



Environmental Impact Assessment Report

Proposed Drumnahough Wind Farm
Co. Donegal

Volume 1 of 4

NON TECHNICAL SUMMARY

SEPTEMBER 2020

Prepared by



On behalf of

Drumnahough Wind Farm DAC



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1 INTRODUCTION

This Environmental Impact Assessment Report (EIAR) relates to a proposed wind energy project in Co. Donegal, named Drumnahough Wind Farm, for which development consent is being sought by Drumnahough Wind Farm Designated Activity Company (Drumnahough Wind Farm DAC) (the applicant), a co-development company between *SSE Renewables Ireland Limited* and *Coillte Cuideachta Ghníomhaíochta Ainmnithe (Coillte CGA)*, from An Bord Pleanála (the competent authority).

This Non-Technical Summary (NTS) is the first volume of the Environmental Impact Assessment Report (EIAR). The other three volumes which comprise the EIAR are:

- Volume 2: Main EIAR
- Volume 3: Appendices
- Volume 4: Photomontages

The purpose of this Non-Technical Summary is to provide a concise overview, in non-technical terms, of the issues, impacts and mitigation measures highlighted by the Environmental Impact Assessment and presented in detail in the main EIAR, Volume 2.

1.1 THE PROPOSED DEVELOPMENT

Drumnahough Wind Farm DAC (The applicant) wish to develop a 12 No. turbine wind farm on the southwestern slopes of Cronaglack, Crockalough and Cark Mountain to the south-west of Letterkenny, Co Donegal. The site has previously received a planning grant for fifteen (15) no. turbines by Donegal County Council (Planning Ref. 08/50687). However due to grid availability issues at the time, the previously consented project was unable to be progressed. This application is seeking permission for 12 No. turbines with a maximum tip height of 167.5m. The proposed turbines will have an expected yield of 60 to 70 MW with up to a 30 year operating life. The project is seeking a ten-year permission period to construct and make operational the proposed wind turbines and associated infrastructure.

To facilitate a connection to the National Electricity Grid (NEG) for the twelve (12) No. turbines, it is being proposed that the wind farm's will connect into the consented Lenalea 110kV Substation (DCC PL Ref. 09/50116), and the consented loop-in connection at Lenalea (DCC PL Ref. 18/50312) and this connection forms part of the proposed development.

Figure 1 shows the proposed development lands and development infrastructure as per the planning application. This area includes a total area of 611ha, which contains the development footprint of the wind farm and associated infrastructure for which development consent is being sought including the proposed grid connection option to the permitted Lenalea substation and works required in relation to a section of the turbine delivery route through Meentycat Wind Farm.

1.2 THE PROPOSED PROJECT

The overall project considered in this EIAR comprises project components for which planning permission is being sought and other project components not included as part of the current planning application. These include works along the turbine delivery route, replacement forestry

lands and an alternative grid connection option to the NEG via a new proposed substation within the site boundary.

It is therefore to be noted that the extent of infrastructure within the development application boundary considered as part of the EIA differs to that presented in the planning application drawings. **Figure 2** shows the extent of infrastructure within the planning application development boundary considered as part of the environmental assessment in the EIAR which includes elements of the project for which planning permission is not being sought in this application.

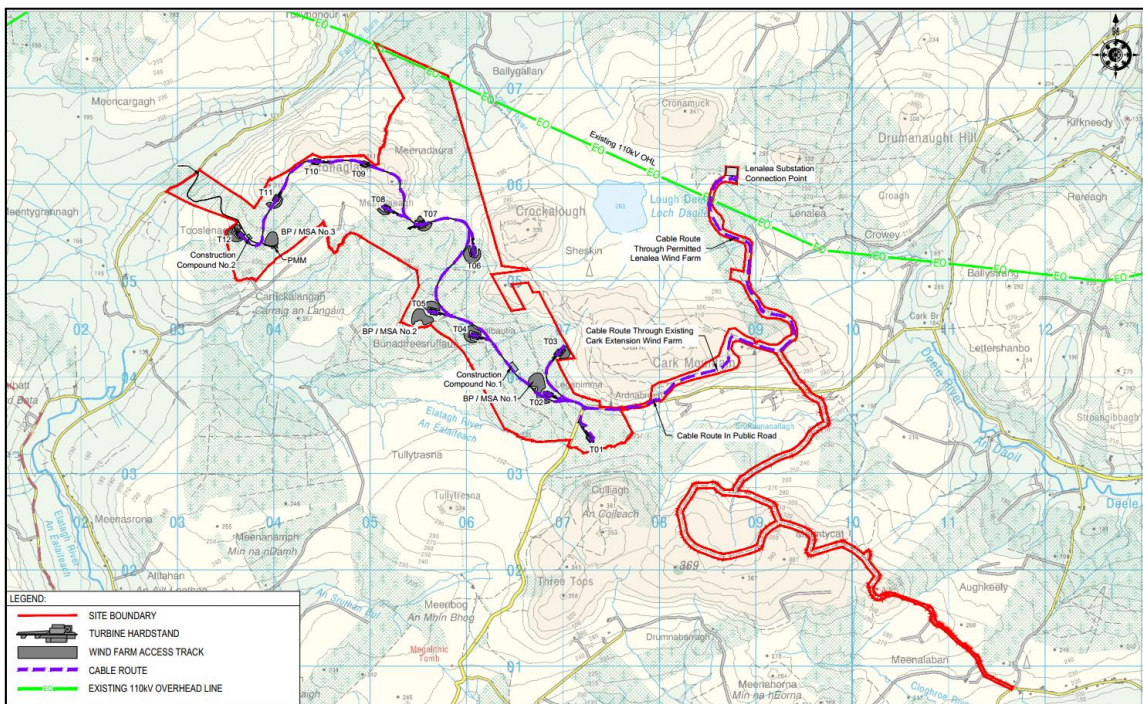


Figure 1 Planning Application Boundary and Proposed Development

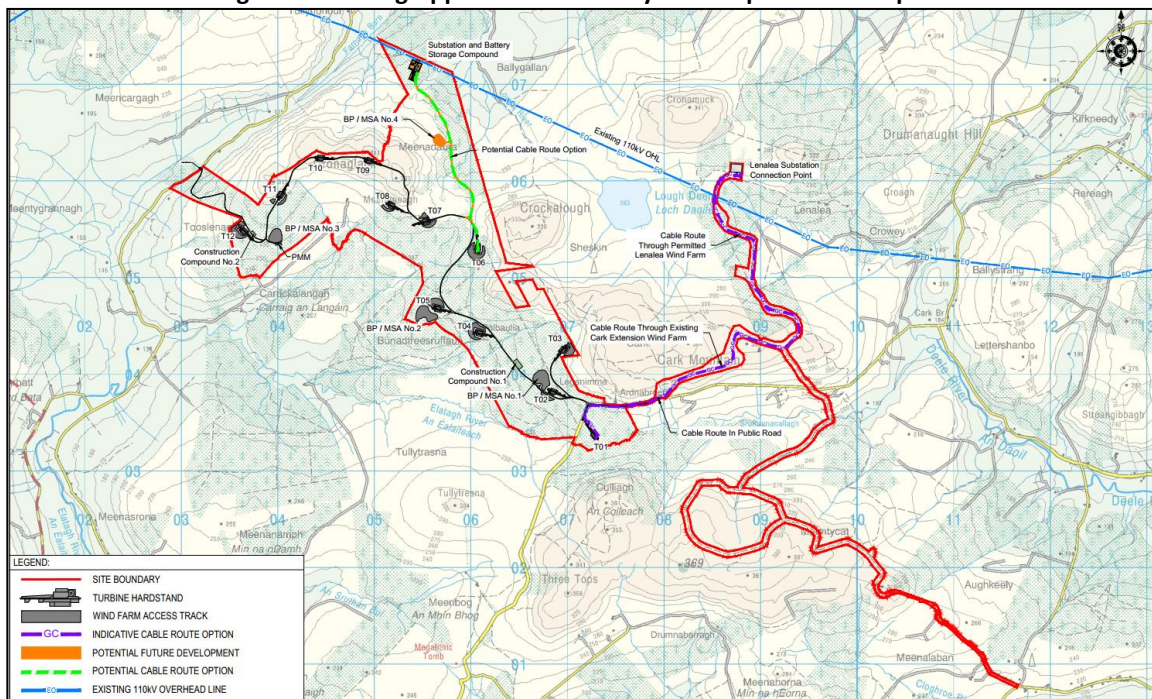


Figure 2 Extent of project within the planning Site boundary considered in the EIA

