



COILLTE

GROW · TRANSFORM · SUSTAIN

Carrownagowan Wind Farm



Dear Homeowner,

First and foremost, we hope this finds you safe and well in these challenging times, and adjusting as best possible to new ways of going about daily life.

As you may be aware, Coillte's Renewable Energy business has been actively exploring a wind farm development opportunity in the Slieve Bearnagh area since early 2018. Since then, the community engagement model which we use within our team has given us an opportunity to meet with a very high proportion of people residing within 2 km of the potential wind farm.

The proposed Carrownagowan Wind Farm project is nearing the end of its pre-planning phase and should shortly enter the planning process. Under normal circumstances, we would be holding a public information event now in order to present the enclosed information to the wider public in the area surrounding this project. However, the Covid-19 pandemic and associated restrictions mean that this is not now possible.

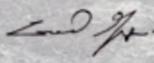
As an alternative, we are now distributing this brochure widely. It sets out a detailed overview of all aspects of the proposed Carrownagowan Wind Farm project. Please be assured that we will continue to make every effort to ensure that we provide you with all the information you need in order to fully understand the details of this proposed project. We are also committed to making available the necessary resources within our team to support any engagement.

Once you have had a chance to read through this brochure and should you have any areas of the project you wish to discuss further, please make contact with any of the team in the coming weeks using the contact details at the back or on the project website (www.carrownagowanwindfarm.ie). Although we cannot call directly to your home while restrictions are in place, we would welcome the opportunity to discuss any aspect of the project with you over the phone or by email.

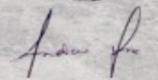
Please stay safe and well, and adhere to all latest HSE guidance. If there is anything we can do to help, please do not hesitate to get in touch.

Yours sincerely,




Ger Hynes
Project Manager
Coillte




Andy Fox
Community
Engagement Manager
Coillte

1. INTRODUCTION

This brochure has been prepared to:

- Provide an update on the proposed Carrownagowan Wind Farm project;
- Outline a brief description of the infrastructure that is proposed;
- Describe the expected benefits of the proposed development and how it may positively impact local communities and initiatives;
- Describe the technical and environmental studies which have been completed as part of the design and environmental assessment process;
- Outline the steps to be taken prior, during and after the planning permission application has been submitted to the Planning Authority.

Why Onshore Wind?

In May 2019, the Government declared that Ireland was in the midst of a climate and biodiversity emergency. The Environmental Protection Agency (EPA) has stated that mean annual temperatures in Ireland have risen by 0.7° Celsius (C) over the past century and are likely to rise by 1.4°C to 1.8°C by the 2050's and by more than 2°C by the end of the century due to climate change. Climate change refers to the change in climate that is attributable to human activity arising from the release of greenhouse gases in particular from the burning of fossil fuels (coal, oil, peat) for transport, electricity generation and agriculture.

As Ireland's largest landowner, Coillte has the capacity and with that the responsibility to contribute significantly to Ireland's efforts to combat climate change and reduce carbon emissions. Our forestry business sequesters 1.1m tonnes of carbon annually and our land asset, with its suitability for wind farm development, puts us at the forefront of being able to deliver on the Government's Climate Action Plan (June 2019) announcing a target of 70% of Ireland's electricity from renewable sources by 2030.

This commitment will form part of the forthcoming climate change legislation for publication in the near future.

A target of net zero economy-wide greenhouse gas, GHG, emissions by 2050.

- A target for the renewable share of electricity generation of 70% by 2030.
- Provision for five-yearly carbon budgets, consistent with the emissions reduction pathway to 2030 and 2050.

The amount of wind energy installed in Ireland has reached 4100 MW generated by 350 wind farms and the Irish Government has recently published 'Project Ireland 2040: National Development Plan 2018 – 2027', which outlines the need for an additional 3,000-4,500 MW of renewable energy as an investment priority. The further development of renewable energy sources is a vital component of Ireland's strategy to tackle the challenges of

combating climate change and ensuring a secure supply of our future energy needs. The proposed project is being brought forward in response to these challenges.

Coillte's ambition is to deliver at least a 1 Gigawatt (GW) of that requirement over the next decade.

Wind energy makes sense for Ireland for many reasons. It's a clean fuel source which does not pollute the air like power plants that rely on combustion of fossil fuels, such as coal or natural gas. Wind turbines don't produce atmospheric emissions that cause acid rain or greenhouse gasses. Wind energy is a domestic natural resource, produced in abundance in Ireland and is free. Coillte's land asset is ideally suited to wind farm development due to the predominance of rural landholdings in areas of high wind resource and low environmental sensitivity. As a wind farm occupies such a small proportion of a site area, approx. 3%, many other land uses can co-exist such as Coillte's forestry business, recreation offering and biodiversity management.

