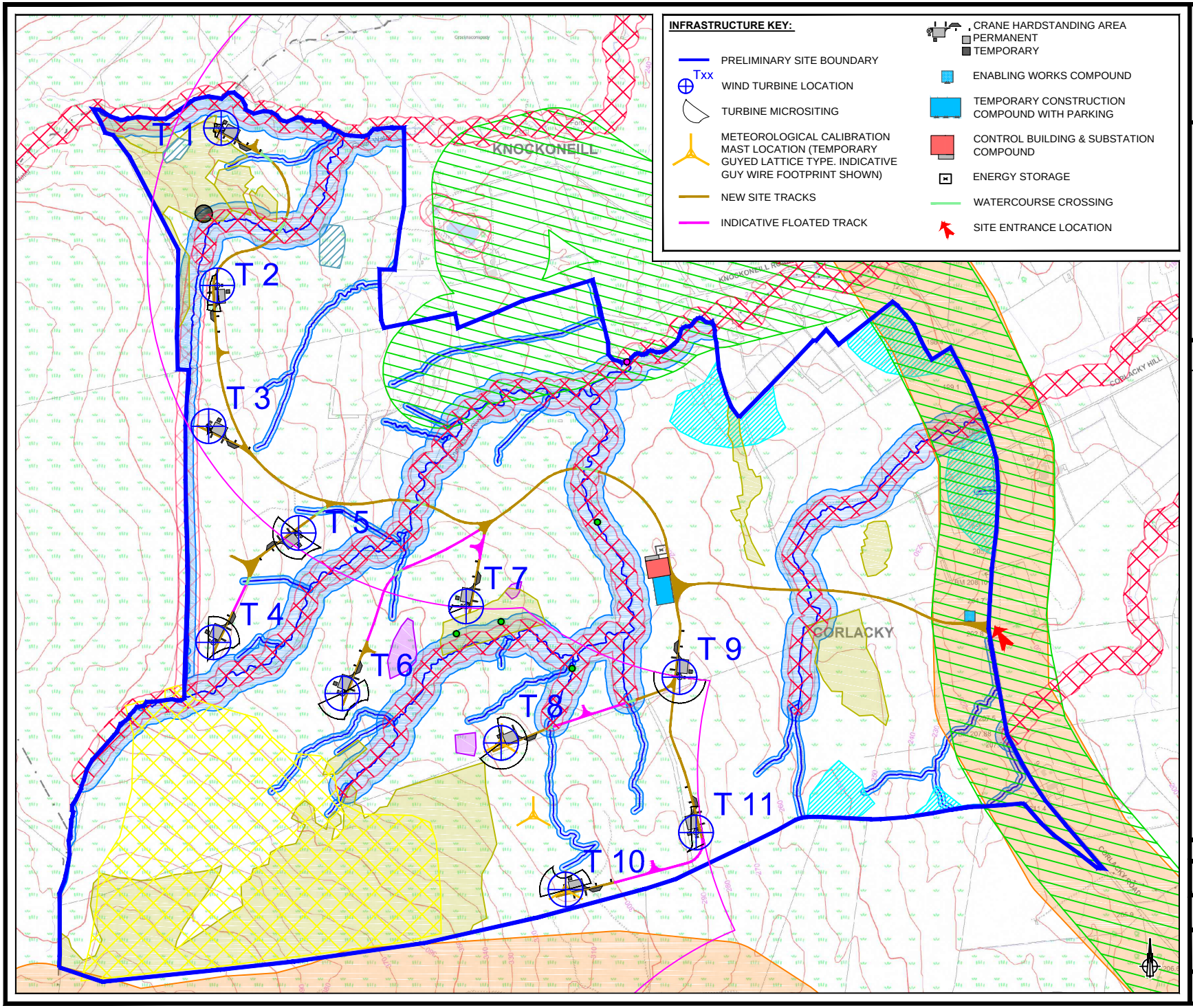
SCALE - 1:1250 @ A4

NON TECHNICAL SUMMARY
2016



CORLACKY HILL WIND FARM

FIGURE 4

COMBINED CONSTRAINTS AND INFRASTRUCTURE

CONSTRAINTS & SENSITIVE FEATURES KEY:

- 1000m FROM OCCUPIED HOUSING
- FORMER BADGER SETT BUFFER (25m)
- BAT BUFFER (31.2m, TO ACHIEVE 50m SEPARATION BETWEEN BLADE TIP AND FEATURE)
- WATERCOURSE BUFFERS (50m, 20m, 10m)
- PRIVATE WATER SUPPLY BUFFER (UPSTREAM ABSTRACTION CONSTRAINT)
- DEVIL'S BIT SCABIOUS
- BOG MYRTLE
- NON-DEGRADED BLANKET BOG (NVC CLASSIFICATION M17 & M19)
- SPECIES POOR FLUSH (NVC CATEGORY M6c)
- PEAT DEPTH > 3m
- MEDIUM PEAT SLIDE RISK AREA
- CARNTOGHER WAY WALKING ROUTE BUFFER TO TURBINES (165m)
- PUBLIC ROAD BUFFER TO TURBINES (165m)

LAYOUT DWG	03163D1001-05	T-LAYOUT NO.	pNIRcoh040

DRAWING NUMBER

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SCALE - 1:15,000 @ A4

NON TECHNICAL SUMMARY 2016