(Note: Alternative cable route (in green) and infrastructure (in orange) not included as part of the planning application but is included as part of the environmental assessment in the EIAR)

1.3 SITE LOCATION

The site of the proposed wind farm development is situated in the rural central upland area of Donegal, on the southwestern slopes of Cronaglack, Crockalough and Cark Mountain. Lands in the portion of the Project Area proposed for wind turbine development occupy parts of the townlands of Tooslenagh, Treankeel, Meenadaura, Carrickalangan and Cark. The grid connection to the permitted Lenalea 110kV substation also includes the townland of Killymasny while the section of the existing access track through Meentycat Wind Farm traverse parts of Meentycat, Meenalabbin and Aughkeely townlands.



Figure 3 Site Location of Proposed Wind Farm Development

2 DESCRIPTION OF THE PROPOSED PROJECT

It is being proposed by Drumnahough Wind Farm DAC (the Applicant) to develop a wind farm (named Drumnahough Wind Farm) comprising twelve (12) No. wind turbines. **Table 1** sets out the characteristics of the project elements for which development consent is being sought and all other associated project components. It also includes an alternative option of a connection to the National Electricity Grid (NEG) via a new proposed substation within the site boundary as the other potential connection method to the NEG. Full details of the proposed development and project are provided in **EIAR Volume 2 Chapter 2**.

Table 1 Characteristics of the Proposed Project

<p>Proposed Development for which consent is sought</p>	<p>Core Wind Farm Components</p> <ul style="list-style-type: none"> • Twelve (12) No. wind turbines (maximum turbine tip height 167.5m) with associated foundations and crane hardstand areas. • One (1) No. Permanent Meteorological Mast (110m height) and associated foundation, hardstand area and ancillary main crane hardstand area. • New and upgraded internal site service roads (3.2km of existing forestry tracks to be upgraded and 7.1km of new internal access tracks to be constructed). • Underground electric cabling systems between turbines within the wind farm site. • Underground electric cabling systems between the wind farm site and connection point at permitted 110kV Lenalea substation. <p>Associated Components of the Proposed Development</p> <ul style="list-style-type: none"> • Minor Upgrading of existing Site Entrance on the L-10142 • Upgrading/ Widening of existing Entrance on the L-1622-1 • New junction off the L-10142 to facilitate construction and access to T1 • Localised upgrading/widening along existing access roads within Meentycat Wind Farm • Two (2) No. temporary construction site compounds (one approximately 100m x 50m and one approximately 55m x 25m). • Three (3) No. borrow pits to be used as a source of stone material during construction and for storage of excess excavated peat materials. • Three (3) No. peat /spoil deposition areas (at borrow pit locations) • Associated surface water management system. • Tree felling to facilitate site development.
<p>Alternative Grid Connection Option</p>	<ul style="list-style-type: none"> • Underground electric cabling systems between the wind farm site and a proposed new 110kV substation. • One (1) No. proposed 110kV substation including: an outdoor electrical yard, two single storey buildings (one for the system operator and one for the wind farm operator) containing associated facilities (control, switchgear and metering rooms, welfare facilities, workshop and office. • A battery energy storage system (BESS) facility adjacent to the new 110kV substation. • 2 No. new end masts and associated overhead power lines to/from the proposed substation to/from the existing 110kV line. • 1.8km of new internal access tracks to be constructed • One (1) No. borrow pits to be used as a source of stone material during construction and for storage of excess excavated peat materials. • One (1) No. peat /spoil deposition areas (at borrow pit locations) • Associated surface water management system.
<p>Other Associated Project Components</p>	<ul style="list-style-type: none"> • Diversion of Existing 38kV Overhead Line at T1 • Temporary works on sections of the public road network along the turbine delivery route (including hedge or tree cutting, relocation of powerlines/poles, lampposts, signage and local road widening). • Off-site replacement of permanently felled forestry at four (4) No. sites, one located across the Cork and Limerick county boundaries, two in Co. Clare and one site in Co. Galway.

2.1 PROJECT CONSTRUCTION

It is proposed to install twelve (12) No. wind turbines each with a maximum tip height of up to 167.5 metres. Each wind turbine will have a reinforced concrete base pad foundation of approximately 28m in diameter and installed to a maximum excavation depth of approximately 6m below ground level, depending on ground conditions. Each wind turbine will also have an associated turbine hardstand area and temporary laydown area adjacent to the foundation.

There are two proposed connection routes and associated connection point options for connecting the proposed Drumnahough Wind Farm to the National Grid considered in the EIAR as shown in **Figure 2**.

Connection Route and Connection Point to the Permitted Lenalea Substation consists of a medium voltage underground electrical cable from the wind farm site entrance to the permitted 110kV Lenalea substation. The overall connection cable route will be approximately 5.3km.

The alternative Connection Route and Connection Point via new on-site 110kV Substation consists of an underground medium voltage electrical cable beginning as a collector circuit within the wind farm in the townland of Cark and travelling northeast to a proposed 110kV substation in the townland of Trenkeel. The proposed 110kV substation will in turn connect to the existing 110kV overhead line between Binbane and Letterkenny, which traverses the site. This will require the installation of two new loop-in lattice towers within the existing Binbane to Letterkenny 110kV OHL.

It is envisaged that the proposed development will commence in 2023 with a 14 month construction period. The start date is dependent on planning being granted, receipt of a grid connection offer from EirGrid, funding and all permits being in place.

Typically construction will occur within the hours 07.00am – 7.00pm, Monday to Friday and 07.00am to 2.00pm on Saturdays.

Works along public roads would be from 9.00 a.m. to 5.00 p.m. Monday to Friday and 9.00 a.m. to 2.00 p.m. on Saturdays.

A permit for moving abnormal loads will be sought from An Garda Síochána for the delivery of oversized wind turbine components (i.e. blades, nacelles and towers).

It is envisaged that the proposed development would generate employment for up to 60 persons during the construction phase to include site contractors, on-site vehicle and plant operators, engineers, materials delivery personnel, environmental personnel, health and safety personnel.

Primary access to the proposed development site will be provided via the existing forestry entrance from the local public road, L-10142 at the southeast of the site (Junction A). This will be the main site entrance during both the construction and operational phases of the development. A second site access point is proposed north west of the site via an existing forestry track from the L-1622-1 local public road (Junction B). This existing entrance is proposed as a temporary access to be used during

the early construction phase only. A new junction and spur road off the L-10142 (Junction C) will be constructed to facilitate access to T1.

