FEHILY TIMONEY

30 YEARS

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED COOM GREEN ENERGY PARK, COUNTY CORK

VOLUME 2 – MAIN EIAR

CHAPTER 2 – NEED FOR THE DEVELOPMENT AND ALTERNATIVES CONSIDERED

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Date: November 2020

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2. NEED FOR THE DEVELOPMENT AND ALTERNATIVES CONSIDERED

2.1 Introduction

The following chapter sets out the need for the development with respect to climate change, national policy and national renewable energy targets. Following the establishment of the need for the development, the reasonable alternatives studied are described and an indication of the main reasons for selecting the chosen option is provided, including a comparison of the environmental effects. This includes the site selection process and details the alternatives considered for the design and site layout of the proposed development which were examined during the development of the project as well as alternative processes, where alternative renewable energy technologies were considered.

2.2 Need for the Development

The proposed development of the Coom Green Energy Park is necessary to produce renewable energy for the Irish national grid in order to transition Ireland to a low carbon economy. The Coom Green Energy Park has an estimated capacity of approximately 105MW and a battery storage capacity of 50MW. The proposed development will play a critical role in providing renewable electricity in the Republic of Ireland, accounting for up to 2.8% of the current installed wind energy capacity (IWEA, 2020).

At a strategic level, the need for the Project is supported by International, European, and National environmental and energy commitments and policies. In Chapter 4 of this EIAR, a detailed analysis of these commitments and policies is outlined. It is now established that Ireland will not meet the agreed targets set by the EU to reduce greenhouse gas emissions by 20% and produce 16% of total energy from renewable sources by 2020. Ireland will be subject to tariffs through the EU Emissions Trading System (ETS) until these targets can be achieved (European Commission, 2019). The Irish Government published the Climate Action Plan in June 2019 (DoCCAE, 2019) which sets actions to ensure Ireland's 2030 targets can be achieved. This is in the context of substantial and continuing failure by Ireland in meeting climate targets to date. According to a 2019 report by Climate Action Network Europe (CAN), Ireland is:

> *"Way off track with its greenhouse gas emission reductions in sectors such as transport, buildings, waste and agriculture (non-ETS) both for 2020 and 2030"*

The Climate Action Plan (2019) recognises that Ireland must make a significant increase in the levels of renewable energy in the country. A press release accompanying the Climate Action Plan (CAP), titled 'Giving Ireland a Sustainable Future' (DoCCAE, 2019a) states that:

> *"We should be radically reducing our reliance on carbon; Ireland's greenhouse gas emissions have been rising rapidly. We are currently 85% dependent on fossil fuels. We have a short window of opportunity to reverse this trend and secure a better, healthier, more resilient future for the country…This plan identifies how Ireland will achieve its 2030 targets for carbon emissions and puts us on a trajectory to achieve net zero carbon emissions by 2050."*

2.2.1 Climate Change

The scientific community and governments across the world are in agreement that the global climate is changing. This is due to human activities which have significantly contributed to natural climate change through our emissions of greenhouse gases. This interference is resulting in increased air and ocean temperatures, drought, melting ice and snow, rising sea levels, increased rainfall, flooding and other influences (EPA, 2020).

The current Taoiseach Michéal Martin on the launch of the Climate Action Bill (2020) remarked that:

> *"The impact of our actions on the planet is undeniable. The science is undisputed. Climate change is happening. And we must act." (Government of Ireland, 2020)*

In this regard, the Government enacted the Climate Action Plan (CAP) of June 2019 and more recently, the Climate Action and Low Carbon Development (Amendment) Bill (2020). The CAP sets out actions to cut emissions and make Ireland a zero-carbon economy by 2050. The Climate Action and Low Carbon Development Bill (2020) will drive implementation of a suite of policies to help Ireland to achieve a 7% average yearly reduction in overall greenhouse gas emissions over the next decade.

It is estimated that the capacity of approximately 105MW of electricity from the Coom Green Energy Park will result in the net displacement of approximately 137,371 tonnes of CO_2 per annum, as detailed in Chapter 6, Air and Climate Change.

This is in line with the targets of the CAP which:

> *"identifies how Ireland will achieve its 2030 targets for carbon emissions, and puts us on a trajectory to achieve net zero carbon emissions by 2050" (DoCCAE, 2019a)*

Greenhouse gases and other emissions from fossil fuels give rise to global warming, acid rain and air pollution. Fossil fuels still dominate Ireland's electricity production. The Coom Green Energy Park will provide renewable energy to the national grid with minimal impact on the environment. It is necessary to meet the challenges of future climate change.

The Department of Communications, Climate Action and Environment stated that:

> *"climate disruption is already having diverse and wide-ranging impacts on Ireland's environment, society, economic and natural resources. The Climate Action Plan clearly identifies the nature and scale of the challenge."* (DoCCAE, 2019)

The Coom Green Energy Park will assist in mitigating the effects of climate breakdown and will support and maintain onshore wind capacity. The CAP seeks a total installation of 8.2 GW of onshore wind capacity by 2030. The Coom Green Energy Park has the potential to contribute to approximately 1.3% of this 2030 target.

2.2.2 EU Renewable Energy Targets and National Policy

As further detailed in Chapter 4 of this EIAR, Ireland has adopted binding agreements to reduce dependency on fossil fuels and increase energy production from sustainable sources, creating a requirement for the nation to transition to a low carbon economy.

This is supported by the latest Programme for Government (2020) 'Our Shared Future' which presents strong climate governance in rapidly reducing climate change in order to protect and improve public health and quality of life. The government are committed to rapid decarbonisation of the energy sector with an aim of providing the necessary actions to deliver national renewable electricity targets.

The EU Directive on the Promotion of the Use of Energy from Renewable Sources (2009/28/EC) sets a target of 20% of EU energy consumption from renewable sources by 2020 and a 20% cut in greenhouse gas emissions by 2020. As part of this Directive, Ireland's overall national target for the share of energy from renewable sources in gross final consumption of energy in 2020 is 16%. This includes a target of 40% renewable electricity production which stood at 33.2% at the end of 2018 (SEAI, 2020). As detailed in section 4.3 of this EIAR Ireland will fall short of their agreed targets and will be subject to tariffs as a result of this deficiency.

Further to 2020 targets, in January 2014, the European Commission published its Climate and Energy Framework 2030 (European Commission, 2014) which seeks to drive continued progress towards a low-carbon economy and build a competitive and secure energy system that ensures affordable energy for all consumers and increase the security of the EU's energy supply. It proposes to achieve a 40% reduction in greenhouse gas (GHG) by 2030 relative to 1990 across the EU, and a binding EU-wide target for renewable energy of at least 27% by 2030. This was increased to 32% in 2018. In 2016 European Commission published its 2030 emissions targets break down for each Member State. Ireland will have to reduce its emissions by 30% relative to its 2005 emissions.

The 2050 "*Roadmap for a competitive low-carbon Europe*" (European Commission, 2011) suggests that by 2050, the EU should cut greenhouse gas emissions to 80% below 1990 levels. This would require 40% emissions cuts by 2030 and 60% by 2040. This is in line with EU leaders' commitment to reducing emissions by 80-95% by 2050. Ireland is likely to face equivalent mandatory targets from the EU.

Ireland has adapted these targets into the Climate Action Plan (2019) which includes a target to increase electricity generated from renewable sources to 70% by 2030. This will require more than doubling Ireland's production of electricity from renewable sources, which stood at 33.2% in 2018 (SEAI, 2020). This 2030 target sets out the pathway to the goal of net zero greenhouse gas emissions by 2050.

To achieve 70% renewable energy production by 2030, substantial new development will be required The CAP sets out targets as follows which rely heavily on wind energy technology:

- Reduce CO_2 eq. emissions from the sector by 50–55% relative to 2030 NDP projections;
- Deliver an early and complete phase-out of coal- and peat-fired electricity generation;
- Increase electricity generated from renewable sources to 70%, indicatively comprised of:
    - at least 3.5 GW of offshore renewable energy
    - up to 1.5 GW of grid-scale solar energy
    - up to 8.2 GW total of increased onshore wind capacity

The binding EU targets have been transposed into Irish National Policy in the 2019 Climate Action Plan which focuses a large amount of future electricity production on the wind energy sector. This demonstrates the significance of wind energy in the Irish energy context and highlights the need for the proposed Coom Green Energy Park in reaching both EU and national targets.

2.2.3 Energy Security

Ireland is one of the most energy import-dependent countries in the European Union, importing 67% of its fuel in 2018 at an estimated cost of €5 billion (SEAI, 2020a). The largest share of energy imports in 2018 was oil, accounting for 73% of total energy imports, natural gas 17%, coal 8.2% and renewables 1.4%

While lower oil imports are being achieved as a result of the growing wind energy sector, Ireland remains vulnerable to future energy crises and price fluctuations given its location on the periphery of Europe.

Price volatility of fossil fuels may increase as carbon prices escalate in the future. The cost of carbon credits is included in all electricity trade, and the price of electricity generated by coal is particularly vulnerable due to the high carbon emissions per unit of electricity generated. Coal still generates a significant amount of Ireland's electricity with 7% of electricity produced by coal in 2018 (SEAI, 2020) down from 18.3% in 2017 (SEAI, 2018). However, the previous programme for government called for a review of options to replace coal with low carbon alternatives within a decade as reflected in the CAP (2019).

The Energy White Paper, Ireland's Transition to a Low Carbon Energy Future 2015-2030 (DoCENR, 2015) sets out a framework to guide policy and actions that the government intends to take in the energy sector. The paper notes that "There will be substantial increases in the cost of carbon in the short and medium term, through the EU Emissions Trading Scheme". The proposed Coom Green Energy Park aims to reduce dependence on imported fossil fuels and add to financial autonomy and energy stability in Ireland.

Furthermore, the EU have rewritten the energy policy framework in the Clean Energy for all Europeans Package (2019). Member states must meet new commitments to improve energy efficiency and the take-up of renewables in their energy mix by 2030. For example, the new rules on the electricity market, which have been adopted, will make it easier for renewable energy to be integrated into the grid, encourage more inter-connections and cross-border trade, and ensure that the market provides reliable signals for future investment. This EU policy framework encourages energy security for all EU member states, emphasising a need for renewable energy and a move away from fossil fuels.

2.2.4 Competitiveness of Wind Energy and Economic Benefits of the Coom Green Energy Park

In addition to helping Ireland avoid significant fines and reducing Ireland's environmentally damaging emissions, the Coom Green Energy Park will also contribute positively to the national and regional economy.

SEAI, in its report Renewable Energy in Ireland – 2020 Update (SEAI, 2020), indicated that in in 2018 wind energy:

- Generated 28% of all electricity;
- Displaced 1.3 million tonnes of fossil fuel use;
- Avoided 3.1 million tonnes of CO^2 emissions; and
- Avoided approximately €432 million in fossil fuel imports (SEAI, 2019).

Additionally, a report published by Barringa in January 2019 states that:

> *"Our analysis indicates that the deployment of 4.1 GW of wind generation capacity in Ireland between 2000 and 2020 will result in a total net cost to consumers, over 20 years, of €0.1bn (€63 million to be exact), which equates to a cost of less than €1 per person per year."* (Baringa, 2019)

Notwithstanding the above financial costs and benefits, the Barringa report outlines that wind generation in Ireland avoids:

> *"33 million tonnes of power sector CO2 emissions. The total carbon emissions from electricity generation in 2017 was 11.7 Mt, so a saving of 33 Mt is equivalent to almost 3 years of total carbon emissions in the electricity sector today. 137 TWh of fossil fuel consumption at a saving of €2.7bn. In comparison, Ireland consumed 44 TWh (3814 ktoe) of fossil fuels for electricity generation in 2017, so a saving of 137 TWh is equivalent to 3 years of current fossil fuel consumption for electricity generation."*

In conclusion, the need for the CGEP development is a result of the need for action to fight against climate change by reducing consumption of fossil fuels. Ireland has accepted this need in entering into binding renewable energy targets with the European Union with an overall aim to become carbon neutral by 2050. The government has indicated that wind energy will play a key role in providing renewable electricity to the national grid. This will comprise of an increase of 8.2GW of onshore wind capacity by 2030 (DoCCAE, 2019). The CGEP has potential to contribute to approximately 1.3% of this 2030 target by providing up to 105MW of renewable electricity. The increase in domestic renewable energy as a result of the CGEP will also assist Ireland in improving resilience in energy security.