Fair Play Engagement

Since early 2018, extensive community engagement has been undertaken with neighbours living close to the proposed site. This is part of Coillte's fair play engagement approach for those who are most impacted by the proposed development and living within 2km of a proposed turbine. The Project Manager and Community Liaison Officer have undertaken a programme of work to ensure that accurate information is shared and that stakeholders have a forum where queries can be posed and addressed.

The format of this programme includes printed information, house visits, community meetings, small group meetings and monthly progress meetings. As specified in the fair play programme, once the project design has reached the latter stages, engagement expands to the wider community in advance of a planning application. All the information within this brochure is intended to provide an understanding of the proposed wind farm, its design and its environmental credentials.

The Team

Coillte Renewable Energy is part of the Land Solutions division within Coillte which is responsible for generating recurring revenue by partnering, developing and adding value where Coillte-owned lands are suited to activity other than forestry, such as renewable energy. Coillte has been involved in the development of 4 operating wind farms including Raheenleagh (Wicklow), Sliabh Bawn (Roscommon), Cloosh (Galway) and Castlepook (Cork) which have a combined total capacity of over 300 megawatts (MW). The team involved in this project includes a Project Manager and Community Liaison Officer as well as the support of a number of specialists in the areas of Grid development, Community Engagement, Planning and Policy and GIS and Wind Resource Management. This project is part of a wider Coillte ambition to support the delivery of a further 1 GW of renewable energy and therefore make a significant contribution to the ambitions outlined in the All of Government Climate Action Plan 2019.

Malachy Walsh and Partners (MWP), an Engineering and Environmental consultancy are leading a multidisciplinary team in carrying out studies, design and preparation of the planning application and Environmental Impact Assessment Report (EIAR) on behalf of Coillte.

MWP has wide ranging experience in all aspects of the feasibility assessment, environmental impact assessment, planning, design and construction of wind farm and other energy related projects. The services that the firm can provide include all aspects of planning submittal, practical civil and structural engineering design solutions to complex engineering problems in difficult site conditions, environmental and ecological engineering solutions for hydrogeology and peat stability as well as noise and air quality monitoring, contract document preparation, cost control and site supervision/ environmental monitoring of the civil engineering construction works.

About The Site

The proposed wind farm is located within forested lands, in an upland area (approx. 200-420m above sea level), on the north- western slopes of Slieve Bernagh mountain, approximately 4 km northeast of the village of Broadford, 7km north-west of Killaloe and 2.5 km south of the village of Bodyke, at its closest point. Lough Derg lies approximately 4km to the east of the proposed development area. There are two main rivers which flow northwards through the site, namely the Carrownagowan River and the Coumnagun River, which converge at the centre of the site to form the Inchaluchoge River.

The wind farm site boundary includes a total land area of approximately 750 ha which principally consists of conifer plantation (of different age profiles), bogland, cutover bogland, and improved grasslands. The townlands within the wind farm site boundary include Ballydonaghan, Caherhurley, Coumnagun, Carrownagowan, Inchalughoge, Killokennedy and Kilbane.

Why This Site?

Identifying a site suitable for a wind farm encompasses several considerations. Suitability of the Carrownagowan site can be attributed to the following characteristics:

- The site is located in an area designated as 'Strategic' in the 2017 Clare Wind Energy Strategy, Clare County Development Plan.
- The site is not designated as a Natura 2000 site (i.e. Special Area of Conservation (SAC) or a Special Protection Area (SPA)) nor a Natural Heritage Area (NHA).
- The site is at an acceptable location for connection to the National Electricity Grid via an existing substation (Ardnacrusha).
- The site has good annual average wind speeds.
- A significant setback from houses can be achieved, with the closest dwellings at a one kilometre setback from the turbines.
- There is a network of existing forestry roads within the site that can be utilised.



Turbine towers arrive in several parts and are constructed on site.

2. PROPOSED DEVELOPMENT

Currently, the proposed wind farm includes the following:

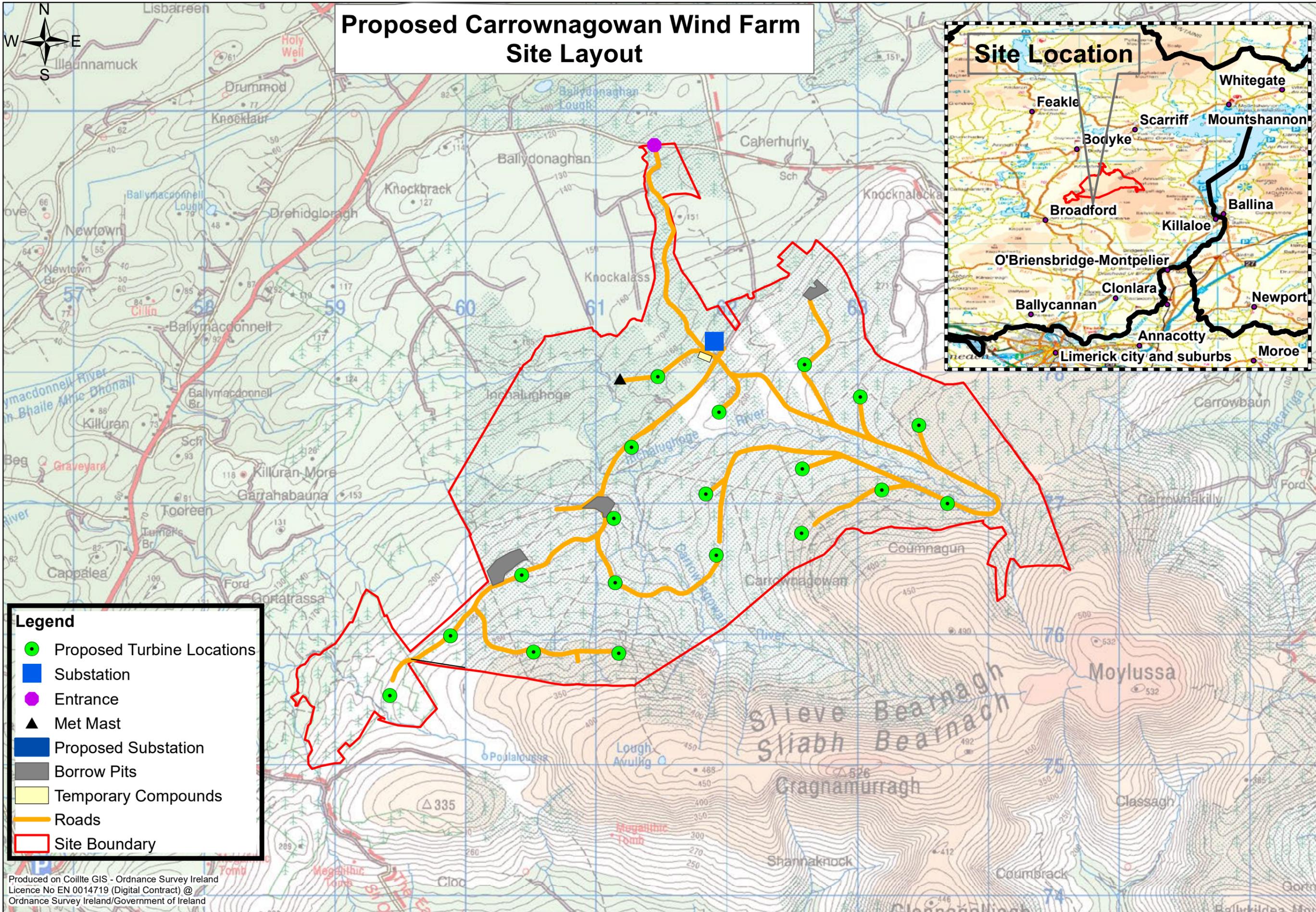
- Up to 19 wind turbines with a proposed overall blade tip height of up to 169 metres and all associated foundations and hard-standing areas;
- An electrical substation with 1 control building and associated electrical equipment;
- 3 borrow pits (to source stone on-site for road upgrade and construction and to minimize construction traffic);
- 3 peat deposition areas (for the excavated peat from the construction phase);
- 1 permanent anemometry mast up to a height of 100 metres;

- Upgrade of existing and provision of new site access roads and associated drainage;
- 2 temporary construction compounds;
- All associated internal and grid connection underground cabling; and
- Biodiversity enhancement areas.

It is proposed that the wind farm will connect to the national electrical grid at the Ardnacrusha substation.



Proposed Carrownagowan Wind Farm Site Layout



Legend

- Proposed Turbine Locations
- Substation
- Entrance
- ▲ Met Mast
- Proposed Substation
- Borrow Pits
- Temporary Compounds
- Roads
- Site Boundary

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3. COMMUNITY BENEFIT AND INVESTMENT PROPOSAL

How will this project benefit the local community?

Carrownagowan Wind Farm has the potential to bring significant positive benefit to the local community. The project will create sustainable local employment, it will contribute annual rates to the local authority and it will provide opportunity for local community investment in the project in line with the new Renewable Energy Support Scheme.

As with all wind farm projects which Coillte develop, a community benefit fund will be put in place for the lifetime of the project to provide direct funding to those areas surrounding the project.

What will the community benefit fund look like?

Two important areas of Government policy development are nearing completion which will have a bearing on the establishment of future community benefit funds, the updated Wind Energy Guidelines and the Renewable Energy Support Scheme (RESS). Both sets of policy are expected to be finalised during Q2/Q3 2020 which will provide the Government requirements on future community benefit funds for renewable energy projects. We will fully take into account these two important policies as we present the Coillte approach to community benefit.