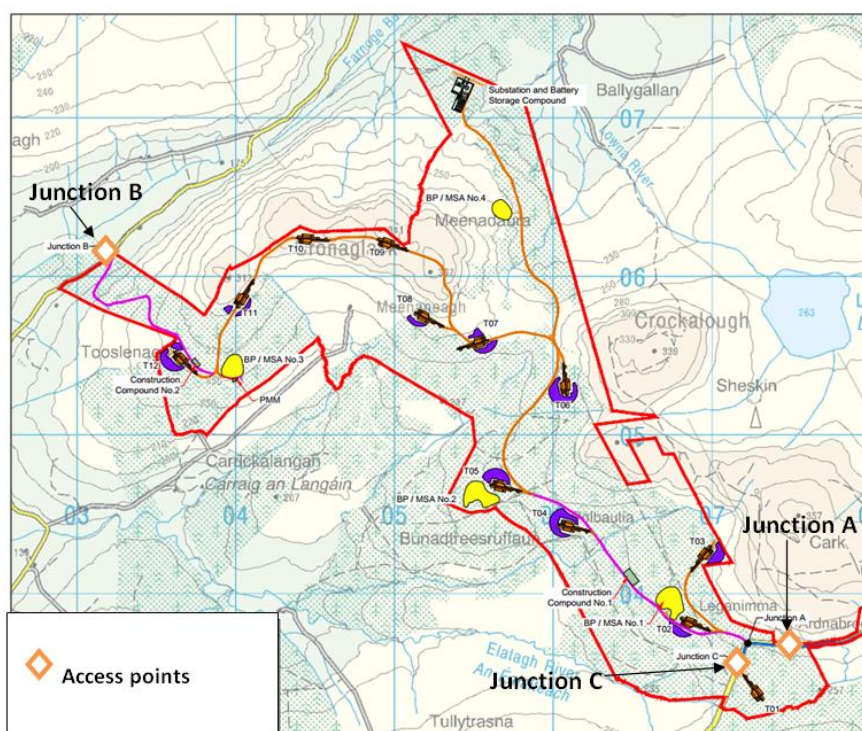


Figure 4 Site Access Points

Two (2) No. temporary construction compounds will be set up upon commencement of the construction phase. The compounds will be used as a secure storage area for construction materials and will also contain temporary site cabins to provide welfare facilities for site personnel. Facilities will include office space, meeting rooms, canteen area and mobile sanitary facilities.

Four (4) No. proposed on-site borrow pit locations have been identified to provide the majority of the required fill material for internal roads, passing bays, hardstands, foundations and temporary compound.

A site surface water management system will be constructed on the site so as to attenuate run-off, guard against soil erosion and safeguard downstream water quality.

Felling of commercial conifer forestry is required within and around wind farm infrastructure to accommodate the construction of the turbine foundations, hardstands, access tracks, turbine assembly and proposed 110kV substation (if the alternative connection point option is advanced).

To allow for forestry removed as part of the project, replacement forestry will be planted at off-site approved lands. Four No. locations have been identified as follows:

- Pollacorragune, Co. Galway
- Craghera, Shessiv, Co. Clare
- Furroor, Kilcolumb, Reanagishagh, Lisroe Co. Clare
- Rathgoggan North, Co. Cork and Co. Limerick

The lands at each of these sites have been granted technical approval by the Forest Service for afforestation.

2.2 OPERATION

The proposed development is expected to have a lifespan of circa 30 years. Each wind turbine will be computerised to control critical functions, monitor wind conditions and report data back to a SCADA system. Turbines can be programmed to shut down during periods when shadow flicker is predicted to occur.

2.3 DECOMMISSIONING

At the end of the estimated 30 year lifespan of the proposed development, the Developer will make the decision whether to repower or decommission the turbines. Any further proposals for development at the site during or after this time will be subject to a new planning permission application. If planning permission is not sought after the end of life of the turbines, the site will be decommissioned and partially reinstated with all 12 No. wind turbines and towers removed.

2.4 THE USE OF NATURAL RESOURCES

The majority of aggregate materials (circa 80%) required for the construction of the roads, hardstands and the substation and battery compound will come from aggregate (rock, stone, gravel, sand) extracted from four (4) No. proposed on-site borrow pits. Material to be delivered to site will mainly consist of higher grade materials not available to be won on site, limestone capping material for roads and hardstands, and concrete for the construction of the 12 No. turbine bases, permanent met mast foundation and substation infrastructure.

Water needs for construction activities will be limited to concrete truck chute washing, wheel wash, dust suppression and sanitary facilities.

2.5 THE PRODUCTION OF WASTE

All soils and subsoils generated from excavation works will be retained on site and reused in bunding, landscaping and localised earthworks. Excess peat and spoil material will be stored on site in designated peat deposition areas.

Wastewater from welfare facilities on site will drain to integrated wastewater holding tanks associated with the toilet units. The stored effluent will then be collected on a regular basis from site by a permitted waste contractor and removed to a licensed/permitted waste facility for treatment and disposal.

2.6 EMISSIONS AND NUISANCES

The anticipated residues and emissions likely to be generated during the project lifetime are summarised in **Table 2** below. These environmental effects have been identified, assessed and proposals for management of the anticipated nuisances and/or emissions are presented throughout relevant chapters of this EIAR.

Table 2 Emissions and Nuisances

Project Phase	Aspect	Potential Emission/Nuisance	Assessment Provided
Construction/ Decommissioning	Air	<p>The main emissions to atmosphere during the construction stage of the project is from fugitive dust associated with the following activities:</p> <ul style="list-style-type: none"> • Groundworks associated with the construction of the project infrastructure • Transportation and unloading of crushed stone around the site; • Vehicular movement over potentially hard dusty surfaces such as freshly excavated and constructed access tracks and crane hardstanding areas; • Vehicular movement over material potentially carried off site and deposited on public roads. <p>The movement of machinery, construction vehicles and the use of generators during the construction phase will also generate exhaust fumes containing predominantly carbon dioxide (CO₂), sulphur dioxide (SO₂), nitrogen oxides (NO_x), carbon monoxide (CO), and particulate matter (PM₁₀).</p>	EIAR Vol 2 Chapter 8 Air and Climate
	Noise	Traffic flows, excavation/blasting mechanical machinery and electrical equipment typically used for construction projects would generate noise emissions.	EIAR Vol 2 Chapter 11 Noise
	Water	Surface water runoff and discharges from construction working areas are likely during construction, although overall the quantity of surface runoff would not change overall as a result of the construction work. Occasional and low quantity discharges could arise from pumping in order to dewater foundation excavations. This would be discharged to the system water management drainage system. Pollution sources could arise as a result of soil erosion or from oil/ fuel or chemical storage and use. Proposals for management of water quality and quantity from the proposed development are presented in EIAR Volume 3: Appendix B-2: CEMP.	EIAR Vol 2 Chapter 10 Water
	Traffic	The additional traffic, especially heavy goods vehicles associated with the construction phase, has the potential to cause nuisance to those using the local road networks	EIAR Vol 2 Chapter 5 Population and Human Health, EIAR Vol 3 Appendix H-1 and H-2
Operational	Air	Due to the nature of the project no significant point source or diffuse air emissions would be produced during its operation.	EIAR Vol 2 Chapter 8 Air and Climate
	Noise	Potential noise nuisance from operational turbines and a proposed new 110kV on-site substation.	EIAR Vol 2 Chapter 11 Noise
	Water	No water emissions or pollution sources have been identified for the operational phase.	EIAR Vol 2 Chapter 10 Water
	Shadow Flicker	In certain conditions, the movement of wind turbine blades could give rise to shadow flicker nuisance at nearby residential receptors.	EIAR Vol 2 Chapter 14 Shadow Flicker

2.7 TRANSBOUNDARY EFFECTS

The location of the project is entirely in County Donegal within the Republic of Ireland. Transboundary impacts relate to potential impacts on other Member States, i.e. outside of the Republic of Ireland. At its closest, the wind farm site is approximately 18km from the Northern Ireland border. There is no risk of significant transboundary effects due to the proposed project.

2.8 RISK OF MAJOR ACCIDENTS AND DISASTERS

It is considered that there is no risk for the project to cause major accidents and/or disasters or vulnerability of the project to potential disasters/accidents, including the risk to the project of both natural disasters and man-made disasters.