2.3 Alternatives Considered

This section of the EIAR sets out the alternatives considered throughout the development process. The alternatives discussed include the site selection process, design and layout of the proposal and the alternative technologies considered. This section has particular regard to the environmental considerations which influence the selection of alternatives and details the evolution of the development through alternatives considered.

2.3.1 Alternative Processes

At the outset of the project, the applicant considered a range of technologies for the production and supply of renewable energy to the Irish national grid. The following section outlines the alternative processes and respective considerations in relation to the chosen alternative technology for the project: on-shore wind.

Bio-Energy

Bio-energy presents an alternative to wind in assisting Ireland to meet its renewable energy targets. Bioenergy refers to the production of renewable energy from a variety of materials of a biodegradable nature and is generally considered under the headings of solid biomass, biogas and biofuels.

Forestry has the largest potential to expand at current market prices for bio-energy production in Ireland and is therefore considered in this section (SEAI, 2018b). However, most of the solid biomass used in Ireland is for heat energy purposes, where higher efficiencies, relative to electricity generation, make the best use of this valuable resource (SEAI, 2020).

A report entitled *Unlocking Ireland's Biomass Potential – Converting Moneypoint Coal Fired Power Station to Sustainable Biomass* (BW Energy, 2016) suggests converting the Moneypoint generation station from coal to biomass can solve Ireland's renewable energy issues is considered misinformed.

The report, prepared by UK consultants BW Energy for the Rethink Pylons campaign group, argued that this was one action that would have enable Ireland to meet its 2020 renewable energy targets at a single stroke.

The report also claims it would allow Ireland to abandon plans for investment in wind energy, transmission infrastructure and other renewable energy technologies. However, the reality is not that simple.

The conversion of Moneypoint to biomass has been considered a number of times over the years, including trials of small amounts of biomass in the station. The technical and economic challenges have proven far greater than set out in the 2016 report. The existing Moneypoint plant cannot use biomass as a fuel. To allow for combustion of biomass, a full redesign and rebuild of much of the station would be required. This process is expensive, hundreds of millions more expensive than is being suggested. To get a sense of what that cost might do to electricity prices, we can look to the UK, where a conversion of a coal plant (Drax Power Station) to biomass required significant financial support to make it viable. Each unit of energy from the UK plant is guaranteed a price of the equivalent of 13 cents, almost double the 7-cent price offered to wind energy in Ireland under the REFIT 2 scheme for renewable energy.

Furthermore, Biomass is best used to generate heat because it is possible to get twice the energy from the same amount of biomass rather than just turning it into electricity. Ireland has a target for renewable heat as well as a target for renewable electricity as set out in the National Renewable Energy Action Plan (DoCCAE 2009). If potential heat resources were to be diverted into electricity it would stifle the achievement of our national targets for 2020 and beyond.

Moneypoint, if converted, would consume an unsustainable amount of biomass resource requiring over 300,000 hectares of land - the equivalent of covering Counties Wexford and Carlow with willow. Assuming this is unlikely, we would have to import very large amounts of biomass from different parts of the world at a significant cost.

In their 2014 Press Release *'Biomass is a Big Part of the Solution, but not the Whole Solution',* SEAI advised that right now, the cheapest way for Ireland to generate clean electricity is by utilising wind energy. It is already one of the biggest single contributors to greenhouse gas reduction in Ireland and has saved the nation close to one billion euros in avoided imports of fossil fuel in previous years. "*We should keep exploiting wind in the right way and add the benefits of exploiting biomass in the right way on top of that"* (SEAI, 2014).

Potential environmental impacts of a biomass plant located at the CGEP site is detailed in Table 2-1 and compared to the residual impacts of the proposed CGEP.

Off-shore Wind

Another alternative form of renewable energy development with potential to contribute to Ireland's renewable electricity supply is off-shore wind energy. Off-shore wind energy was not considered feasible for this renewable energy project as the developers do not hold the relevant licences required for such developments and do not have the expertise to develop such a project. Off-shore wind energy development was therefore not considered further.

Solar Energy

There has been a recent surge of interest in solar energy in Ireland due to rapid improvements in solar technology and cost competitiveness.

A report undertaken by KPMG entitled A Brighter Future – *Potential Benefits of Solar PV in Ireland* (KPMG, 2015), detailed the potential impacts of solar on the Irish energy network and market, and how it will interact with other technologies, principally onshore wind.

The report notes that while solar PV would diversify Ireland's renewable energy portfolio, its output is unlikely to be correlated with that of wind.

The KPMG report notes that:

> "*Ireland's progress to date towards meeting its targets has principally been through the deployment of onshore wind energy. Onshore wind will continue to be the principal means of meeting Ireland's 2020 targets, with a total of 3.2-3.7GW projected to be commissioned by 2020".*

In Ireland's climate, 1MW of solar has a capacity factor of approximately 11%, compared to 1MW of wind having a capacity factor of approximately 33%. Wind energy has been cited as a more efficient power source than solar. Compared to solar panels, wind turbines release less $CO2$ to the atmosphere, consume less energy, and produce more energy overall within their lifespan (Redlitz, 2016).

One 4.8 MW wind turbine has the ability to generate the same amount of electricity per kWh as approximately 11,034 solar panels (assuming that each panel has a capacity of 435W). Furthermore, land take for commercial scale solar development is significantly greater per megawatt than that required for wind energy development and requires a massing of predominantly flat and unvegetated lands. 1MW of Solar PV requires approximately 2 hectares of land. The proposed CGEP has an output of up to 105MW and will require 62.8 hectares of tree felling. For a solar PV development with the same output, this will potentially require approximately 210 hectares of tree felling, as the CGEP site is located predominantly on forested lands.

The applicant investigated the possibility of including a large-scale solar PV system as part of Coom Green Energy Park (CGEP) however it was considered that the larger development footprint associated with solar farm development would result in greater habitat loss at the proposed development site due to greater amounts of tree felling required to accommodate solar panels. This in turn would increase the potential for silt laden runoff to enter receiving watercourses. For these reasons, solar development was not considered environmentally feasible at the CGEP.

Furthermore, the replanting obligations relating to the felling for such a solar farm development would result in a requirement of significantly more replant lands than that required for the CGEP. The cost of providing appropriate replant lands at this scale would make solar PV technology uneconomical at the CGEP site.

Potential environmental impacts of a 105MW solar PV development located at the CGEP site are detailed in table 2-1 and compared to the residual impacts of the proposed CGEP.

In conclusion, the applicant considered alternative renewable technologies for the production of renewable energy for the Irish market at the CGEP site. Each technology was considered with respect to gross energy production, technological advancement, economic viability, available resources, policy context and potential environmental impact. On-shore wind was chosen as the most viable technology option for the Irish energy market due to its advanced technological status, high power output, long-term economic benefit to customers and positive policy reinforcement as set out in the Climate Action Plan (2019). Furthermore, the residual environmental impacts of the CGEP are not considered significant, as detailed in table 2-1, in comparison to potential impacts of other renewable technologies at the CGEP site. It is for these reasons that on-shore wind technology was chosen as the optimum technology for the CGEP project.

Table 2-1: Comparison of Potential Environmental Effects Associated with Alternative Renewable Technologies

Environmental Consideration	Residual Impact of CGEP Project	Biomass	Solar Energy
Air & Climate	Slight to moderate temporary localised residual impacts arising from fugitive dust emissions. Long-term positive impact on air quality and climate due to avoidance of burning of fossil fuels resulting in the offset of up to 137,371 tonnes of CO_2 per annum.	As biomass is more suited for heat energy purposes, fossil fuel power stations will remain the primary alternative to provide the required quantities of electricity to the national grid resulting in continued greenhouse gas and other air pollutant emissions.	Moderate temporary negative impact due to felling of extensive area of forestry. Long-term positive impact on air quality and climate due to avoidance of burning of fossil fuels.
Noise & Vibration	Potential for short term elevated noise levels along the grid route during construction. Operational phase to have a slight to moderate negative impact on nearby dwellings due to introduction of new source of noise into the soundscape.	Temporary noise impact at nearby dwellings associated with construction activity.	Temporary noise impact at nearby dwellings associated with construction activity.
Biodiversity	Imperceptible residual impact on habitat, flora and terrestrial mammals. No significant residual impacts on avifauna or bats. No residual impacts are anticipated to fisheries and aquatic ecology.	Loss of habitat due to extensive fuel source required for energy production (tree felling).	Loss of habitat due to tree felling required.
Land, Soils, Geology	Imperceptible residual impact following implementation of mitigation measures.	Neutral	Neutral
Hydrology & Water Quality	Imperceptible and non-significant impacts following implementation of mitigation measures.	Potential migration of silt to watercourse as a result of extensive tree felling required to accommodate biomass plant and the felling required to fuel the plant to produce electricity.	Potential migration of silt to watercourse as a result of extensive tree felling required to accommodate solar farm.
Population & Human Health	Positive economic benefit to local area due to job creation and community benefit fund. Positive health gain due to provision of upgraded walking tracks and offset of CO_2 emissions. .	Positive economic benefit from job creation and community benefit fund.	Positive economic benefit to local area due to job creation and community benefit fund.

Environmental Consideration	Residual Impact of CGEP Project	Biomass	Solar Energy
Material Assets	Positive impact by offsetting use of fossil fuel. Positive impact due to provision of electricity infrastructure.	Little offset to fossil fuel use in electricity production. Extensive fuel source required to produce electricity.	Loss of significant area of commercial forestry in the study area due to land requirement of solar farm. Positive impact by offsetting use of fossil fuel.
Traffic & Transport	Slight and non-significant temporary impact due to construction and decommissioning activities.	Slight temporary impact due to construction and decommissioning activities. Slight long-term operational impact due to transport of fuel.	Slight temporary impact due to construction and decommissioning activities.
Archaeology & Cultural Heritage	Slight to moderate, indirect, long-term negative residual visual impacts on a number of cultural heritage receptors. Reversable on decommissioning.	Neutral	Neutral
Landscape & Visual	Magnitude of the landscape impact is deemed to be moderate to slight within the Central Study, reducing to low to negligible beyond 5km.	Visual impact as a result of large biomass power plant on an elevated site, inconsistent with the existing environment at the CGEP site.	Visual impact as a result of solar farm located on elevated lands, removal of extensive area of forestry and potential for glint and glare.
Telecoms & Aviation	Following implementation of mitigation measures, no significant residual effects are likely.	Neutral	Neutral

2.3.2 Do-Noting Alternative

As set out in section 2.2.2, Ireland has binding targets set by the EU. Ireland is obliged to ensure that 16% of the total energy consumed in heating, electricity and transport is generated from renewable resources by 2020 and reduce its emissions by 30% by 2030, relative to its 2005 emissions, with an overall objective of carbon neutrality by 2050. This is in order to help reduce the nation's CO_2 emissions and to promote the use of indigenous sources of energy. These targets have been incorporated into national policy in the Climate Action Plan which aims to:

- Reduce CO2 eq. emissions from the sector by 50–55% relative to 2030 NDP projections;
- Deliver an early and complete phase-out of coal- and peat-fired electricity generation; and
- Increase electricity generated from renewable sources to 70%
  - Indicatively comprising up to 8.2 GW total of **onshore** wind capacity.