Coillte expects that for each megawatt hour (MWh) of electricity produced by the wind farm, the project will contribute €2 into a community fund for the RESS period i.e. first 15 years of operation and €1 per MWh for the remaining lifetime of the wind farm. If this commitment is improved upon in upcoming Government Policy we will adjust accordingly.

If this project is constructed as currently designed we estimate that a total of approximately 10 million euro will be available in the local area for community funding over the lifetime of the project.

The above figure is indicative only and will be dependent on the generation capacity of the wind farm which is influenced by a number of factors including:

1. Number of wind turbines.
2. Capacity and availability of energy production of those turbines.
3. Quantity of wind (we can have both good and bad wind years).

How the fund will be used and administered?

The Community Benefit Fund belongs to the local community. The premise of the fund is that it should be used to bring about significant, positive change in the local area.

Working together with the near neighbours, the focus up to this point has been achieving a set of key principles for inclusion in the planning application, that is detailed enough to give some clear boundaries and commitments at this stage, but does not restrict the flexibility of being able to adapt to changing circumstances in terms of the project evolution, government policy and direction and a significant amount of work needed within the community.



Tom Costello, CLO at Sliabh Bawn Wind Farm with 12th Roscommon scouts who received funding to purchase equipment from the Community Benefit Fund at Sliabh Bawn.

What is meant by Community Investment?

The proposed Renewable Energy Support Scheme (RESS) sets out that future renewable energy project proposals enable the possibility for local communities to invest in projects in a meaningful way as a means to directly gain from the financial dividends that a project can provide should it be consented, built and operated. In response to this, Coillte have been working hard with external agencies to develop workable models of Community Investment. As with the benefit fund, we aim to take this work into the community during 2020, to continue to explore this exciting possibility and see how best to embed its design within the community.

Additional Benefits arising from the construction and operation of the proposed development:

- Up to 100 people directly employed at peak construction.
- 2-3 long term, high quality technical jobs in operation and maintenance.
- Substantial rates paid to Clare County Council. Rates paid to Clare County Council for the proposed development will have a positive impact on local infrastructure and amenities such as roads, public lighting, street cleaning, libraries, fire services and public amenities. Under current council rate guidelines, estimated annual rates of €638,400 would be collected by Clare County Council rising to approximately €1.3 million if the more recent suggested rates are adopted nationwide.
- Indirect employment created through supply of a wide range of products and service.

4. SITE DESIGN PROCESS

The design process for the wind farm starts with a number of exclusions to avoid or minimize potential impacts. This included limiting the angle of slope of the ground where development can occur, including a setback distance from watercourses and residences, as well as a setback distance from the Slieve Bernagh Special Area of Conservation (SAC).

The following design parameters were applied;

- Avoid steep areas – steep ground slope
- Avoid watercourses – 75m buffer
- Avoid dwellings – 750m buffer
- 150m buffer to the SAC
- Avoid biodiversity areas
- Avoid area of historic landslide
- Avoid deep peat
- Optimise design for visual impact

A turbine layout was then developed to take account of all the constraints mentioned above and their associated buffer zones and the separation distance required between the turbines. The location and alignment of the associated infrastructure, such as roads, crane hard stands

and substation, was then developed following confirmation of the turbine layout. In addition to the above, the locations of the proposed wind turbines and all other proposed infrastructure locations have been informed by rigorous site investigations and assessments carried out over a two year period including:

- Ecological Surveys
- Ornithological Surveys
- Geotechnical, Hydrological and Geological Site Investigations
- Shadow Flicker Modelling
- Noise Modelling
- Archaeological Surveys
- Landscape and Visual Assessment
- Wind Resource Modelling

The constraints map has been continuously updated throughout the development design process based on the findings of each of the site investigations and assessments that have been completed. The constraints map will be available to view on the project website.

5 THE PLANNING PROCESS

Scoping and Consultation

Development projects such as wind farms require a detailed Environmental Impact Assessment Report (EIAR). In order to ensure that the EIA process was appropriate to the project and locality, an information document was prepared and circulated to statutory and non-statutory consultees and in addition to the near neighbours.

Regular consultation with local residents was maintained throughout the design and environmental assessment process. Focusing on those residents within 2 km of a potential turbine location, detailed face-to-face consultation has taken place since February 2018. After an initial period of one-to-one house calls, regular engagement meetings were organised with the aim of both passing on progress updates with regard to the design of the project and providing space for open dialogue on key issues of concern and potential opportunities. Monthly community group meetings were held throughout 2019, as well as workshops specifically discussing noise, ecology, visuals and the community fund.

Regular interaction with our neighbours has been ongoing and will continue throughout the project.