2.9 ALTERNATIVES CONSIDERED

The proposed development has been designed to minimise potential environmental impacts and to maximise wind potential on site.

The wind farm has been designed following a step by step EIA process which informed and identified the buildable areas suited to turbines, roads and infrastructure based on avoidance of unsuitable areas and following the good practice of mitigation by design. More details on the project design and evolution can be read in **EIAR Volume 2 Chapter 4**.

Alternatives examined included alternative site layouts, alternative turbine scales, alternative grid connections and alternative construction methods.

Six (6) alternative wind farm layouts were examined in order to find the most optimum design solution for the site with the least level of environmental impact.

The final site layout (iteration number 6) was determined based on multi-discipline inputs and consideration of topography, biodiversity, land and soils, archaeology, hydrology, landscape, and engineering constraints and assessments. The development as proposed is the preferred option as it results in the least effects on resources and receptors while meeting the project objectives of a large scale renewable wind energy development.

Further details on the alternatives examined can be read in **EIAR Volume 2 Chapter 4**.

3 ENVIRONMENTAL IMPACT ASSESSMENT

The main objective of the EIA process is to ensure that all direct, indirect and cumulative environmental effects of the project are anticipated. Where effects are identified as unacceptable, these will be avoided or reduced during the design process through the implementation of practical mitigation measures. The main chronological stages of the environmental assessment undertaken include:

- Carrying out baseline studies and collecting data on the existing receiving environment
- Assessing potential for significant environmental effects (impact assessment)
- Recommending or designing mitigation measures to avoid or minimize environmental effects

The EIA has been carried out in accordance with the relevant legislative requirements and guidelines including the *Environmental Impact Assessment of Projects: Guidance on the preparation of the EIA Report*. European Commission (2017) and Draft Guidelines on Information to be contained in environmental impact assessment reports EPA (2017). Specialist guidance as required under each of the environmental topics discussed hereunder has also been used where appropriate.

3.1 POPULATION AND HUMAN HEALTH

The scope of this assessment considers the effects of the construction, operation and decommissioning of the proposed project in terms of how the proposal could affect population and settlement, economic activity, employment, land use, amenities and tourism, and health and safety.

The Project Area for the wind turbine development is located in a rural, lightly populated area. Settlement patterns typically comprise farmsteads and one-off residential dwellings, distributed along the local and regional road networks that encompass the site and serve the area. The greatest density of settlement occurs along the local road networks in clustered and ribbon development to the north and south west of the development site. The nearest urban settlements to the site of the proposed development are the villages of An Clochán approximately 4.7 km to the south and Drumkeen approximately 9 km to the southeast.

There are no residential dwellings within the proposed development site boundary. There is one unoccupied and derelict dwelling within less than 1km of the nearest proximal wind turbine (approximately 690m from T11). There are approximately 4 residential dwellings approximately 1km from the site and 10 residences within 1-2km from the site. A review of the Donegal County Council planning data base shows that there is planning permission for a new residential dwelling approximately 2.2km east of T1.

There are currently no defined recreational land-uses within or associated with the proposed development lands. While there are no tourist attractions pertaining specifically to the site of the proposed development, there are a number of recreational and cultural amenities in the vicinity of the site, and in the wider area including: Walking trails and Forest Walks; Cycling; Golf; Angling and Equestrian activities. There is no potential for a significant impact on tourism or recreation land uses.

The development project will have a positive impact on employment at both the local and national level and in both the short and long term. It is the intention of the developer to encourage the main contractor to use local sub contractors, drivers, suppliers and materials as much as possible.

During operation, the proposed development would bring added benefit to the local community through the provision of a community benefit fund. Additionally, annual rates payments from the project will contribute substantial funds to Donegal County Council over its lifespan, which will be redirected to the provision of public services within Co. Donegal.

It is not likely that the proposed development would directly or indirectly result in any negative effect or reduction in existing economic activity of the area during any phase of the development. During the construction phase aggregates and concrete supply for road construction and foundations will be obtained from local quarries and suppliers, supporting the local economy.

The wind farm site is located in proximity the Donegal Gaeltacht. No significant negative effects upon the status of Irish as a community language or the socio-economic vibrancy of the Gaeltacht will occur.

Serious risks to human health and safety are not envisioned. The rigorous safety checks imposed on the turbines during design, construction, commissioning and operation ensures the risks to humans are negligible.

As with any development, the construction activities can cause a nuisance to the local community and are likely to pose temporary minor disturbances locally. The most notable of these disturbances relates to the generation of additional traffic on the local networks. Here noise and safety implications are also a concern. However, disturbances associated with the additional volumes of traffic will principally be confined to the construction phase and will cease on completion of works. The construction phase will be managed to minimise the impact on the human environment and the local residents. With the mitigation measures in place, no significant negative effects on the local human environment are expected.

There are no predicted adverse operational impacts associated with the proposed development which would result in significant negative effects on local society. The project will produce electricity in an environmentally-friendly manner thereby avoiding the risk of air pollution and thus benefit human health.

In terms of impacts to neighbouring lands and land-uses it is considered that the proposed development does not pose a significant risk to either existing or future land-uses. All existing land-use practices can co-exist with the proposed development. There will be no severance, loss of rights of way or amenities as a result of the proposed development.

Noise effects are not considered to be significant. The noise assessment shows that that predicted noise levels will comply with the noise limits set out in the current Wind Energy Development Guidelines and thus will not adversely impact on the quality of life of local residents and the existing relatively tranquil environment in which they live.

The shadow flicker assessment shows that while there is potential for a number of dwellings within 1.4 km of the turbines to experience shadow flicker effects, the operational mitigation measures proposed (i.e. turbines will be programmed to shut down during periods when shadow flicker is predicted to occur) ensures that zero shadow flicker will occur at all residential receptors.

The operational phase will be managed to minimise the impact on the human environment and the local residents. Should it be required, turbines will be operated in a noise reduced mode at specific wind speeds to ensure that specified limits are met at all locations or shut down for periods. With the mitigation measures in place, no significant negative effects on the local human environment are expected.

The proposed wind turbines are located at substantial distances from residential receptors and thus would have no possible Electromagnetic radiation impact.

The visual factor of the development is perhaps the most intrusive aspect. Given the size of the turbine structures and their proposed position along an upland area, a visual effect is unavoidable. The extent of intrusion will vary in degree and significance according to viewing distance, the numbers and parts of turbines visible, the number of viewers affected and of course public perception. The landscape assessment demonstrates that the proposed development would not have a significant negative visual effect in terms of local population or key tourism and recreational amenities.

3.2 BIODIVERSITY

The biodiversity chapter describes the ecology of the proposed development site and environs in terms of designated sites, habitats, flora, fauna and biological water quality. This chapter specifies mitigation measures to ensure that significant impacts on these features do not occur. Studies and reporting were in line with best practice and recently produced guidance. The Information on the existing environment was obtained using publicly available information sources and by field surveys.

The proposed development does not occur within any area protected for nature conservation, such as Special Areas of Conservation (SAC) or Natural Heritage Areas (NHA). The River Finn SAC and Tullytresna Bog proposed NHA share a similar boundary close to the southwestern boundary of proposed development site. Some of the proposed development occurs upslope of these protected areas, so are linked by surface water features including small streams.

The conifer plantation which overlies the bulk of the site is of low ecological value with reduced biodiversity and has degraded adjacent bog habitats. The most important habitats at the site are upland blanket bog and wet heath. These habitats have been evaluated as being of county Importance due to the European level of protection afforded to them. Several small streams drain the site. Most of these flow into the River Elatagh a tributary of the River Finn. Other streams drain to the Swilly and Deelee Rivers. Protected plants were not recorded during the field surveys.