Furthermore, the Climate Action and Low Carbon Development (Amendment) Bill (2020) will drive implementation of a suite of policies to help Ireland to achieve a 7% average yearly reduction in overall greenhouse gas emissions over the next decade.

Under the "Do-Nothing" scenario, the CGEP project would not go ahead, the development of wind turbines is not pursued, the site remains in use as commercial forestry and agriculture. In the "Do-Nothing" scenario, the prospect of creating sustainable energy through County Cork's wind energy resource would be lost at this site. The nation's ability to produce sustainable energy and reduce greenhouse gas emissions to meet EU targets and targets set out in the National Climate Action Plan (2019) would be stifled. This may result in the nation incurring significant financial penalties from the EU.

The proposed development will save approximately 137,371 tonnes of CO_2 emissions per annum which would otherwise be released to the atmosphere through the burning of fossil fuels in the "Do-Nothing" scenario. Importation of fossil fuels will continue and Ireland's energy security will remain vulnerable. Furthermore, according to EirGrid Group's All-island Generation Capacity Statement 2019 – 2028 (Eirgrid, 2019), the growth in energy demand for the next ten years will be between 18% and 41%. A "Do-nothing" scenario would contribute to strain on existing energy infrastructure and may impact on economic growth if energy demand cannot be met.

Under the "Do-Nothing" scenario, the socio-economic benefits associated with the proposed development will be lost. These benefits include up to 168 no. jobs during the construction phase of the project, and up to 42 long term jobs once operational. Furthermore, under the "Do-Nothing" scenario the local community will not benefit economically from the community benefit fund associated with the project which could be used to improve physical and social infrastructure in the area.

In the "Do-Nothing" scenario, the potential environmental impacts of the proposed development as set out throughout this EIAR will not occur and mitigation measures will not be implemented.

2.3.3 Site Selection – Macro Level

The site selection process for the proposed development began at a macro level. This process firstly took account of relevant International, National and Regional policies, as well as the principle environmental, planning and technical criteria that determine the feasibility and suitability of the existing environment to absorb wind energy developments. Coillte, as a semi-state company has a duty to contribute where possible towards national policy and objectives.

Coillte has a significant landholding which includes large areas of unpopulated land at reasonable elevations, indicating potential for viable wind energy development. The macro level strategic site search examined Coillte land holdings throughout the country to identify potential suitable sites.

The primary macro level considerations in the identification of a broad area for wind energy development included the following:

- Identification of environmental designations on a National Scale;
- Identification of areas of built Wind Farms in Ireland;
- Identification of Grid Capacity and Electricity Infrastructure;
- Relevant National and Regional Policies; and
- Status and availability of Coillte lands.

An assessment of environmental designations (SACs, SPAs, NHAs, pNHAs) identified the west and the eastern seaboard of the country as having dense levels of European and National environmental designations. Areas in the south, east and midlands have less dense designations allowing for greater scope for development in these areas. See Figure 2-1 which illustrates the distribution of designated sites throughout the country.

Areas throughout the country where wind energy development already exists were examined to determine and locate areas with capacity for future wind energy development, as well as areas with further cumulative capacity to absorb further wind energy development. Figure 2-2 shows the locations of existing wind energy projects as of 2020 on the island of Ireland. The figure shows dense areas of wind energy development which were further examined for cumulative capacity. Areas in the south, midlands and east with less dense wind energy development where examined for viability.

The electricity transmission system as the backbone of the nation's power system, efficiently delivering large amounts of power from where it is generated to where it is needed. An assessment of Grid Capacity across the Country by Eirgrid in their All-Island Ten-Year Transmission Forecast Statement 2019-2028 identifies the existing infrastructure throughout the country. Figure 2-3 shows the transmission system which appears to be more extensive at towns and cities with strategic cross-country connections in between. The site selection process for the CGEP considered infrastructure location as an important factor due to the requirement of returning the electricity to the national grid in a sustainable and efficient manner.

Path: R:\Map Production\2020\P20-099\Workspace\EIAR\P20-099_GIS_Fig2-1_DesignatedSites_A3.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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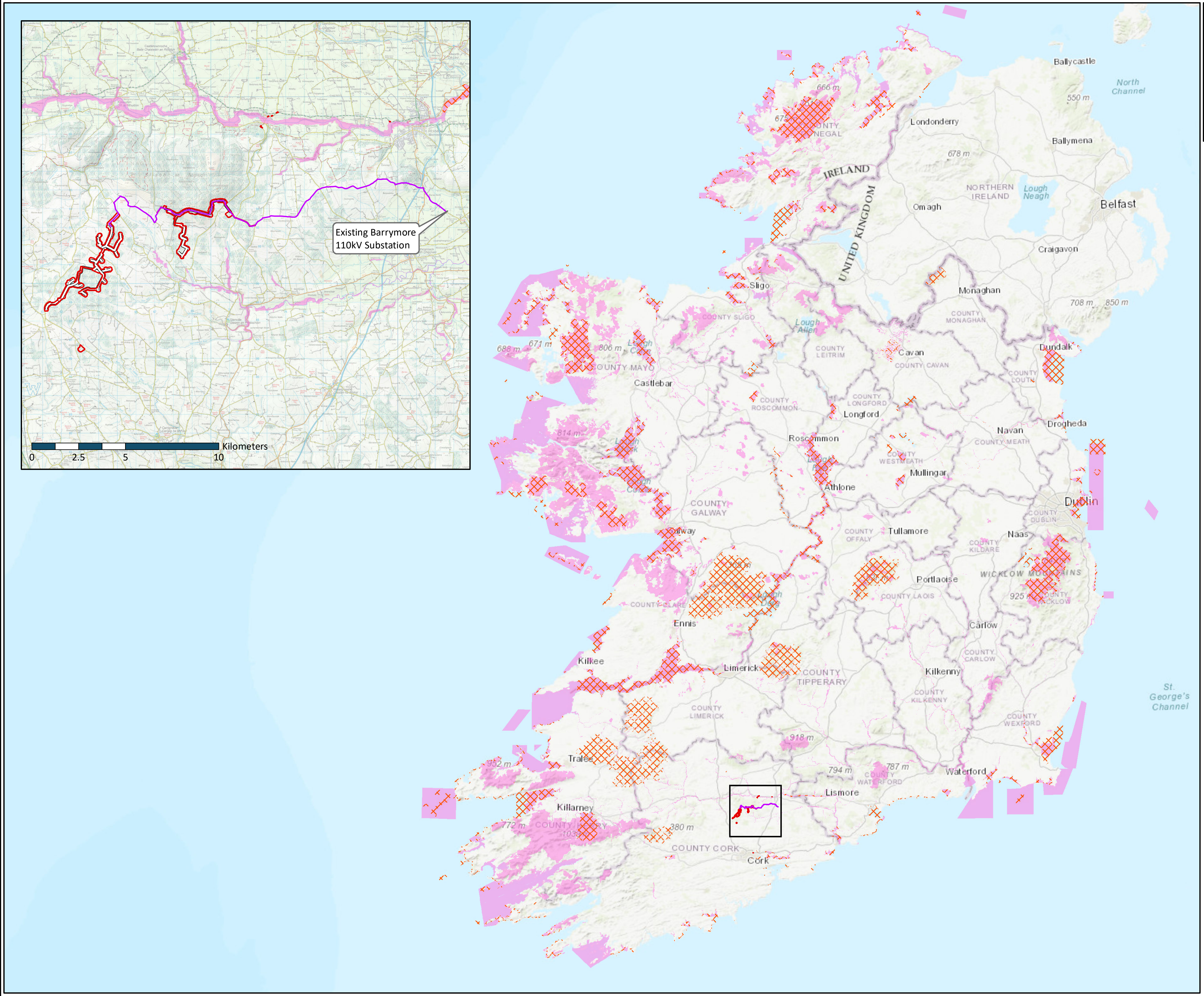

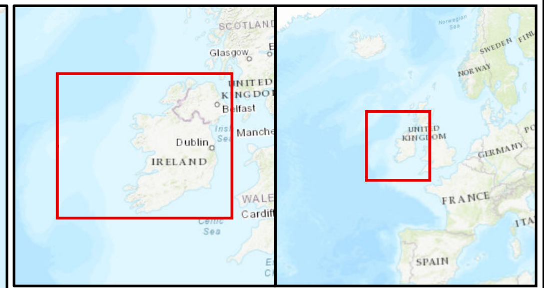

- Proposed Cable Route
- Proposed Development Boundary
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)

TITLE: Designated Sites	
PROJECT: Coom Green Energy Park, Co. Cork	
FIGURE NO: 2.1	
CLIENT: Coom Green Energy Park Ltd.	
SCALE: 1:1750000	**REVISION:** 0
DATE: 20/10/2020	**PAGE SIZE:** A3

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Kilometers
0 25 50 100

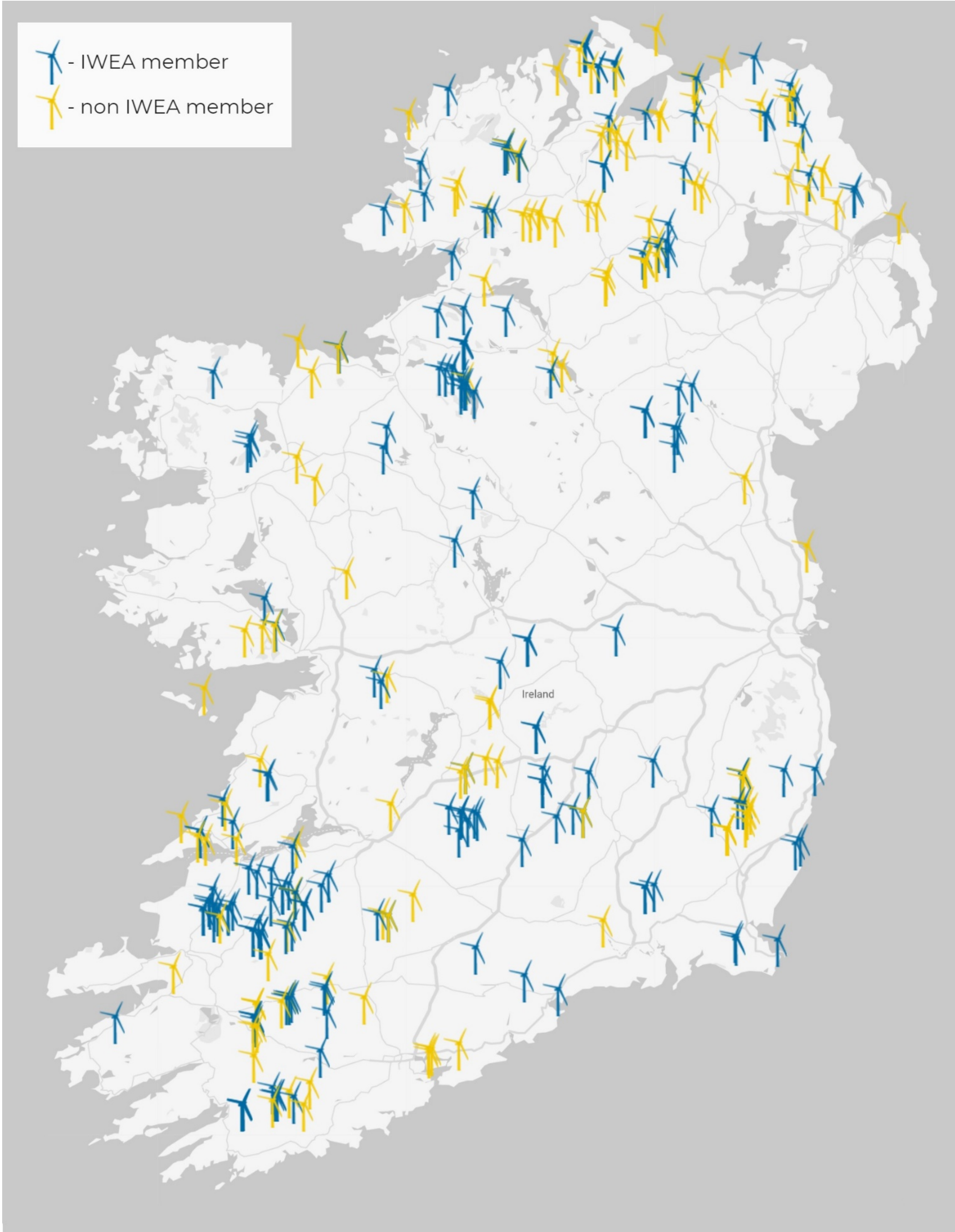

Figure 2-2: Existing Wind Energy Development in Ireland

Source: IWEA (02/10/2020) Available at: https://www.iwea.com/about-wind/interactve-map