Environmental Impact Assessment Report

The EIAR will focus on the areas outlined here and will accompany the planning permission application.

MWP, are compiling the EIAR with the input of a number of other specialist consultants.

Chapter 1 Introduction

Chapter 2 Description of the Proposed Development

Chapter 3 Civil Engineering

Chapter 4 Alternatives

Chapter 5 Population and Human Health

Chapter 6 Biodiversity

Chapter 7 Ornithology

Chapter 8 Water

Chapter 9 Land and Soil

Chapter 10 Noise and Vibration

Chapter 11 Shadow Flicker

Chapter 12 Landscape

Chapter 13 Cultural Heritage

Chapter 14 Air and Climate

Chapter 15 Material Assets

Chapter 16 Interaction of the Foregoing

Chapter 17 Schedule of Environmental Mitigation

Planning Application

An application for planning permission for the Carrownagowan Wind Farm will be submitted directly to An Bórd Pleanála as the project is of a scale to be deemed strategic infrastructure. During the project design and environmental assessment, meetings were held with the local planning authority, Clare County Council, and with An Bórd Pleanála, to discuss the project. The planning application will be supported by an Environmental Impact Assessment Report (EIAR) and a Natura Impact Statement (NIS). A separate website will be created as required by An Bord Pleanála to present the full application and all the supporting documents and drawings.

6. POPULATION AND HUMAN HEALTH

The assessment examines the potential impacts of the project (both beneficial and adverse) on the local and regional community. The key issues examined include population and settlement, employment and economic activity, land-use, residential amenity, community facilities and services, tourism, and health and safety.

Regarding the proposed wind farm development, the potential significant well being and nuisance effects of the proposed scheme on the local human environment have been identified as follows:

- Dust emissions from construction activities
- Noise emissions during construction activities and operation

- Public safety
- Visual impacts during operation
- Shadow flicker during operation
- Traffic nuisance during construction
- Interference with telecommunication signals during operation

Each of these issues has been fully assessed and are documented in other assessment undertaken as part of the EIA

7. BIODIVERSITY

The site principally consists of conifer plantation. A number of field areas of wet grassland occur, reverting from improvement for agriculture. Sections of cutover bog, raised bog, blanket bog and wet heath occur. Some of the bogland habitats at the site are degraded to some extent as a result of the forestry operations, though some areas are relatively intact.

Two main rivers drain northwards through the site; the Carrownagowan River and the Coumnagun River, forming the Inchaluchoge River towards the centre of the site. Water quality surveys and the existing EPA records, indicate that the overall water quality draining the site has a "Good Status". Fish species recorded included, brown trout,

Atlantic salmon, river/brook lamprey, three-spined stickleback, stone loach, European eel, and minnow.

Irish mountain hare, fox, badger, pine marten, red squirrel, red deer were found using the study area. It is likely otters are using the rivers within, and extending away from the site. Bat surveys completed, recorded common and soprano pipistrelle, Leislars bat, and Myotis species.

The bird species using the site are typical for the habitats present in upland area.

The closest Special Area of Conversation (SAC) to the site is the Slieve Bernagh Bog SAC, designated for bogland habitats, which is adjacent to the proposed site.

8. WATER

There are two main rivers which flow in a northwesterly direction through the site, namely the Carrownagowan River and the Coumnagun River. These converge at the centre of the site to form the Inchaluchoge River. The Inchaluchoge River drains into the Bunratty-Ballymacdonnell River catchment. The western portion of the site is drained by four small tributaries to the Killuran River. The Killuran River is located within the Bunratty-Killuran catchment.

As part of the baseline assessment, a comprehensive hydrological monitoring programme has been undertaken at the site. This involved measurement of water quality and field chemistry and river and stream flows. Continuous monitoring and event monitoring have been undertaken.

Within the site, there are numerous manmade drains that are in place predominately to drain the existing forestry plantations. The integration of the proposed wind farm infrastructure with the existing forestry drainage, and natural drainage of the site, in a manner that avoids water quality and flooding impacts in downstream rivers and streams is a key component of the wind farm design. The water quality of the local rivers is typically very good.

The proposed wind farm site is not located in an area that is susceptible to flooding from rivers. Drainage attenuation will be applied across the site to ensure no impacts on downstream flooding will occur as a result of the proposed wind farm development.

Due to the nature of wind farm developments, being near surface construction activities, impacts on groundwater are generally negligible and surface water is generally the main sensitive receptor assessed during impact assessments.

The peat that covers the site is saturated with peat water, but this peat water is not very mobile, and it moves very slowly. The subsoils and bedrock that occur below the peat are also partially saturated with groundwater, but this is separate from the upper peat water. Groundwater

at the site can be classed as sensitive in terms of potential impacts from the proposed development. However, the majority of the site is covered in peat which acts as a protective cover to groundwater quality. The small footprint of the development over a very large site means that potential for impacts on groundwater flows and groundwater quality are negligible. There will be no impacts on downstream private wells as a result of the proposed development.