The proposed development site is of no particular value to bats or non-volant fauna. It is an exposed windswept upland poorly drained area with low carrying capacity for most fauna. Bat densities were found to be low. Bats, otter and deer were evaluated as being important at a local scale due to their occurrence and/or conservation status. There was some evidence of badger, stoat and pine marten

but populations of no greater than local importance were recorded. The prospect of these fauna dwelling within the site is low given the marginal/suboptimal habitats present. The watercourses within the site are headwater streams considered too small to support important aquatic communities. The importance of watercourses increases as they flow away from the proposed development site and become larger, capable of supporting significant numbers of salmon and trout.

A total area of 6.71ha. peat habitats would be lost due to the construction footprint and there would be potential secondary impacts on adjacent peat habitats. Potential impacts on fauna relate primarily to habitat loss and disturbance, and collisions with proposed turbines in the case of bats. Impacts on aquatic receptors is related to water quality and pathways with source pollutants. Cumulative impacts related to climate change, water quality deterioration, agricultural intensification and wind farm development could exacerbate potential impacts associated with the proposed development.

General best practice construction mitigation measures will be followed, including working according to a Construction and Environmental Management Plan (CEMP) which has been prepared. A Biodiversity Enhancement Plan (BEP) aimed at achieving biodiversity net gain within the proposed development will be implemented onsite under the guidance of an Ecological Clerk of Works. The BEP would aim to offset habitat loss created as a result of the proposed development works at construction stage and help weaken overland surface water connectivity between the proposed development and downslope watercourses during operation stage. Measures to provide a biodiversity net gain in an area currently under commercial forestry, provide habitat amelioration and habitat creation including peat habitat restoration, establishment of stream buffer zones/forestry set back distances, riparian woodland creation, pond creation and bat box installation.

Through habitat reinstatement and a Biodiversity Enhancement Plan, there would be rehabilitation of 6.2ha. (currently conifer plantation) and habitat restoration of 7.2ha of upland blanket bog and of other habitat (mostly conifer plantation) to upland blanket bog, resulting in a net gain of ca. 6.7ha. of peatland habitats. It is considered that the proposed development will not result in significant effects on habitats and flora at the local level given the distribution of the affected habitats in the locality and mitigation/enhancement measures proposed.

3.3 ORNITHOLOGY

The proposed development does not occur within any area protected for birds, such as Special Protection Areas (SPAs), Irish Wetland Bird Survey sites or Ramsar sites. The closest SPA is Derryveagh and Glendowan Mountains SPA, located 5.5km to the northwest, where red-throated diver, merlin, peregrine, golden plover and dunlin have been selected as special conservation interests. Red grouse breeds at Meentygrannagh Bog SAC and pNHA which lies ca. 145m west of the proposed development site. Tullytresna Bog proposed Natural Heritage Area (pNHA) is of ecological importance as it supports red grouse and snipe and is adjacent to the proposed development site.

The proposed development site is used by a variety of birds, mostly species that are common in Ireland and of low conservation concern. Notable species recorded at the proposed development site and environs (e.g. Lough Deele) include merlin, hen harrier, golden eagle, golden plover, peregrine falcon, red grouse, goosander, meadow pipit and snipe. The most important birds recorded at the proposed development site were merlin and golden plover (assessed as being

important at the county scale) and golden eagle (nationally important). Merlin has been recorded ground nesting within the site from 2018 to 2020. Rare occurrences of flocks of golden plover of county Importance were recorded flying through the site. Golden eagle was recorded three times during 2018-2020 surveys, but the proposed development site is not within the main foraging range of a known nesting pair. With the exception of merlin, the proposed development site lacks potential breeding sites for these species and there is no optimal breeding habitat present adjacent to site. The proposed development does not contain particularly sensitive habitats or key populations of vulnerable bird species taking account of publicly available bird sensitivity mapping and records, data supplied by NPWS and bird surveying of the site from 2018 to 2020. Golden eagle and goosander are considered high sensitivity species with merlin, peregrine, golden plover, lesser black-backed gull and red grouse considered medium sensitivity.

There will be no direct impacts on protected areas such as SPAs. The potential impact on Tullytresna Bog pNHA is assessed as low. The NIS concluded that the integrity of the SPAs will not be adversely affected in view of the sites' conservation objectives.

The wind energy development has the potential to result in habitat loss, disturbance and displacement of birds. Habitat loss within the development area will be mostly in conifer plantation and to a lesser extent on peatland habitats. This can result in reduced feeding and nesting opportunities for birds, an impact assessed as imperceptible negative, or low. Limited habitat loss associated with the proposed development site will not significantly impact wetland species as there is an abundance of similar habitat in the general area. Disturbance can be caused by the presence of machinery and personnel on-site. With the exception of merlin, potential disturbance to birds of prey owing to the construction phase is considered a low impact (merlin: medium impact).

The main operational effects of the wind farm is displacement (due to barrier effects) and collisions. The magnitude of these effects on sensitive species such as merlin, peregrine, kestrel, sparrowhawk, hen harrier, buzzard, grouse, grey heron, snipe, golden plover, goosander, golden eagle and gulls are assessed as minor at most. There is therefore no significant concern in relation to increased energy expenditure due to further flights or potential disruption of linkages between distant feeding, roosting, moulting and breeding areas. The collision risks are low due to factors related to bird species, numbers and avoidance behaviour.

Disturbance and avoidance impacts of decommissioning the wind farm will be similar to construction (slight negative) but of shorter duration.

The cumulative effect of a set of projects is the combined effect of all the projects, taken together. Taking into account the already modified nature of the proposed development and wider study area (past and present forestry operations), the potential for significant cumulative impacts are considered unlikely to be significant. No significant effects on local avifauna are predicted with regard to cumulative impacts of climate change and wind energy development.

Consultation between the design team and the developer was conducted on an ongoing basis during the design phase, in order to formulate a proposed development design which will avoid, by design and at source, any construction activities, and minimise habitat loss for bird species such as merlin. A Project Ornithologist with appropriate expertise and recognised long-term ornithological experience will conduct pre-construction and construction phase bird surveys at the site, including the monitoring of merlin. General best practice construction mitigation measures will be followed,

including working according to a Construction and Environmental Management Plan (CEMP) which has been prepared.

Bird surveys will continue during the operational phase at locations used pre-construction.

With the avoidance measures (design phase), and full implementation of mitigation measures throughout the construction phase, operational phase, and decommissioning phase of the project, significant residual effects on avian KERs are not expected.

The ecosystems at and surrounding the proposed development are considered to have the capacity to accommodate change at the level predicted without significant effects on birds.

3.4 LAND AND SOILS

The lands and soils environment for this site have been assessed for impacts of tree felling; roads and drainage; excavation works; rock blasting; material storage; soil erosion; and waste generation due to the activities associated with the proposed development in its construction, operational and decommissioning phases. The impact due to the replacement lands has also been assessed. Cumulative impacts have also been considered. Data analysed to determine the impacts came from desk studies and site visits.

The topography of the site ranges from approximately 235m to 330m. Cark mountain with a peak of 364m is located to the east of the site.

The bedrock under the site is predominately schist with an area of quartzite at the north east site access point. Soil types mapped at the site include peat with local areas of bedrock present at the surface and till. Observations made during site visits confirmed the presence of the above range of ground conditions. The measured peat depth on the site varied from 0.1 to 4.5m deep with an average depth of 1.73m. The Peat Stability Risk Assessment for the site was completed through a two-stage analysis and concluded that there is a Negligible Risk to the infrastructure of the Wind Farm and surrounding area.

No geological heritage sites are present within the site boundary. Also, no quarries or mineral locations are mapped within the vicinity of the site.

The existing land cover on the site varies from bogs, grassland to forestry and woodlands. The majority of the site is within Coillte owned afforested land. These land uses have much altered the natural land and soil environment over time.