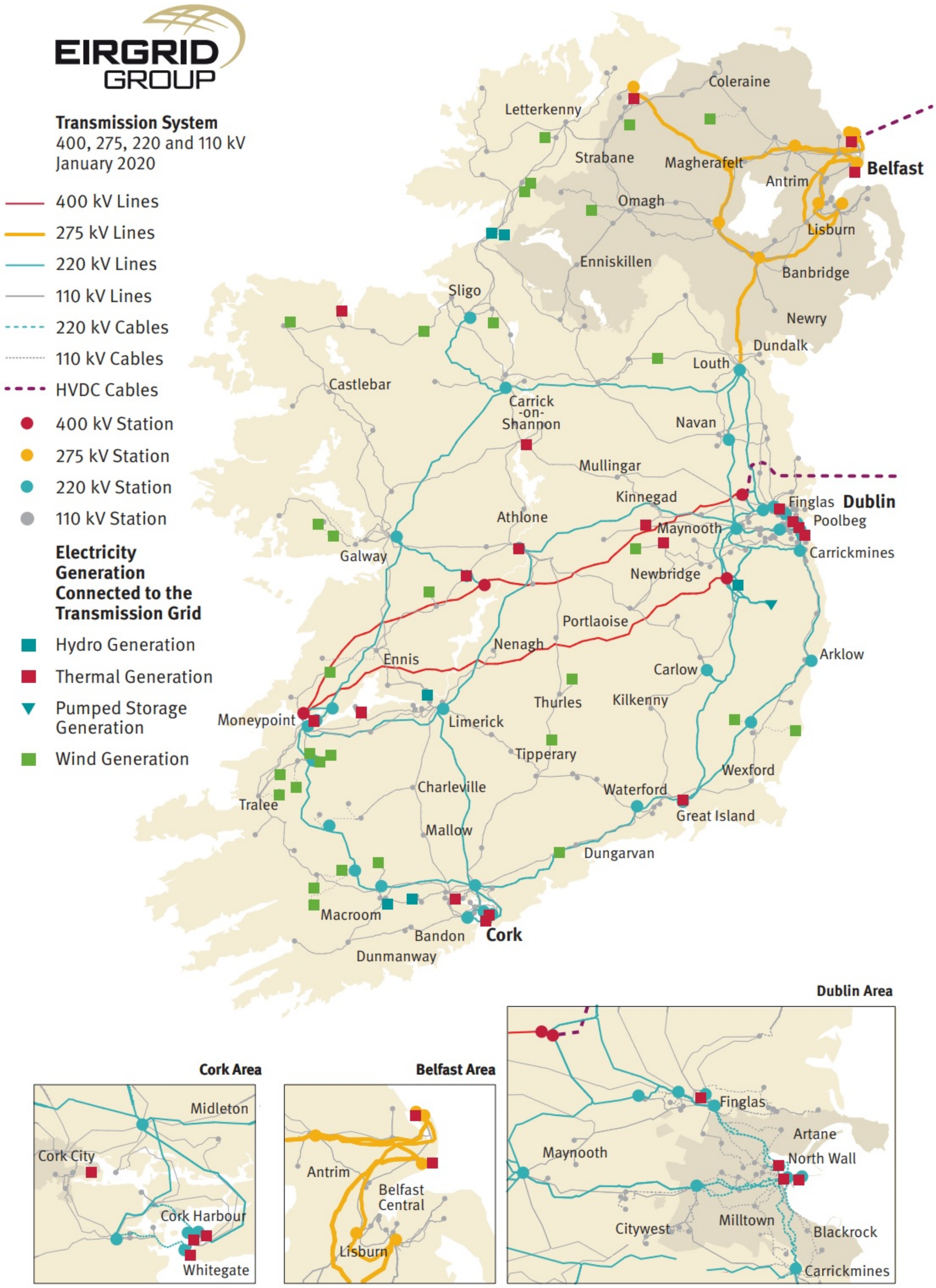

Figure 2-3: National Transmission System

Source: Eirgrid & Soni 2020

Relevant policy was considered at a national and regional level in order to determine appropriate locations for wind energy development throughout the country. At a national level, the National Spatial Strategy (NSS) (2002) was the foremost forward planning document at the time of site selection. The NSS supported utilising and developing the economic resources of rural areas including renewable energy.

This was further strengthened by Project Ireland 2040: The National Planning Framework (NPF) (DoHPLG, 2018) is the current foremost forward planning document within the Republic of Ireland and guides development accordingly.

The NPF sets out the key goals and objectives for the State, and central to this framework is the theme of Realising Our Sustainable Future. In particular, Section 9.2: Resource Efficiency and Transition to a Low Carbon Economy notes that:

"Our transition to a low carb energy future requires:

- *A shift from predominantly fossil fuels to predominantly renewable energy sources;*
- *Increasing efficiency and upgrades to appliances, buildings and systems;*
- *Decisions around development and deployment of new technologies relating to areas such as wind, smart grids, electric vehicles, buildings, ocean energy and bio energy; and*
- *Legal and regulatory frameworks to meet demands and challenges in transitioning to a low carbon economy."*

With respect to the locating of renewable energy projects, the NPF states that:

> *"Rural areas have significantly contributed to the energy needs of the country and will continue to do so, having a strong role to play in securing a sustainable renewable energy supply."*
>
> *"In meeting the challenge of transitioning to a low carbon economy, the location of future national renewable energy generation will, for the most part, need to be accommodated on large tracts of land that are located in a rural setting, while also continuing to protect the integrity of the environment and respecting the needs of people who live in rural areas."*

Key future planning and development and place-making policy priorities for the Southern Region as set out in the NPF include:

> *"Harnessing the potential of the region in renewable energy terms across the technological spectrum from wind and solar to biomass and wave energy, focusing in particular on the extensive tracts of publicly owned peat extraction areas in order to enable a managed transition of the local economies of such areas in gaining the economic benefits of greener energy."*

Furthermore, the Regional Planning Guidelines for the South West Region (2010) which were relevant at the time of site selection were considered which set out objectives supporting wind energy development to facilitate the sustainable development of additional electricity generation capacity throughout the region and to support the sustainable expansion of the electricity network.

The Southern Regional Spatial & Economic Strategy (RSES) (Southern Regional Assembly, 2020) strengthens the preceding guidelines, encouraging the development of wind energy projects within the region.

The RSES states:

> "Wind energy is currently the largest contributor of renewable energy and it has the potential to achieve between 11-16GW of onshore wind and 30GW of offshore wind by 2050 (SEAI, 2016). The sector can make a significant contribution to meeting national energy demands while attaining our energy and emissions targets for 2020 and beyond.
>
> It is an objective to further develop a diverse base of smart economic specialisms across the rural Region, including innovation and diversification in (among other things) renewable energy as a dynamic driver for the rural economy."

The site selection process at a macro level broadly considered the locating of renewable energy projects throughout the country. Environmental designations, the locations of existing wind energy development, electricity infrastructure capacity and policy context were considered. The process led to a focused search for areas considered to have capacity for wind energy projects and a search for appropriate and available Coillte lands within these areas. The macro level site search applied a number of criteria to identify lands in the Coillte estate which may be available, in principle, for wind farm development. This stage in the selection process discounted lands that were not available for development under a number of criteria, as follows:

- Committed Lands
- Millennium Sites
- Life Sites
- Wild Nephin Properties
- National Parks
- Gates 2&3 Wind Farm Development Sites
- Statutory Designations.

Once identified, potential sites were examined against the high-level criteria as described above. A micro level search was then conducted to examine which of the sites identified were suitable for further consideration to develop a wind energy project.

2.3.4 Site Selection – Micro Level

The micro level search criteria reflects the broad range of issues which can arise in wind farm development and allows for direct comparison across the study area to determine the relative suitability of potential wind energy development sites. A range of sites for wind energy development were considered by the applicant. Each site was subject to consideration on a series of criteria in order to determine their wind energy feasibility. The micro level search process is set out below in relation to the subject site.

The micro level search criteria included the following:

- County Development Plan Policies and Designations;
- Natura 2000 sites;
- Population Density;
- Access to major transport routes;

- Proximity to the National Electricity Grid;
- Wind Speeds;
- Land availability;
- Assessment of environmental sensitivities based on desktop review of available information.

2.3.4.1 County Development Plan

The Department of Housing, Planning and Local Government's Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (2018) and the Environmental Protection Agency document 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (Draft, EPA, 2017) state that it is important to acknowledge the existence of difficulties and limitations when considering alternatives.

The Draft Guidelines state:

> *"Alternatives may be identified at many levels and stages during the evolution of a project, from project concepts and site locations, through site layouts, technologies or operational plans and on to mitigation and monitoring measures. The alternatives that are typically available for consideration at the earlier stages in the evolution of a project generally represent the greatest potential for avoidance of adverse effects."*

Section 3.4 of the Draft Guidelines is concerned with the Consideration of Alternatives, which states that:

> *"**Higher level alternative may already have been addressed during the strategic environmental assessment of strategies or plans**. Assessment at that level is likely to have taken account of environmental considerations associated for example with the cumulative impact of the area zoned for industry on a sensitive landscape. Note also that plan-level/higher-level assessments may have set out project level objective or other mitigation that the project and its EIAR should be cognisant of. So, at EIA level this prior assessment of strategic alternatives informs the EIAR".*

Development Plans and Regional Plans provide a strategic framework and policy context for all planning decisions. The Planning and Development Act 2000, as amended, reinforces the role of the Development Plan as the primary strategic statement on land-use planning at city, town and county levels, and provides a clear defined context for the formulation and content of planning applications. Sites which Coillte identified for potential wind energy developments were screened against policy designations. Sites were discounted unless they were identified as being at least "open for consideration" for wind farm development.

Key policies of the Cork County Development Plan 2014-2020 (Cork County Council, 2014) were identified including the following:

- Wind Energy Development Zonings;
- Landscape Character Assessments;
- Sensitive Landscape Designations; and
- Cultural Heritage Sites.

As set out in Section 4.6 of this EIAR, the Cork County Development Plan policy supports the development of Wind Energy projects in appropriate areas. The subject site was found to be in an area designated in the Cork County Development Plan as being 'Open to Consideration' for wind energy development. The site falls within 3 no. landscape character area ranging in sensitivity from low to high. The proposed turbines fall within the Valleyed Marginal Middleground landscape character area which is considered to have medium_landscape sensitivity, medium landscape value and local landscape importance. Two scenic routes were identified in proximity to the site. A study of cultural heritage sites was conducted which identified no major constraints with respect to architectural heritage and protected monuments. With respect to County Development Plan designations, the subject site was considered feasible for wind energy development.