There are a number of water schemes locally. 2 no. Group Water Schemes are situated north of the site. Bodyke GWS is situated ~3.3km north-northwest of the site, as well as Raheen Road GWS ~ 4.2 km northeast of the site. A third GWS at Ogonnelloe is located approximately 7 km northeast of the site.

The mapped zones of contribution to these existing sources are remote from the proposed wind farm site and given the separation distances from the development site, the changes in topography, and also the significant surface water drainage regime (that flows in a westerly direction) between the wind farm site and the Bodyke and Raheen Road GWSs, there is no potential for impacts at these existing sources as a result of the proposed wind farm development. Also, there is no proposed wind farm development anywhere upstream of the Ogonnelloe GWS, and therefore there is no potential for impacts at this scheme as a result of the proposed wind farm development.

Slieve Bernagh Bog SAC is located on land south, south-east, east and north of the proposed wind farm site. A hydrological buffer zone has been applied to the designated site (Slieve Bernagh Bog SAC) and no wind farm development is proposed within this buffer. The designated site can be considered very sensitive in terms of potential hydrological impacts. However, the buffer separation distance to proposed wind farm infrastructure, and also the slopes of the ground, and existing intermediate drainage and fire breaks separate the hydrology of the surround bogs from

the wind farm site. As such, there is no potential for significant impacts on the hydrology of the SAC as a result of the proposed wind farm development.

Downstream surface water quality is also very sensitive in terms of potential hydrological impacts. Drainage management within the wind farm development and integration of this wind farm drainage with existing forestry drainage is a critical aspect of the design.

Two methods will be employed to control drainage water within the site during construction, thereby protecting downstream surface water quality and aquatic habitats. The first method involves 'keeping clean water clean' by avoiding disturbance to natural drainage features, minimising any works in or around artificial drainage features, and diverting clean surface water flow around excavations and construction areas. The second method involves collecting any drainage waters from works areas within the site that might carry silt, to allow settlement and cleaning prior to its release. During the construction phase all runoff will be treated to

a high quality prior to being released. There will be no risk of increased flooding down-gradient of the site as a result of the proposed development due to these drainage measures. Impacts on water quality during the construction phase of the wind farm will be imperceptible to none. A surface water monitoring programme will be put in place during the construction phase.

During the operational phase drainage control measures will ensure that surface runoff from the developed areas of the site will continue to be of good quality and will therefore not impact on the quality of down-stream of rivers and streams. The existing forestry drainage system at the site will also be utilised to ensure all water leaving the site will be good quality. No significant impacts on surface water quality are anticipated during the operational phase.

Overall no significant impacts or significant in-combination impacts on the surface water or groundwater environments have been identified by the assessment.

9. LAND AND SOILS

The site is situated in an upland area (approx. 200-420m above sea level), on the north-western slopes of the Slieve Bernagh mountains. The site covers an area of approx. 750 hectares, which principally consists of conifer plantation (of different age profiles), and an array of forestry tracks already exist around the site.

The geology of the site comprises blanket peat overlying subsoil deposits which in turn are underlain by weathered and solid bedrock. Comprehensive site investigation works, including field mapping of exposures, peat depth probing and augering and trial pit excavations were undertaken to assess the geology of the site for constructability purposes. Overall peat depths

recorded during the peat probing investigation ranged from 0.05m to 4m. The average depth across the study area was 1.25m.

Construction of the wind farm infrastructure will require the removal of blanket peat, subsoils and possibly rock to create competent foundations. Excavation of bedrock from proposed on-site borrow pits along with suitable off-site aggregate sources will provide appropriate construction material for access roads, turbine bases and general hard-standing construction. Removal of blanket peat, subsoils, and bedrock represents a permanent direct impact on the geology of the site which is considered to be an acceptable part of economic progression and development.



During the construction phase sources of contaminants (such as oil based substances or other hazardous chemicals) will not be stored at the site except where this is done within safely bunded areas that safely contain all spillages and prevent the migration of contaminants into soil, peat and bedrock. Refueling will be done with a double skinned bowser with spill kits on the ready in case of accidental spillages. The risk is considered to be low once mitigation measures are implemented.

The peat stability assessment undertaken at the site shows that the site has an acceptable margin of safety and is suitable for the proposed wind farm development and proposed grid connection options. A number of control measures are given in the peat stability assessment to manage all risks associated with peat instability that will make the site safe to work on.

A Peat/Spoil Management Plan has been prepared for the development which details management of peat during construction works and long-term storage thereafter. Peat removed during the excavation works will be stored appropriately as close as possible to the extraction area. Working of these peat harvesting sites over the years has shown that this is the most environmentally sensitive and stable way of handling and storing of excavated peat.