In order to mitigate the impacts of the proposed development, a number of mitigation measures have been proposed. These are proposed in the areas of: Design; Land Use; Slope Failure; Excavations; Rock Blasting; Storage and Disposal of Excavated Materials; Waste Generation; General Site Management; Drainage; Surface Water; and Replacement Forestry Lands. An example is the designing of infrastructure to avoid areas of deep peat, as identified from the peat survey. Another example is the commitment to adhering to best practice methodologies and operating to a Construction and Environmental Management Plan will also limit the impact on the land and soils.

Given the low risk and highly modified nature of large parts of the site and in light of the works and the mitigation measures included in the EIAR, it is considered that there will be no significant impact

to the land and soils environment due to the development, operation and decommissioning of this project.

3.5 WATER

The primary drainage of the proposed development area is through a network of streams which join the River Finn. Surface water drains naturally into these streams mainly by overland flow. There is low movement of water in the bedrock and peaty soil layer due to impermeability. Drainage in the area is typically a complex of small drainage ditches created for commercial forestry.

The majority of the proposed wind farm site is located in the Finn sub-catchment, while the northern edge of the site is located within the Swilly sub-catchment. The eastern edge of the site is in the Deele sub-catchment. The two assessed grid routes are located within the same catchment area as the proposed wind farm.

The water quality status in these sub catchments range from poor to good with the Finn sub-catchment listed as “at risk”. The water quality of the streams in the area was surveyed and the resulting water quality ranged from poor to good.

The water quality status of the catchments around the forestry replacement lands, which are all outside Donegal, range from poor to good.

During the construction, operation and decommissioning of the proposed wind farm project, a number of activities will take place on site, some of which will have the potential to affect the water quality at the site or in its vicinity.

The activities include forest felling, peat excavation, construction of new site access tracks, turbine hard-standing areas and the grid connection route along with the substation.

Some of the potential impacts on the waters include:

- An increase in rain water run-off has the potential to cause soil erosion and sediment release into the rivers.
- Sediment release into the river system from construction works and peat excavation.
- Localised lowering of the water table and diverting water into the drains and channels.
- Blockage of cross-drains could lead to consequent flooding and concentration of flows.
- The velocity of flows in the drainage system adjacent to access tracks could cause erosion in steeply sloping drains adjacent to access tracks.
- Inappropriate management of spoil heaps could result in accidental break outs of silt on site leading to the loss of suspended solids to surface waters.
- Use of machinery during construction could result in spillages of fuel, oils, lubricants and other hydrocarbons to surface waters.

Mitigation by design and management will be used to reduce the likely significant impacts.

Mitigation by design will include siltation and erosion controls via a drainage system that will slow water and settle out suspended solids. The drainage system will use temporary settlement ponds to stop suspended solids from getting into the rivers during the construction phase.

The development itself was designed with a 50m buffer zone to rivers/streams with the exception of water crossings. The roads and grid connections have been designed to make use of existing roads and river crossings, as much as possible. New access tracks have been designed to avoid areas of deep peat and/or steep slopes.

During the construction phase mitigation by management will include forestry clearing in accordance with the Forestry and Water Quality guidelines. Additional silt fencing and emergency spill kits will be kept on site for use in emergencies. The silt fencing will act as a barrier to suspended solids and be kept in place until vegetation has been satisfactorily established. A drainage system monitoring schedule will consist of a daily and weekly visual inspection of the drainage system. A surface water monitoring program will include monthly monitoring of selected watercourses for parameters such as suspended solids.

During the operational phase of the wind farm the drainage system will be periodically checked and maintained as required.

Once the above mitigation measures are used, the residual impact on the water environment during the construction, operational and decommissioning phases of the development is assessed as imperceptible negative to minor negative. Mitigation measures will be monitored throughout the construction, operational and decommissioning phases. When the mitigation measures are implemented in full, a high degree of confidence can be assured that any effects on the receiving environment will be minor.

Taking into account the combined or cumulative impact of this project with others in the area, the proposed development is not expected to contribute to any significant, negative cumulative effects on waters.

3.6 AIR AND CLIMATE

The potential effects of the proposed development on local air quality and climate have been assessed. The effects of construction, operation and decommissioning have been considered.

Representative Environmental Protection Agency (EPA) ambient air quality data has been used to characterise the existing air quality in the area. The air quality for the region where the Drumnahough Wind Farm is proposed (Rural West AQIH Region 6) is currently ranked as '2 - Good'. The nearest air quality station to the site is in Letterkenny. The air quality index characterised by this station was classified as 1 'Good'.

There is the potential for dust nuisance to occur during the construction phase. However, considering the separation distance to nearby dwellings, in addition to strict adherence to best construction practices, the impact on local air quality will not be significant.

Once operational, there will be no direct emissions to the atmosphere from the proposed development. The electricity generated will displace electricity that would otherwise have been generated by burning fossil fuels. The CO₂ offset by the proposed development will further assist Ireland's CO₂ reduction commitments under the Paris Agreement and the Climate Action Plan 2019. The Drumnahough Wind Farm is fully aligned with current energy and climate policy, aims and objectives, which primarily seek to increase the production of electricity from renewable sources.

There will be some CO₂ losses associated with the turbine life (manufacture, construction and decommissioning), and the disruption of the natural on-site natural sink resources. However this will be quickly repaid once the wind farm is operational. The calculated CO₂ payback period is 2 years.

3.7 NOISE

The noise environment in the surrounding area is of low population density and is typically dominated by 'natural' noise sources such as wind disturbed vegetation, birds and farm animals. Other sources of noise include intermittent local road and agricultural vehicle movements in the area.

The proposed construction activities will occur at relatively large distances from the residential properties considered, such that the resulting predicted noise levels will have negligible impacts. Construction traffic passing to and from the proposed development site will also represent a potential source of noise to surrounding properties. The EIAR has identified a worst-case scenario traffic associated with construction of 12 heavy vehicles per hour. Although this traffic may pass in relative proximity to some dwellings, the impact is considered to be minor. The noise from construction activities has been assessed and is predicted to result in a temporary negligible to minor impact which is not significant.

The operational noise assessment demonstrated that predicted noise levels will comply with the noise limits set out in the current Wind Energy Development Guidelines. The predicted operational noise levels from the proposed development are considered acceptable and are therefore not significant.

Given the separation distance between the substation and battery storage area and the nearest residential properties, the associated noise levels at these properties will be below the most stringent noise limit.

De-commissioning is likely to result in less noise than during construction, and therefore be associated with minor effects at most which is not significant.

No cumulative construction activities would occur in sufficient proximity to generate potentially significant cumulative construction effects. Cumulative operational noise levels including all neighbouring schemes are considered acceptable in line with relevant noise limits and are therefore not significant.

To reduce the potential effects of construction noise mitigation measures are outlined as follows:

- Activities that may give rise to noise at the surrounding properties and heavy goods vehicle deliveries to the site will be limited to the hours 07:00 to 19:00 Monday to Friday and 07:00 to 14:00 on Saturdays.
- Turbine deliveries will only take place outside these times with the prior consent of the Council and An Garda Síochána.

- All construction activities shall adhere to good practice with all equipment maintained in good working order

Mitigation during decommissioning will be similar to that during construction phase.

Residual effects section outlines the degree of environmental change that will occur after the proposed mitigation measures have taken effect. Mitigation measures as discussed above will aid reduction in the potential noise and vibration effects during construction. Operational noise levels are acceptable in terms of the relevant guidance for the assessment of windfarm noise, and therefore considered not significant.

De-commissioning is likely to result in less noise than during construction and therefore will not result in significant adverse noise effects.

3.8 LANDSCAPE

The Landscape and Visual Impact Assessment describes the landscape context of the proposed development and assesses the likely landscape and visual impacts of the proposed development on the receiving environment.