Path: R:\Map Production\2020\P20-099\Workspace\EIAR\P20-099_GIS_Fig2-4_CPDDesignationsAndLocationsOfNatura2000Sites_A3.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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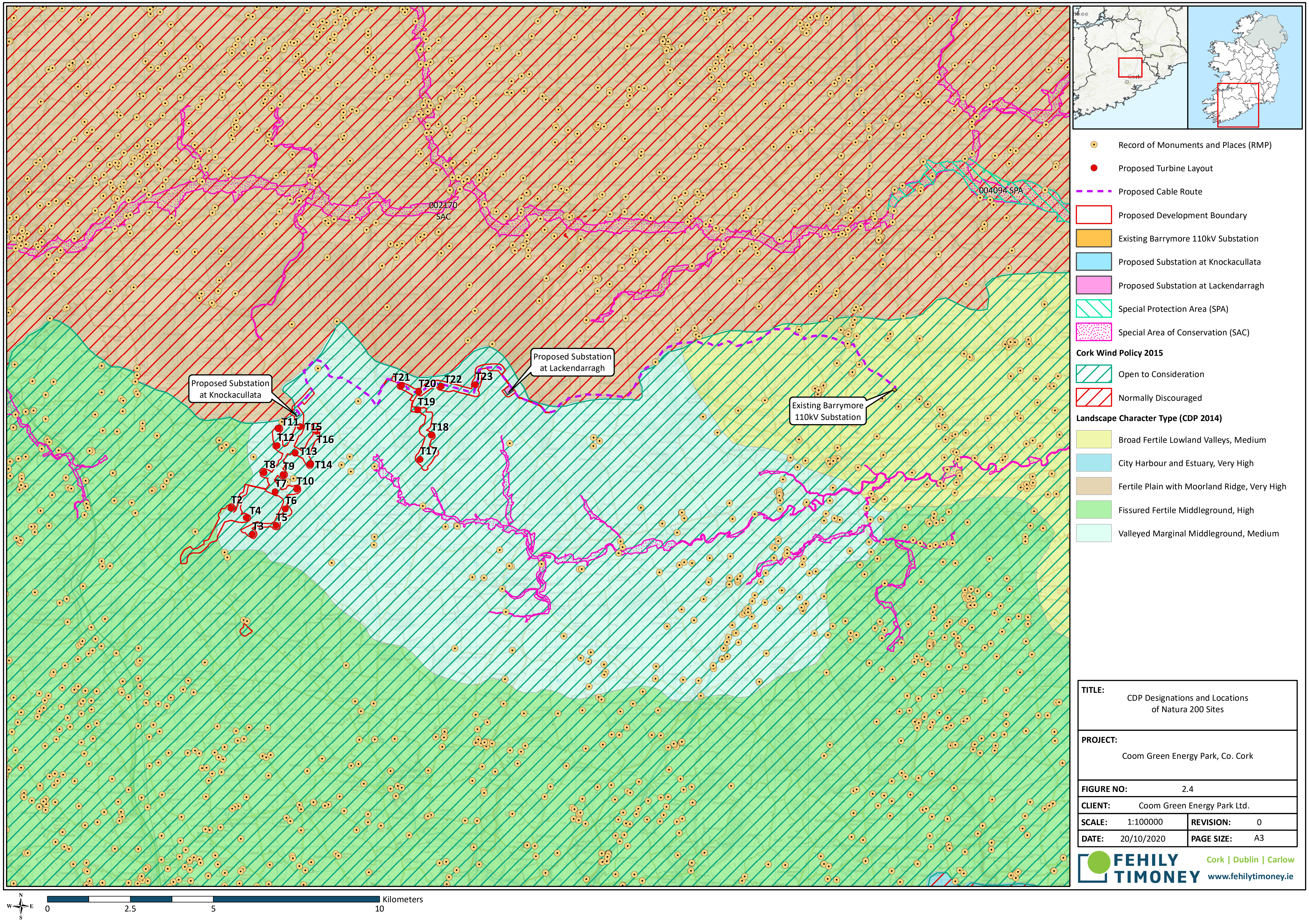

TITLE:	CDP Designations and Locations of Natura 200 Sites
PROJECT:	Coom Green Energy Park, Co. Cork
FIGURE NO:	2.4
CLIENT:	Coom Green Energy Park Ltd.
SCALE: 1:100000	**REVISION:** 0
DATE: 20/10/2020	**PAGE SIZE:** A3

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2.3.4.2 Natura 2000 Sites

It is preferable that wind energy development is not located in an area designated as a Special Area of Conservation (SAC), Special Protected Area (SPA) or Natural Heritage Area (NHA). The CGEP site is not located within an SAC, SPA or NHA, however, the subject site was found to be in proximity to the Blackwater River SAC and the Bride/Bunaglanna Valley proposed NHA. With respect to the conservation objectives for these Natura 2000 sites, it was considered that a wind energy project could be developed at the subject site without causing negative impacts to the designated sites.

2.3.4.3 Population Density

Areas with low housing density are preferable for wind energy development so as to minimise potential disturbance to residential amenity which may be caused as a result of construction activities, visual impacts, shadow flicker and noise. As discussed in Section 11.3 of this EIAR, the population of the subject site was found to be far below the state average and below the Cork County average, as detailed in Table 2.2 below. Population density of the site and locality is illustrated in Figure 2-5.

Table 2-2: Population Density

Area	Population Density (Persons per square kilometre) 2016
State	70
Cork County	56
Cork City	3,174.7
Study area	22.2
Grid Route Area	43.4

2.3.4.4 Other Considerations

Wind speed was assessed at the site in order to determine if wind energy development would be feasible. Wind speed analysis is available from the Sustainable Energy Authority of Ireland (SEAI). Wind speed at the subject site is above average due its elevation in an otherwise generally flat area. Average wind speeds at a height of 100 meters range from 8 to 10.5 meters per second according to SEAI data. This indicates viable values for wind energy development at this location, considering values over 8 meters per second are generally required.

The subject site is in proximity to 2 no. primary transport routes, the M8 motorway to the east and the N20 to the west. Local roads leading from these primary routes to the site are of good quality and capacity and will require little upgrade to facilitate construction traffic and turbine deliveries.

Path: R:\Map Production\2020\P20-099\Workspace\EIAR\P20-099_GIS_Fig2-5_PopulationDensity_A3.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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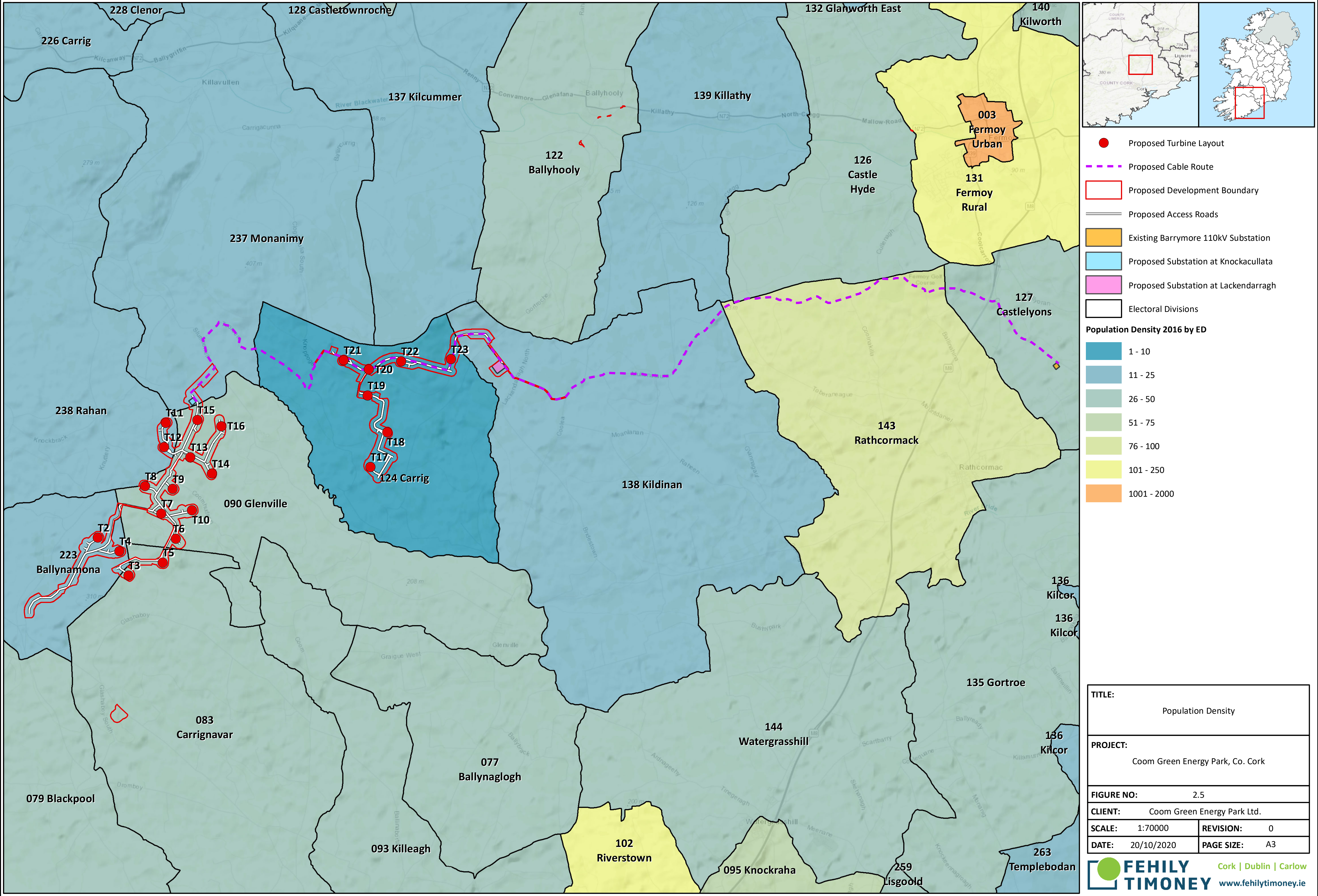

Proposed Turbine Layout
Proposed Cable Route
Proposed Development Boundary
Proposed Access Roads
Existing Barrymore 110kV Substation
Proposed Substation at Knockacullata
Proposed Substation at Lackendarragh
Electoral Divisions

Population Density 2016 by ED

1 - 10
11 - 25
26 - 50
51 - 75
76 - 100
101 - 250
1001 - 2000

TITLE:	Population Density		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	2.5		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:70000	REVISION:	0
DATE:	20/10/2020	PAGE SIZE:	A3