Drainage and erosion prevention measures will be put in place at the peat storage areas. No significant impacts or cumulative impacts on the soil and geological environmental are anticipated as a result of the proposed wind farm and its grid connection route options.

10. AIR AND CLIMATE

This chapter describes the likely significant impacts the construction and operation of the proposed wind farm development will have on air quality and climate.

While there may be an imperceptible temporary negative impact to local air quality in the immediate vicinity of the development arising from vehicle exhausts and dust generation during the construction phase, the overriding long term impact will be positive.

Once operational, electricity generated by the wind farm will displace electricity that would otherwise have been generated by fossil fuel power stations, therefore reducing CO2 emissions, improving air quality and contributing to the fight against climate change.

In its 2019 Climate Action Plan the Irish Government, in recognition of the climate change challenges ahead, states:

“Decarbonisation is now a must if the world is to contain the damage and build resilience in the face of such a profound change.”

11. NOISE

The main sources of noise from a wind turbine include aerodynamic noise (rotating blades in the air) and mechanical noise (gearbox and generator). Noise only occurs above the 'cut-in' wind speed and below the 'cut-out' wind speed. The typical 'cut in' wind speed of a modern turbine is 3 meters per second (m/s) and the 'cut-out' wind speed is approximately 25 to 30 m/s.

Construction noise will occur during excavation and earth moving, laying of roads and hard standings, transportation of materials and erection of the wind turbines. The construction phase will be phased and temporary.

Noise and vibration assessments were undertaken for the operational, the construction and decommission phases of the proposed development. The cumulative impact with other wind farms was also considered where relevant.

Vibration, low frequency noise and infrasound are also addressed in the study.

To inform the noise impact assessment, baseline noise monitoring of the existing noise environment was carried out over a 4-week period in early Autumn 2018.

Locations were chosen to represent the typical noise levels around the proposed development; dwellings in different directions around the site and, where possible, the nearest dwelling in a specific direction was chosen. Care was taken to ensure that the noise monitors could be left in a safe location over the extended monitoring period and at sufficient distance from typical noise sources so as not to unduly elevate background noise levels. A single baseline noise monitoring location can represent a number of other dwelling locations.

Following the establishment of the existing noise levels prior to development, appropriate noise levels were then determined in line with Government policy and guidance. The noise limits seek to strike a balance between the noise restrictions placed on a wind farm, the protection of amenity and the national and global benefits

of renewable energy development. The predicted noise emissions from the wind farm are then compared against these limits.

The noise predictions were undertaken using industry standard noise prediction computer software. The input criteria are defined by best practice, are standard and can take account of the following:

- Geometric divergence;
- Air Absorption;
- Reflecting obstacles;
- Screening;
- Vegetation; and
- Ground reflections

The predicted wind farm noise emissions must not exceed the noise limit. To ensure noise limits are not exceeded, the most appropriate wind turbine model operating in the most appropriate mode will be selected.

The construction phase entails the building of the wind farm infrastructure including, roads, hard standings, turbine bases, drainage system, substation, control buildings and borrow pits if required. The main noise sources include heavy machinery and support equipment used to construct the various elements.

The impact from the construction phase has been predicted using calculations and then compared against commonly adopted construction noise thresholds. Given the large separation distance and the short and temporary nature of the construction works the impact is not expected to be significant.



Photomontage showing proposed development from Feakle (approx 10km from project site).

12. LANDSCAPE AND VISUAL

The assessment of Landscape and Visual Effects assesses the effects of the development on the landscape as a resource and on the fabric and character of the landscape. Assessment of visual effects relates to the change in views and visual amenity experienced by groups of people.

County Clare's 'Living Landscapes' are categorised into areas which have similar characteristics for which similar planning policies are applicable. The Plan notes that the approach builds on the Landscape Character Assessment of County Clare. The Plan also notes that the landscapes are not constant but seen as alive and continually changing. The three categories are listed as settled, working and heritage landscapes.

The proposed development is located in a Settled landscape, which also includes the areas south to Bridgetown and west including Tulla and Kilkishen and north as far as Feakle. The Plan notes that Settled landscapes accommodate roads, power-lines, quarries and piped services that service settlements and industry. Uses which are envisaged include energy, along with agriculture, forestry, extraction, transportation, industry, commerce, tourism, recreation and leisure, education, healthcare and social infrastructure.

13. CULTURAL HERITAGE

There are no Recorded Monuments within the boundaries of the proposed wind farm or grid connection route, however, there are a total of 43 Recorded Monuments within the receiving environment of the proposed Scheme. There are no National Monuments in State Care or monuments subject to Preservation Orders within the receiving environment. There are no Protected Structures or structures recorded by the National Inventory of Architectural Heritage located within 2km of the proposed turbines. There is however one Protected Structure located along the route of the proposed grid connection, Kilbane Bridge.