The proposed wind farm project is located in the Cark Uplands. This is an area of uplands to the southwest of Letterkenny, and northwest of Ballybofey. These uplands are bounded by the River Swilly valley to the north, and the Finn river valley to the south. The land rises from these valleys, to a height of over 300m, with several peaks, including Cark Mountain, Culliagh, Cronaglack and Three Tops. The landcover of the Cark Uplands consist mainly of large areas of blanket bog and coniferous forestry and a number of large wind farms.

The Finn Valley to the south, and Swilly Valley to the north are considered to be of Low-Medium sensitivity as they are partly screened by topography. Areas of medium landscape sensitivity are found in the site and immediate surrounds, in the Cark Uplands. An area of high sensitivity is found at Glenveagh National Park, west and northwest of the site, as well as the Bluestacks to the south of the site. These are both areas of Especially High Scenic Amenity (EHSA) in the Development Plan.

The proposed development will not introduce a new element to the landscape, but an increase in the number of turbines. Landscape Effects in the immediate vicinity of the site are considered Slight to Moderate, and some open views of the turbines will be available at relatively close proximity such as areas to the north and northwest. In the wider landscape the effects on the landscape character of the Glenveagh National Park are considered Not Significant to Slight. The overall landscape character of the National Park will not be affected, and several key areas including Glenveagh Castle and gardens, Lough Beagh, the visitor centre, and the majority of the trails in the park will not have visibility of the turbines.

A number of photomontages (17) were produced, and several Zone of Theoretical Visibility (ZTV) Maps were produced to assist in the assessment of visual effects. The pattern of visibility shown in the ZTV indicates that areas that will have theoretical visibility of the proposed turbines is concentrated on the site and immediate surrounds, and generally more evident on parts of the higher ground and slopes of higher ground, in the wider landscape, with less visibility in the valleys. The pattern of visibility shown in the ZTV also indicates that considerable areas within the 30km boundary have no visibility of the proposed turbines.

The photomontages were taken from a variety of locations along nearby roads, representing local residents, those travelling through the landscape, as well as a location within the Glenveagh National Park, areas of EHSA, waymarked trails and scenic views.

The assessment of the 17 viewpoint locations shows that the visual effects range from those with: No visual effect (3 No. viewpoints); Imperceptible effects (2 No. viewpoints); Not significant (3 No. viewpoints); Slight effects (5 No. viewpoints); Slight/Moderate (1 No. viewpoints); Moderate effect (3 No. viewpoints).

The most pronounced effects (Moderate) were found in three viewpoints to the north of the site – Viewpoints 4, 8, and 15. Two of these are along the R250 immediately north of the site, where there are open views from elevated locations, and the turbines will appear at close proximity while Viewpoint 4 lies further north along the R251. In the immediate vicinity of the site, especially approaching from the south and east, the turbines will be seen against a backdrop of existing turbines, however to the northwest at Tullyhonour and Rathdonnell, it is noted that a low number of residences in this vicinity are likely to experience open views of the turbines at close proximity. No other turbines are visible from this area.

Visual effects on Glenveagh National Park and its elements of cultural and historic importance were also assessed. In general, visibility from the most visited parts of the park are minimal. The only public road in the Park with theoretical visibility is a short section of the R254, which is illustrated by Viewpoint 1 (and considered Not Significant). Other key visitor areas in the park including the Visitor centre, Glenveagh Castle and four of the five trails will not have visibility of the turbines. Two blade tips only will be visible from the St Columbcille's stone at Lough Gartan. As indicated on the ZTV, parts of the Lough Inshagh walk which are elevated will have theoretical views of the proposed turbines, (as one travels south to Lough Gartan). Views as the trail approaches Lough Gartan will be screened by vegetation.

The border with Northern Ireland is approximately 16 kilometres from the proposed turbines, at its closest point, south and east of the N15. Theoretical visibility is not widespread, and the ZTV Map shows several limited areas with some theoretical visibility.

Cumulative landscape and visual effects were also assessed. In terms of landscape effects, wind turbines, areas of blanket bog and coniferous forestry dominate these uplands, and this would be the addition of another wind farm to the area, contiguous to others. This has the effect of extending the presence of turbines further to the northeast, but without a significant cumulative effect on the Carr Mountain uplands landscape character.

Cumulative visual effects from the 17 viewpoints range from no effect to Moderate effect, and are more pronounced in some areas than in others, with viewpoints directly to the north of the site (4,8) and one to the south (11) considered Moderate, and ranging from adverse to neutral in effect. The remaining viewpoints show in many instances, from more distant viewpoints the proposed turbines will be difficult to distinguish from other turbines, and visual effects are much less from distant views.

3.9 ARCHAEOLOGY AND CULTURAL HERITAGE

This study assesses the impacts on archaeology and wider cultural heritage from elements of the project for which development consent is being sought and all other project components including works along the turbine delivery route, replacement forestry lands and an alternative grid connection option via a proposed new on-site substation with battery storage facility.

There are no recorded archaeological monuments or artefacts recorded within the boundary limits of the proposed Drumnahough Wind Farm site boundary. Examination of the wider study area encompassing the development site demonstrates that the wider study area has not been densely settled, with only fourteen recorded sites within a 5km radius from the centre of the Drumnahough site. The upland region of the wider study area encompassing the proposed wind farm is generally spare of archaeological monuments.

In a wider cultural context, three 19th century upland Malt Kiln Settlement Sites A, B & C, comprising a coherent aspect of the industrial built heritage of upland Donegal were recorded within and abutting the boundary limits of the proposed Drumnahough Wind Farm. These zones of cultural interest were assigned a 20m buffer and therefore there will be no impact by the proposed wind farm on any of these sites.

No previously unrecorded archaeological sites or features were noted or recorded in the course of the field walking or in the course of the desk-based research within the boundary limits of the proposed Drumnahough Wind Farm. There is a possibility that there will be a low impact on any unknown potential subsurface archaeology within the boundary limits of the proposed Drumnahough Wind Farm during the construction phase. Licensed archaeological test excavations should be undertaken in advance of construction at targeted areas of all primary ground impacts associated with the proposed development including: (a) turbine pad foundations; (b) potential borrow pits; (c) substation; (d) proposed internal trackways across greenfield areas and their associated drains and turning areas; (e) greenfield subsurface cable trenching.

There are no recorded monuments, or recorded artefacts within any of the five proposed forestry Re-planting sites in Co. Clare, Co. Galway, Co. Limerick and Co. Cork. No previously unrecorded archaeological sites or features were noted or recorded in the course of the field walking or in the course of the desk-based research within the five proposed Replanting sites.

The Zone of Notification (ZON) of a recorded Enclosure (LI047-031) is situated within the northern limits of re-planting Site 4 at Ballincolly, Co. Limerick. A zone of 60m of this recorded Enclosure will be physically established on the ground (post & wire fence) under supervision by the project archaeologist in advance of the proposed re-planting works. This will effectively mitigate any impact on this feature.

In a wider cultural context, examination of the historic OSI mapping, further supported by BING aerial imagery and site inspection indicates that the proposed Re-planting in the southern plot at Craghera, Co. Clare could impact on the relict remains of a lime kiln and a vernacular structure. A 20m planting exclusion zone (post & wire fence) will be established around the relict structure and lime kiln sites in advance of re-planting works under archaeological supervision. If this planting

exclusion zone is physically established around the two 19th century structures, there will be no impact by the proposed Re-planting works.

In wider cultural context, there is low possibility that that Re-planting in the southern limits of Site 5 at Rathgoggan North, Co. Cork may impact on the potential subsurface remains of two vernacular structures, and pre-famine industrial milling complex, recorded as Ballincolly Mill. No physical evidence of these structures was recorded during field inspection or from targeted imagery undertaken in July 2020.