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Path: R:\Map Production\2020\P20-099\Workspace\EIAR\P20-099_GIS_Fig2-6_WindSpeeds_A3.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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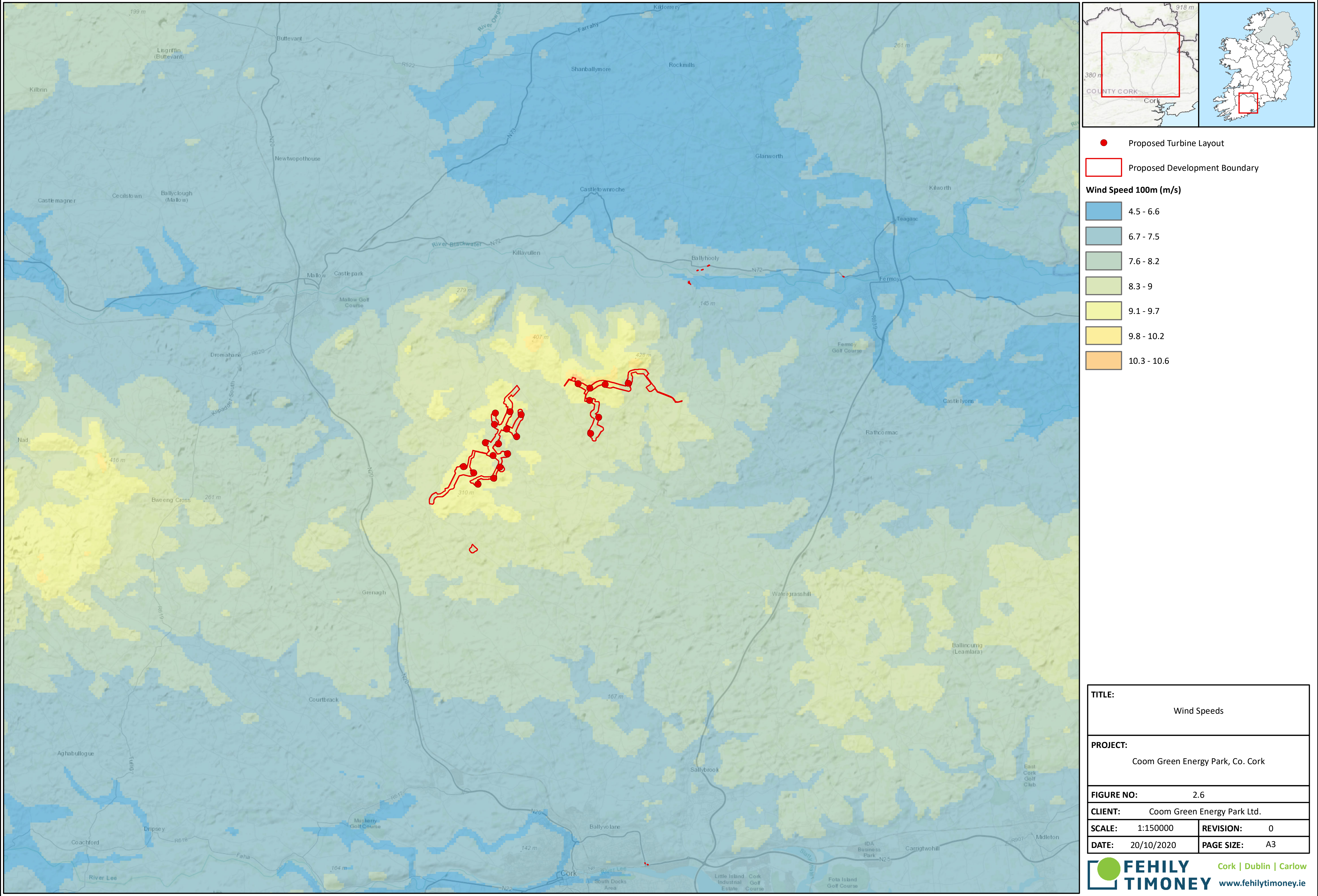

Proposed Turbine Layout

Proposed Development Boundary

Wind Speed 100m (m/s)

- 4.5 - 6.6
- 6.7 - 7.5
- 7.6 - 8.2
- 8.3 - 9
- 9.1 - 9.7
- 9.8 - 10.2
- 10.3 - 10.6

TITLE: Wind Speeds	
PROJECT: Coom Green Energy Park, Co. Cork	
FIGURE NO: 2.6	
CLIENT: Coom Green Energy Park Ltd.	
SCALE: 1:150000	**REVISION:** 0
DATE: 20/10/2020	**PAGE SIZE:** A3

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N W E S
0 2.5 5 10 Kilometers

Grid constraints were also considered with potential sites being discounted due to lack of proximity to the national grid. A number of alternative grid options were considered for the subject site. A 220kV power line is located approximately 4km east of the site where potential for a loop in connection was considered. Beyond this, a 110kV power line and the Barrymore 110kV substation is located approximately 12km east of the subject site where capacity exists for export of electricity to the national grid. Other options for grid connection were considered including a loop in connection to the Mallow – Kilbarry 110kV powerline to the west of the CGEP site and a connection to the Mallow 110kV substation approximately 9km north west of the site. This is further detailed in section 2.3.5.2.

The broad criteria required for viable wind energy development, as detailed above, was applied to a number of sites throughout the country. This resulted in a short list of viable alternatives. Due to the subject site's high range of viability, a lack of environmental sensitivities at a macro and micro level, and the availability of appropriate land, the developer chose the CGEP site to advance a proposal for a wind energy development.

2.3.5 Layout, Design, Alternatives and Constraints

2.3.5.1 Project layout Alternatives

Alternative project layouts were developed in order to avoid environmental sensitivities, minimise potential environmental impacts both on and off site and to maximise the wind potential on site. The design has been carried out in accordance with industry guidelines and best practice, namely the Department of Environment, Heritage and Local Government's (DoEHLG) Wind Energy Development Guidelines (2006) and the Irish Wind Energy Association Best Practice Guidelines (2012). The design had due regard to the Department of Housing, Planning and Local Government's (DoHPLG) Draft Revised Wind Energy Development Guidelines (2019), considering the draft status and ongoing review of these guidelines. The layout and design was an iterative process which took account of such criteria as:

- Set back from houses;
- Set back from designated sites;
- Set back from other constraints such as watercourses and power lines;
- Suitable wind speeds;
- Landscape and visual sensitivity;
- Ecology;
- Ornithology;
- Soils and Geology;
- Hydrology;
- Noise; and
- Cultural Heritage.

Constraints and environmental sensitivities were first identified, and buffers applied in order to determine appropriate areas within the site to accommodate development. The environmental sensitivities of the site included an analysis of the criteria listed above. The constraints identified and resulting design solutions are listed in table 2.3.

Table 2-3: Environmental Considerations

Environmental Consideration	Required Setback/Constraint
Residential Amenity	A minimum 700m set back from all inhabited dwellings was originally sought, in line with the Wind Energy Development Guidelines which sets out a minimum setback distance of 500m. This was subsequently increased to 750m as a result of public consultation where local residents requested a greater setback distance from turbines.
Flora and Fauna	Avoidance of designated sites and mitigation designed to avoid potential impacts on species and habitats.
Ornithology	Avoidance of designated sites and buffer applied to identified hen harrier nesting and roosting sites.
Soils and Geology	Avoid where possible areas of deep peat.
Hydrology	Minimum 50m set back of infrastructure from rivers and streams where reasonably possible.
Water Quality	Minimum 50m set back from significant rivers and streams and appropriate mitigation designed to avoid siltation during construction.
Noise & Vibration	Ensure compliance with the relevant guideline limits for noise. A 750m setback between the turbines and nearby dwelling structures has been achieved which will assist in maintaining residential amenity at local dwellings. Further mitigation measures have been set out in Chapter 7 – Noise and Vibration.
Shadow Flicker	Zero shadow flicker on residential receptors has been committed to in line with the Draft Revised Wind Energy Development Guidelines (2019) – relevant turbines will be turned off when the potential for shadow flicker exists at any sensitive receptor.
Cultural Heritage	Avoid direct impact on designated sites of cultural heritage and archaeologically significant sites.
Material Assets	Offsets to wayleaves were not required as no wayleaves fall within the boundary of the site. Commercial forestry impacted by the proposed development will be replanted at an alternative site.

2.3.5.2 Alternative Designs and Scales

2.3.5.2.1 Wind Turbine Scale

Initially, as part of the design process a number of different turbine heights were considered. The relationship between the height and density or number of turbines required to achieve a particular output is a key design consideration. Several case studies and land surveys have highlighted that when given an option people tend to prefer a scenario of fewer larger turbines. One such study commissioned by Bord Fáilte (now Fáilte Ireland) in 2008 found that:

> *"In terms of the size and composition of wind farms, tourists tended to prefer farms containing fewer turbines. If both produced the same amount of electricity, tourists also preferred wind farms containing a small group of large turbines (55%) to a large group of smaller turbines (18%)."*

There is a balance to be struck between the visual and spatial dominance of turbines and the clutter and the frequency of turbines within a view as both of these effects contribute towards the magnitude of visual impact. This is illustrated in Figure 2-7, which compares a similar energy yield across three turbine heights within the same view. This is intended only as an illustrative diagram to show the balancing relationship between turbine height and density.

On the basis of these factors and through design stage analysis, it is considered that the slightly increased sense of visual dominance imparted is preferable to the reduced level of permeability and increased visual clutter associated with a greater number of shorter turbines required to achieve the same output. Moreover, the perceived visual dominance of taller turbines is further offset by increased setback distances from residential receptors. In this regard, alternative turbine outputs were considered correlating to alternative turbine heights.

In deciding to propose fewer taller turbines, a turbine model with a greater output was chosen as the likely option. This decision had regard to potential visual impact. Macroworks, experts in visual impact analysis, carried out a visual impact assessment which indicates that the proposed scale of development can be comfortably assimilated into this rolling landscape context without undue conflicts of scale with underlying land form and land use patterns. For these reasons the magnitude of the landscape impact is deemed to be **Medium** within the Central Study Area to the south of the Nagles ridgeline and is considered to reduce to **Medium-low** in the area north of the Nagles ridgeline. The visual impact assessment is detailed in Chapter 15 – Landscape and Visual.

The decision to provide fewer, larger turbines with greater power output is in line with industry trends. This option increases energy efficiency, improving the energy output to the national grid per turbine, thus reducing the cost of energy for the consumer. Recent permitted wind farm applications in Ireland which proposed fewer, larger turbines include the Ardderroo Wind Farm, Co. Galway (ABP ref. PL07 .303086) which consists of 25 no. turbines with tip height up to 178.5m, the Coole Wind Farm, Co. Westmeath (ABP ref. PL25M.300686) which consists of 13 no. wind turbines with tip height up to 175m and the Derryadd Windfarm, Co Longford (ABP ref. PL14 .303592) which consists of 24 turbines with tip height up to 185m.

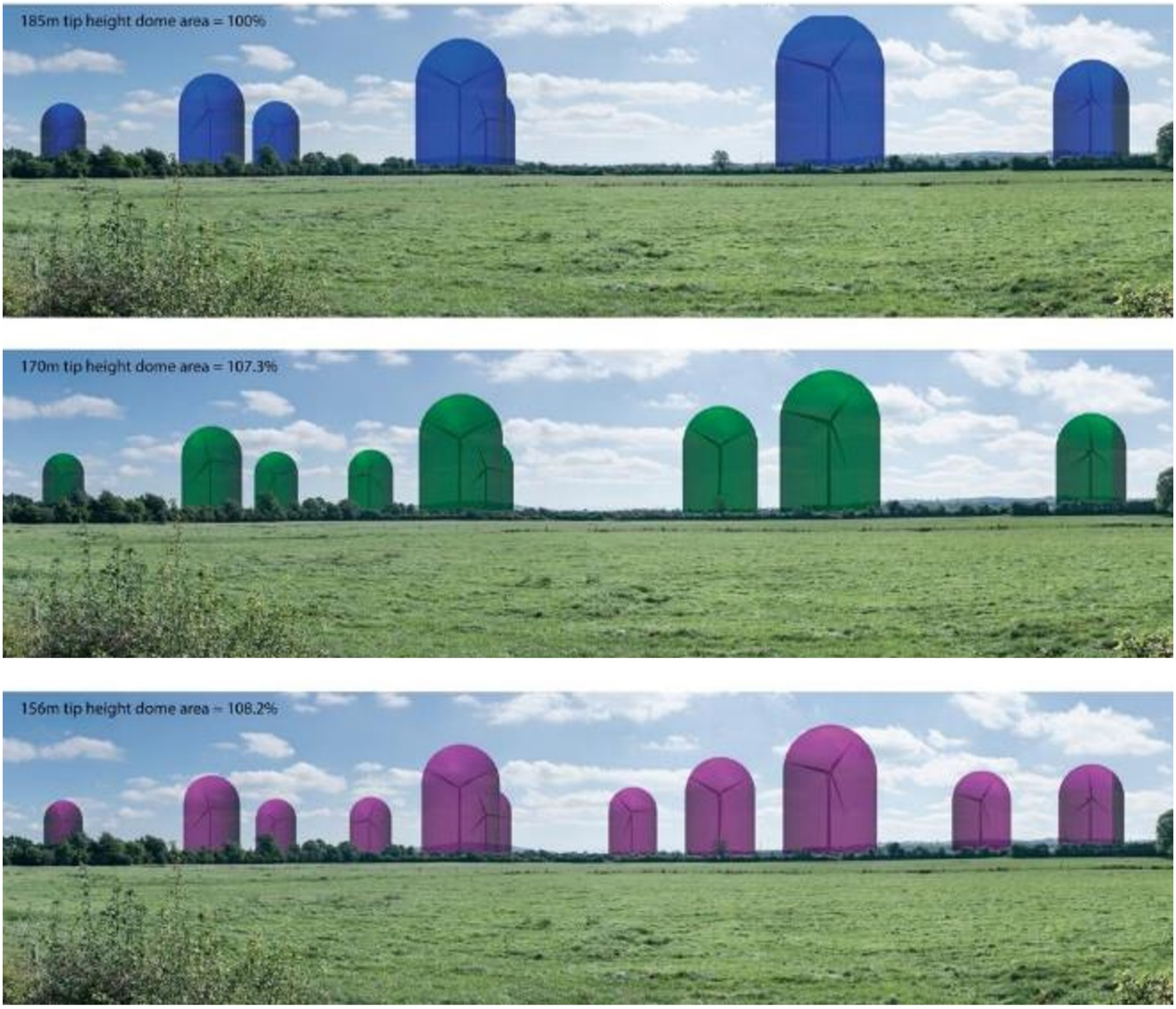

Figure 2-7: Turbine height versus density relationship (same power output within survey)

2.3.5.2.2 Design Iteration 1 (DI1)

The development of the CGEP project considered 4 design iterations during the project design stage. The design iterations were influenced by potential environmental effects identified throughout the assessment, leading to the evolution of the project and the establishment of alternative design iterations. A comparison of the 4 alternative design iterations is detailed below.