The earliest archaeological sites within the receiving environment of the proposed scheme date to the Bronze Age. Wedge tombs represent the final phase of megalithic tomb construction in Ireland, they generally date to the Early Bronze Age and are concentrated largely in the west of Ireland. There are four wedge tombs located within the receiving environment of the proposed wind farm. Once such tomb is located c. 640m south of the proposed wind farm boundary, a second is recorded in the townland of Cloongaheen West c. 1.1km south, a third is recorded in the townland of Killokennedy, c. 1.17km to the south, with the final tomb recorded c. 1.72km southwest of the proposed scheme in the townland of Drummin. The frequency of wedge tombs in the landscape to the south of the proposed Scheme indicates a definitive Bronze Age presence in the landscape and there are further examples of this monument type further to the southeast and east of the receiving environment.

Evidence for early medieval activity is more prevalent across the landscape. Ringforts are described as farmsteads defended by a circular enclosure. The need for defences does imply that boundaries, territories and leadership changed frequently in the early medieval period. There is one ringfort recorded c. 1.45km north-northeast of the proposed scheme in the townland of Caherhurly. In addition, a total of 26 enclosures are recorded within the receiving environment of the proposed

Scheme. There is a clear pattern in the distribution of these enclosures, with nine located to the north of the proposed scheme, 15 to the south and two to the east. These enclosures are all located on lower ground, surrounding the mountain. These areas would have been, and still are, far more suitable for farming and settlement than the slopes and peaks of the nearby mountain.

Medieval activity in the landscape can be seen through the presence of tower houses. An unclassified castle referred to as a tower house, is located c. 1.89km north-northwest of the proposed wind farm boundary. Very little of the structure survives, with a short section of masonry wall c. 2m high on top of a small outcrop of limestone. The castle was built by the McNamara family and in 1570 John McNamara died in the possession of four stone castles, including Caherhurly.

Post-medieval activity is recorded across the site and wider area, with a range of small structures recorded on 19th century maps across the mountain. These most likely represent small home and farmsteads, many of which have since been demolished. Three demesne landscapes have been recorded within the receiving environment which were associated with former country houses, these include that at Caherhurly House, Trough Castle and Ballyquin House.

There will be no direct impacts to any known archaeological sites, however there is potential for sub-surface remains associated with 19th century vernacular structures to be impacted during the construction of the scheme. Archaeological monitoring of construction works will be carried out in order to preserve by record (archaeological excavation) any such remains prior to removal.

14. MATERIAL ASSETS

An Aviation study has been completed to investigate any issue with Shannon airports flights and calibration checks. There will be no impact as a result of the proposed wind farm.

A Traffic study has also been carried out to consider the additional traffic associated with the construction of the wind farm and the delivery of the turbine components. Separately a delivery route assessment has been carried out which has considered turbine delivery from both Galway and Foynes ports.

15 ENVIRONMENTAL BENEFITS

The proposed development could generate approximately 91 MW per hour of renewable, clean electricity. Over the lifetime of the project, 2.8 million tonnes of carbon will be offset compared to traditional electricity generation. During construction and turbine manufacture, some carbon is lost to the atmosphere, but this will be offset by the wind farm itself within 15-21 months of operation.

Wind farms emit no toxic substances or air pollutants, unlike coal or gas power stations.

The energy generated by the proposed development, will offset associated emission of greenhouse gases from electricity-generating stations dependent on fossil fuels, thereby having a

positive effect on climate.

The 91 MW of renewable electricity which could be generated by the proposed development, is enough to supply approximately 66,500 homes per annum based on average household use of 4.2MWh of electricity per year. (Source: Commission for Regulation of Utilities Typical Consumption Figure 2017). Central Statistics office, Census figures from 2016 show that there are 43,469 occupied dwellings in County Clare.

The proposed wind farm will take up only a small portion of the total site area (~4%); the existing land-use of mainly commercial forestry will continue in conjunction with the proposed development.

16. NEXT STEPS

Once the EIAR is complete, Coillte will submit a planning application to An Bórd Pleanála for a 30 year permission for the proposed Carrownagowan Wind Farm.

The planning application will consist of the following;

- Planning Application Form
- Planning Application Fee
- Public site notices
- Newspaper notice
- Planning Drawings

- Environmental Impact Assessment Report and appendices
- Natura Impact Statement

Notification of the intention to submit an application supported by an EIAR will also be sent to the Department of Housing, Planning and Local Government's EIAR portal and the confirmation will be included with the planning pack.

All documents and drawings will be uploaded to a specific website dedicated to this planning application.

17. CONTACT US

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View of proposed Carrownagowan Wind Farm from Bodyke, east of "Cobbler's Rest" pub, R352.



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