In terms of potential impacts along the turbine delivery route, the highest potential of archaeological impact occurs at Cloghroe (Nodes 16-17) whereby proposed road widening here could impact on a Portal Tomb (DG069-018). Here the current local road is very narrow, and the Portal Tomb abuts its southern site while the ZON of the monument extends across the entirety of the road. Any proposed levelling or road widening at Cloghroe should only be undertaken on the northern side of the road after licensed archaeological testing has taken place. An effective robust temporary high visibility fence should be erected around the roadside limits of the Portal Tomb in advance of the turbine components delivery to mitigate any potential accidental impact during the delivery.

It is concluded that with the implementation of the proposed mitigation measures, impacts will be effectively mitigated and there will be no significant residual impacts on the archaeological, architectural and cultural heritage.

3.10 SHADOW FLICKER

Shadow flicker is defined as the alternating light intensity produced by a wind turbine as the rotating blade casts shadows across the window of a residence.

In line with best practice, the scope of this assessment extends to a distance of 10 times the maximum rotor diameters (1.45 km) where shadow flicker could theoretically occur. There are 7 No. properties within the 10 x rotor diameter study area.

The developer is committed to ensuring that shadow flicker does not occur at any dwelling that could potentially experience shadow flicker within the 10 rotor diameter study area, equivalent to 1.45 km.

The installation of a programmable shadow flicker module will allow the control of turbines in order to eliminate shadow flicker. The correct operation of the installed shadow flicker control measures will ensure that there will be no impact from shadow flicker. The operation and performance of the shadow flicker control measures will be monitored on an ongoing basis.

3.11 MATERIAL ASSETS

This assessment identifies Material Assets within the vicinity of proposed Drumnahough Wind Farm site or will be utilised by the development. Material asset assessed include transport infrastructure, electricity supply and infrastructure, aviation, television and telecommunications, water and wastewater infrastructure and waste management.

Transport Infrastructure

There are two proposed entrances to the proposed development site. Both will be utilised for the delivery of construction materials and by staff. Primary access to the development will be provided via the existing entrance at the junction of the Local Road L-10142 on the southeast of the site. A second site access point is proposed via an existing forestry track from the L-1622-1 local public road to the north west of the site. This existing entrance is proposed as a temporary access to be used during the early construction phase only.

Potential impacts on the surrounding road network will arise principally during the construction phase. Peak daily construction traffic is predicted to be 180 HGVs with the predicted highest peak hourly HGV traffic volumes to be approximately 24 per hour. Peak construction traffic would principally occur during turbine base pours and therefore arise on twelve occasions.

Traffic studies carried out for the proposed development indicate that while the increased traffic volume on the local road network during the construction phase would be substantial, this increase will be well within the carrying capacity of the local road network.

The wind turbine loads will be delivered in consultation with Donegal County Council, and An Garda Síochána, during off-peak traffic periods. A total of 120 delivery vehicles will be required for the 12 turbines. This could result in temporary delays for other location traffic during the off-peak traffic delivery periods.

A traffic management plan will be implemented to ensure significant effects do not result.

Aviation

There are three aviation centres within 50 km of the proposed development; Donegal Airport to the west northwest, Ruskey Airfield and Finn Valley Flying Club to the southeast. Consultation with Irish Aviation Authority (IAA) concluded that the proposed development will not impact on aviation in the area.

Television and Telecommunications

TV reception in the area is principally received from the following transmitters Holywell Hill, Ballybofey, Letterkenny and Trucksmore. Mobile network operators with masts and communication links in the area include Meteor, Vodafone and Three. The Broadcasting Authority of Ireland (BAI) has indicated that they are not aware of any issues from existing wind farms with existing Frequency Modulation (FM) networks. Any impacts on TV and Telecommunication reception in areas can be suitably addressed under agreement between the applicant and any affected Telecommunication provider.

Water, Wastewater and Waste Management Infrastructure

No public water or wastewater utility infrastructure is required at the wind farm site.

Water needs for construction activities will be low and limited to truck washing, wheel wash, dust suppression and sanitary facilities. Sanitary wastewater will be collected in portable toilets during construction. Disposal of sanitary wastes will be managed through a contract with a licensed waste contractor. There are 10 no. of licensed facilities within 45km of the proposed development.

During the course of the project, waste will be produced such as construction wastes and wastes from welfare facilities.

The types of wastes to be generated will be similar to established construction waste streams and will not require unusual or new treatment options. Waste volumes will not be significant as to require new permitted treatment, storage and disposal facilities as there is sufficient capacity at existing licensed disposal or recycling facilities in proximity to the proposed development

On decommissioning about 85% of turbine components can be recycled or reused. The effects of waste management are considered to be moderate negative.

3.12 INTERACTION OF THE FOREGOING

There is potential for interactions between one aspect of the environment and another which can result in direct or indirect impacts, and which may be positive or negative.

A matrix has been generated to summarise the relevant interactions and interdependencies between specific environmental aspects (Refer to **Figure 5**). It contains each of the environmental topics, which were considered as part of this environmental impact assessment, on both axes.

The most dynamic interaction and interdependencies relate to the connection between ecology, soils, and hydrology. Changes in site run-off from changes and removal of soil cover can result in effects or changes on hydrology, both in terms of water quality and hydraulic regime, which may result in secondary ecological effects on vegetation patterns and habitats and species. The relationship and effects of these aspects have been fully considered in **EJAR Volume 2 Chapter 6** Biodiversity, **Chapter 9** Land and Soils and **Chapter 10** Water. The following is a summary of other key interactions. Where any potential interactive effects have been identified, appropriate mitigation is included in the relevant sections of the EJAR.

Figure 5 Matrix of impacts

Major Interaction												
Minor Interaction												
C	Construction Phase											
O	Operation Phase											
		Population & Human Health	Biodiversity	Ornithology	Water	Lands and Soils	Air Quality & Climate	Noise and Vibration	Landscape and Visual	Shadow Flicker	Archaeology & Cultural Heritage	Material Assets
Population & Human Health		Major Interaction			C	C	C/O	C/O	C/O	O		O
Biodiversity			Major Interaction	C	C	C		C/O				
Ornithology			C	Major Interaction		C		C/O				
Water		C	C		Major Interaction	C						
Lands and Soils			C	C	C	Major Interaction					C	
Air Quality and Climate		C/O					Major Interaction					C
Noise and Vibration		C/O						Major Interaction				
Landscape and Visual		O							Major Interaction		O	
Shadow Flicker		O								Major Interaction		
Archaeology and Cultural Heritage					C				O		Major Interaction	
Material Assets		C/O				C/O						Major Interaction

3.13 MANAGEMENT OF ENVIRONMENTAL IMPACTS

Environmental impacts during construction will be managed through the design and implementation of a Construction and Environmental Management Plan (CEMP). This will address working hours, traffic management, control of pollution, waste management, noise, dust and vibration.

Potential environmental impacts during operation can be managed and the necessary plans and controls are incorporated in the mitigation measures in this EIAR.

With the implementation of the proposed mitigation measures there will be no significant residual impacts as a result of the proposed project.

3.14 CONCLUSION

All power generation has environmental effects; those created by wind farms are minimal. The long term impacts of the project will be the provision of a renewable energy source which will help Ireland meet targets for reductions in greenhouse gas emissions. The effect of the project will be clearly positive as wind energy does not defer the environmental costs of non-renewable electricity production to future generations.

Implementation of the recommended mitigation measures in the construction and operation of the Drumnaough wind farm, no significant residual impacts are expected to Population and Human Health, Biodiversity, Ornithology, Water, Land and Soils, Air and Climate, Cultural and Archaeological Heritage and Material Assets. Overall the design and layout of the proposed Drumnaough wind farm is considered appropriate for the landscape and the proposal is not considered to significantly affect the overall landscape sensitivity and values of the area