Initially, a layout of the maximum number of turbines was considered based on wind speed and wind wake analysis. This consisted of up to 39 turbines at the subject site. A preliminary feasibility assessment was then conducted to identify potential constraints. This included identification of ecological sensitivities, identification of residential properties, noise assessment and landscape visual impact assessment.

Assessment of the preliminary layout revealed that turbines were located within potentially sensitive habitats and two turbines were located in areas susceptible to landslides. Furthermore, an initial setback distance of 700m between turbines and receptors was applied resulting in the removal of a number of turbines and the relocation of others to protect residential amenity.

This initial assessment resulted in the establishment of Design Iteration 1 (DI1) which consists of 27 turbines with a tip height of up to 169m and a setback distance of 700m from nearby dwelling structures. DI1 was utilised as a starting point for public consultation purposes in presenting the proposed development to stakeholders and local residents. DI1 is illustrated in Figure 2.8.

The public consultation process which included door to door visits to community members, meetings with community councils, community information events and technical workshops, assisted in the examination of alternative project design as local knowledge and stakeholders' concerns were considered, along with further site investigation and initial environmental impact assessment. These considerations were used to develop Design Iteration 2 (DI2) which included the following alternative design amendments.

2.3.5.2.3 Design Iteration 2 (DI2)

The initial 700m setback distance from dwelling structures included in DI1 was increased to 750m in DI2 following public consultation and a want for greater setback distances in the design to protect residential amenity. The increased setback distance aimed to mitigate against potential noise and visual impacts at nearby dwellings. This increased setback reduced the development area of the project, resulting in the relocation of several turbines including T8, T10, T19 and T20 in order to locate them within the 750m setback distance. The increased setback distance also resulted in the removal of T1 in order to maintain the 750m setback. T15 and T16 were relocated ca. 200m and 100m respectively to increase setback distance from dwellings following discussion with local residents.

T24, T25, T26 and T27 were removed from the design due to their prominence on the Nagle Mountains Ridgeline and potential impact on the amenity of the Blackwater Valley to the north. This issue was raised by the local planning authority who identified the potential impact with respect to County Development Plan designations which assigns Very High landscape sensitivity; Very High Landscape Value; and County Landscape Importance to the Blackwater Valley. The removal of the 4 no. turbines was concluded following a detailed Landscape and Visual Impact Assessment of DI1 which identified potential visual impacts on the Blackwater Valley. The removal of these turbines allowed for the relocation of T20, T21 and T22 to increase setback distances from nearby dwellings.

The design of DI2 included the removal of 5 no. turbines and the re-siting of other turbines to avoid potential environmental impacts, resulting in a 22-turbine project. The design of DI2 reduces impact on residential amenity of local receptors and is considered a positive alternative to DI1 with respect to environmental constraints. DI2 is illustrated in Figure 2.9.

2.3.5.2.4 Design Iteration 3 (DI3)

The development of DI3 was informed by detailed site investigation and environmental impact assessment as well as further public and stakeholder consultation. Design alternatives included the relocation of T8 and T17 due to the presence of unmapped watercourses and the need to maintain a 50m buffer between turbine locations and streams to avoid potential impact on water quality and aquatic biodiversity during the construction phase, as set out in best practice guidance (IWEA, 2012).

Internal layout at the eastern array was altered to maintain a buffer between the proposed development and the Bottlehill Landfill facility, in line with planning conditions and to protect the existing material asset of the landfill infrastructure and its associated land use. This included the relocation of T4 and T7. The hardstanding area of T6 was rotated to avoid potential impact on the landfill drainage infrastructure.

DI3 includes all proposed mitigation measures as set out throughout this EIAR. Potential for noise and shadow flicker nuisance at local residential receptors have been significantly reduced due to the mitigation measures as set out in Chapter 7 - Noise and Vibration and Chapter 12 - Shadow Flicker. Potential impacts on water quality and biodiversity have also been significantly reduced due to the mitigation measures as set out in Chapter 8 – Biodiversity, Chapter 9 – Land, Soils and Geology and Chapter 10 – Hydrology and Water Quality. As a result, it is expected that DI3 of the proposed CGEP will not have a significant impact on the receiving environment. DI3 is illustrated in Figure 2-10.

2.3.5.2.5 Design Iteration 4 (DI4)

Design iteration 4 (DI4) was developed due to unexpected circumstances where certain lands were no longer available to the developer following establishment of DI3. An alternative design was required to relocate a number of the project's proposed wind turbines and associated infrastructure. The redesigned elements of the project aimed to maintain the non-significant impacts associated with DI3, while maintaining the proposed energy capacity in order to contribute to national renewable energy targets and reduction in emissions as set out in section 2.2 of this chapter. DI4 is illustrated in figure 2-11

The amendments to the design were focused on the south western section of the site surrounding the existing Bottlehill Landfill Facility. The amendments to the design are as follows:

- Relocation of 8 no. turbines including T2, T3, T4, T5, T6, T7, T9 and T10;
- Approximately 3km of additional new access tracks;
- Approximately 2.9km of additional existing forestry tracks to be upgraded;
- Relocation of the main site entrance from the existing Bottlehill Landfill Entrance to an existing Coillte forestry access track.
- Relocation of a temporary compound and a borrow pit.
- Track upgrades north of T17 and new tracks west of T23 have been reduced at the eastern cluster of the CGEP.

Potential impacts associated with the design amendments for design iteration 4 (DI4) have been considered. The relocation of the borrow pit and temporary construction compound at the south of the western turbine cluster will result in reduced impact on nearby residential receptors located to the south with respect to potential noise and dust nuisance as a result of excavation. The alternative borrow pit site is located within a section of forestry approx. 600m from the nearest residential receptor, providing an additional 100m setback distance when compared to previous design iterations.

The proposed site entrance at the western turbine cluster is located on an existing Coillte forestry access track, however, the route deviates slightly and enters a section of existing forestry to the south of the track in order to maintain an appropriate buffer from the existing dwelling to the north. This is designed to minimise impact on residential amenity at this dwelling.

With respect to material assets, DI4 will have less of a potential impact on the operations of the existing landfill facility, should it come on line during the construction of the proposed CGEP. Previous design iterations relied on the landfill access road for all construction related access to the western turbine cluster. DI4 will require the use of the landfill access roads for standard construction vehicles to access turbines T2 – T7, as detailed in Chapter 13: Traffic and Transportation. This reduces the traffic related impacts on the landfill access road associated with previous design iterations.

With regard to tree felling, DI4 will result in approximately the same amount of tree felling as DI3, with an expected 62.8 hectares of commercial forestry required to be felled. This will be subject to felling licence and provision of 62.8 hectares of replant lands at Moneygorm, County Cork and Ballard, County Wicklow.

Table 2-4 illustrates the potential residual environmental impacts of each alternative design iteration. The design of the CGEP project aimed to reduce all potential environmental impacts through the iterative design process as detailed above, culminating in the final design iteration (DI4) which includes all proposed mitigation measures as set out throughout this EIAR.

Table 2-4: Comparison of Residual Environmental Impacts of Design Iterations 1 – 4

CGEP Design Iterations				
Environmental Considerations	**DI1**	**DI2**	**DI3**	**DI4**
Air & Climate Change				
Noise & Vibration				
Biodiversity				
Land, Soil & Geology				
Hydrology & Water Quality				
Population & Human Health				
Material Assets				
Shadow Flicker				
Traffic & Transportation				
Archaeology & Cultural Heritage				
Landscape & Visual				
Telecommunication & Aviation				

Magnitude of Residual Effects	Positive	Imperceptible	Low Impact	Medium Impact	Negative Impact

2.3.5.2.6 Grid Connection

At the outset of the project, a range of potential grid connection options were considered in the vicinity of the CGEP site. Each option was first examined with respect to capacity. Once capacity was confirmed, the environmental impacts of the potential options were examined. The options considered are made up of existing grid infrastructure in proximity to the subject site. The developer consulted with EirGrid during the examination of options to identify capacity in the network and to seek advice on feasible options, as recommended by the draft Revised Wind Energy Development Guidelines (2019). The options are set out below in table 2-5 with their respective capacity as indicated by EirGrid:

From the options detailed in Table 2-5, two connection locations were brought forward for environmental assessment following confirmation of capacity from EirGrid.

These options consist of Option 1: a connection to the 110kV substation at Barrymore, approximately 12km east of the subject site, and Option 2: a connection to the Knockraha – Kilronan 220kV powerlines located approximately 3km to the east of the subject site. Both options follow the same route with Option 1 extending further east than Option 2, as indicated in Figure 2-12. Option 2 requires a new 220kV substation and compound located adjacent the existing 220kV powerlines.

Table 2-5: Potential Grid-Connection Options and Capacity

	Connection Location Options	Capacity
1	Connection to Barrymore 110kV substation	Yes
2	220kV substation on the Knockraha - Kilronan line	Yes
3	Connection to Kilbarry 110kV substation	No
4	Connection into Knockraha 220kV substation	Unlikely
5	Connection to Mallow – Kilbarry 110kV line	No
6	220kV Loop in to Knockraha – Clashavoon line	Unlikely
7	Connection to Mallow 110kV substation	No
8	38kV connection to Fermoy North – Mallow line	No

Option 1 and Option 2 were examined with two possible connection methods considered for each, underground cable (UGC) and overhead line (OHL). The UGC option follows tertiary public roads. Although the route comes in proximity to the River Blackwater SAC at the main channel of the River Bride, the route has no direct impacts on sensitive habitat receptors or sensitive fauna. A number of watercourse crossing were identified with respect to potential impacts on water quality and aquatic biodiversity. However, no major constraints were identified so long as instream works are avoided, and best practice construction methods are employed to avoid impact on these watercourses. Traffic impacts were considered as part of this option, however, due to the tertiary nature of the route and the temporary construction works involved, this impact is considered to be slight and temporary. Overall, the UGC option is considered to have slight and temporary impacts.

The construction and long-term operational presence of the high voltage (110kV/220kV) OHL option creates a risk of collision and mortality for bird species within the study area, in particular with regard to the Hen Harrier which is present at the western portion of the corridor. The OHL option also requires works within habitats of protected species and would result in slight construction phase habitat loss as well as potential disruption for any required maintenance during operation. The presence of an OHL would also impact on landscape sensitivity. Due to potential environmental impacts, the high voltage OHL option is considered to have a potential moderate and long-term impact on biodiversity and a slight and long-term impact on landscape sensitivity. Furthermore, the draft Revised Wind Energy Development Guidelines state the following with respect to OHL:

> *In general, it is considered that underground grid connections for wind energy projects are the most appropriate environmental and/or engineering solution, particularly in sensitive landscapes where the visual impacts need to be minimised. Therefore, this should be the default approach. However, there may be cases where specific ground conditions would prevent this, e.g. in upland locations where peat stability issues can arise from large-scale excavation.*

In light of the potential environmental impacts of the OHL option and national policy stance, the UGC option was chosen as the optimal grid connection solution.

Option 1, connection to the Barrymore 110kV substation via UGC, was chosen as the preferred option following discussion with EirGrid. Furthermore, the requirement of a new 220kV substation as part of option 2 would require significant above ground infrastructure on a greenfield site, as well as access roads and drainage which would have a slight and long-term impact on the soil and hydrology of the 220kV substation site. This option was seen to have greater potential for negative environmental impacts as opposed to Option 1 which focuses on works within the existing public road and has little residual impact. Therefore, Option 1, connection to the Barrymore 110kV substation via UGC, was chosen as the most favourable connection method.

Following public and stakeholder consultation, the 110kV cable route connecting the east and west clusters of the CGEP, which makes up Option 1A in figure 2-12, was redesigned to travel north along the L-57511-0 local road and enter Coillte land west of T21. The route then travels east along existing forestry tracks, tying in with the proposed internal access tracks at T21. This alternative route was designed to avoid temporary disruption to residential receptors and agricultural practices during the installation of the UGC which may temporarily impact on access and may cause temporary noise nuisance as a result of construction and installation works. This concern was highlighted during public and stakeholder consultation and therefore Cable Route Option 1A was removed from the design and the route was re-aligned to reduce the extent of these temporary impacts. The realignment formed Cable Route Option 1B as illustrated in figure 2-12.

Table 2-6 illustrates a comparison of potential residual environmental effects of each of the 5 no. cable route options assessed as part of the CGEP project. Evident from the table is the greater impact of the 220kV options as a result of the requirement for a new substation compound which would have a slight and long-term impact on land, hydrology and landscape and visuals at the substation site. The OHL options were ruled out due to potential impact on biodiversity and sensitive habitats. Option 1B was chosen over Option 1A due to the slightly greater impacts on residential amenity from noise associated with cable works at adjacent dwellings along the route of Option 1A. This issue was highlighted by the local community during public consultation. Therefore, UGC Option 1B was chosen as the optimum option for connection to the national grid as assessment indicates that it has the least potential residual environmental impact.

Table 2-6: Comparison of Residual Environmental Impacts of Grid Route Options

	Grid Route Options				
	220kV Including New Substation		110kV link to Barrymore		
Environmental Considerations	**OHL (Opt2)**	**UGC (Opt2)**	**OHL (Opt1)**	**UGC (Opt1A)**	**UGC (Opt1B)**
Air & Climate Change					
Noise & Vibration					
Biodiversity					
Land, Soil & Geology					
Hydrology & Water Quality					
Population & Human Health					
Material Assets					
Traffic & Transportation					
Archaeology & Cultural Heritage					
Landscape & Visual					
Telecommunication & Aviation					
Magnitude of Residual Effects	Positive	Imperceptible	Low Impact	Medium Impact	Negative Impact

2.3.5.2.7 Turbine Delivery Route

Two options for turbine delivery routes (TDR's) were considered as detailed in Chapter 3 of this EIAR. The delivery routes provided an option from the N20 to the west of the CGEP site and a second route to the east from the M8 motorway at Junction 14, to approach the site from the east along the N72 via Fermoy, and east of Ballyhooly.

An assessment of the existing routes between the two proposed turbine clusters indicated that no viable route was available for the delivery of turbines without significant accommodation works and potential impacts to property, land and potential for impact to watercourses and habitats.

The reasonable alternative was therefore to use both eastern and western TDRs to delivery turbine components to the respective sites. The eastern TDR provides access to the eastern turbine cluster at Knockdoorty and Glannasack and the western TDR provides access to the western turbine cluster at Bottlehill and Mullenaboree. This alternative was considered to have significantly less impact on local roads and land located between the two proposed turbine clusters of the CGEP.

2.3.5.2.8 Site Access

The development of Design Iteration 4 required an alternative site access at the western turbine cluster for both construction traffic and turbine delivery.

An assessment of feasible options was completed which included the assessment of six alternative access points and the assessment of a number of junctions and bends to indicate capacity for turbine delivery. The points assessed are illustrated in figure 2-13.

The assessment included the identification of environmental constraints and potential impact to material assets including property, infrastructure and forestry. The preferred option was to access the site at an existing access point in order to avoid impact as far as possible by utilising existing tracks to avoid ground disturbance and potential habitat loss.

Options 2 and 3 were discounted due to the requirement for a new entrance, including vegetation clearing, felling, groundworks and laying of access tracks on a steep gradient. Potential for impact to groundwater was identified at these locations and potential run-off during extreme weather events was identified which could impact on road safety (human safety) on the existing public road. Run-off also has potential to cause silt to migrate to nearby streams close to Options 2 and 3, potentially impacting on water quality and aquatic biodiversity.

Option 4 was discounted as it required a new entrance, including vegetation clearing, felling, groundworks and laying of access tracks across a sensitive habitat including provision of a stream crossing. Significant felling would also be required to accommodate Option 4 resulting in an impact to material assets and potential for migration of silt to the nearby watercourse.

Option 5 was discounted as the approach road was not considered suitable for turbine delivery without significant accommodating works with potential to impact on local traffic. This option would include vegetation clearing, ground works and additional tree felling at the location of the site entrance. A stream crossing is also required along the approach road with potential for impact on water quality and aquatic biodiversity.

Option 6 was considered feasible; however, it would require significant groundworks to create an entrance and access on a steep gradient in order to achieve compliance with TII road standards and turbine manufacturer requirements. Furthermore, potential impacts on residential properties were identified for accommodation works to allow for turbine delivery causing potential for impact to material assets. The location of the entrance is in close proximity to a number of residential dwellings where potential for impact from noise was identified with potential effects on residential amenity during construction. For this reason, Option 6 was discounted.

Option 1 is an existing Coillte access track located on the L-1219-0 road. This was chosen as the preferred access option as the existing entrance has safe visibility and much of the land required to be cleared and surfaced to accommodate turbine delivery is previously disturbed land where a carpark was formerly located. Less tree felling is required for Option 1 in comparison to the alternative options. A pumping station was identified adjacent the entrance which is to be avoided and the proposed access track has been realigned to avoid potential impact on a residential dwelling located along the access route as detailed above in Section 2.3.5.2.5. Construction related noise is expected to be within construction noise limits at nearby dwellings at this access point, however, the increased numbers of vehicles on this access track has potential to result in a moderate, temporary impact on residential amenity at this dwelling due to increased noise.

Potential impact on traffic and transportation is expected to be temporary in duration, slight and not significant for all options with the exception of Option 5 where significant accommodation works are required.

Table 2-7 illustrates a comparison of potential environmental effects considered for the various Site Access Options at the western turbine cluster. Option 1 was chosen as the most viable with the least potential environmental impact. The site access options for the western turbine cluster are illustrated in figure 2-13.

Table 2-7: Comparison of Potential Environmental Impacts of Site Entrance Options

	Site Entrance Options					
Environmental Considerations	**Opt 1**	**Opt 2**	**Opt 3)**	**Opt 4**	**Opt 5**	**Opt 6**
Air & Climate Change						
Noise & Vibration						
Biodiversity						
Land, Soil & Geology						
Hydrology & Water Quality						
Population & Human Health						
Material Assets						
Traffic & Transportation						
Archaeology & Cultural Heritage						
Landscape & Visual						
Telecommunication & Aviation						

Magnitude of Potential Effects	Positive	Imperceptible	Low Impact	Medium Impact	Negative Impact

2.3.5.2.9 Battery Storage

Battery energy storage system (BESS) units are an element of the proposed CGEP. The BESS units aim to facilitate on-site energy storage and to provide ancillary services to the electricity grid. The proposed BESS will be situated next to the main on-site substation compound at Lackendarragh North.

Considerations were made as to where to position the BESS units during the design stage of the project. The BESS units were first positioned at the 2 no. substations locations including the IPP Substation at Knockacullata and the Grid Connection Substation at Lackendarragh North. These sites were chosen for their location in proximity to the grid export cable and to minimise potential impact on the receiving environment.

BESS requires a hardstanding area and security fencing to house the system. Potential impacts of providing another additional hardstanding area for the BESS include the requirement for earthworks as a result of additional tree felling to accommodate hardstanding areas and access tracks which could lead to the potential increase of release of silt at nearby watercourses.

The substation compounds were chosen to house the BESS to avoid potential impact from additional landtake required for a separate hardstanding compound. This way, the substation compounds double as a BESS compound, reducing potential impacts on the receiving environment. The substation compounds were also chosen due to their setback from surrounding dwellings and their screening by adjacent forestry which will reduce visual impact and mitigate against any potential noise impact caused by the BESS.

As detailed in Chapter 5, during public consultation, issues were raised regarding the safety of BESS and their proximity to dwellings in the area of the CGEP.

Concerns raised by the public were considered in the design of the CGEP and the BESS was consolidated to a single location at the substation compound at Lackendarragh North. This option greatly reduced the proximity of dwellings to the BESS as the area of the Lackendarragh North Substation has a lower dwelling density compared to the proposed substation at Knockacullata. This assures greater safety to local residents in the unlikely event of an accident.

Furthermore, this option also maximises the efficiency of the export capacity of the BESS as this location is closer to the export location on the national grid, meaning less electricity will be lost during export. This will result in greater renewable electricity yields to the national grid resulting in greater reductions to fossil fuel use in energy production. Therefore, the improved efficiency will provide a greater long-term benefit to air quality and climate as a result of reduced CO2 emissions. Benefits to material assets also include the reduced requirement for importation of fossil fuels.

A do-nothing alternative was also considered where battery storage would not be included as part of the proposed CGEP. As there are imperceptible negative environmental impacts associated with BESS following implementation of mitigation measures, the do-nothing scenario would not have any significant benefits on the receiving environment during the construction and operation of the CGEP.

The do-nothing scenario would reduce the electricity output capacity of the proposed CGEP resulting in less benefits to air quality and climate due to the requirement for the burning of fossil fuels as an alternative to renewable electricity. The do-nothing scenario would also reduce the benefit to material assets as there would be less offset to fossil fuel importation.

A comparison of the potential environmental effects of the alternatives considered for battery storage are presented in table 2-8. This includes the following alternatives:

- 2 no. BESS at substation compounds at Knockacullata and Lackendarry North;
- 1 no. Bess at substation compound at Lackendarragh North (Chosen Option);
- BESS located at an additional separate compound; and
- Do-nothing scenario (no BESS included in the CGEP)

Table 2-8: Comparison of Potential Environmental Effects Associated with Alternative BESS Locations

Environmental Consideration	2 no. BESS at substation compounds at Knockacullata and Lackendarry North	1 no. Bess at substation compound at Lackendarragh North (Chosen Option);	BESS Located at an Additional Separate Compound	Do-nothing Scenario (no BESS is included in the CGEP)
Air & Climate	Positive long-term effect on air and climate as a result of greater export capacity of renewable electricity from the CGEP. Offset to CO2 emissions.	Positive long-term effect on air and climate as a result of greater export capacity of renewable electricity from the CGEP. Greatest offset to CO2 emissions due to improved efficiency of BESS system.	Positive long-term effect on air and climate as a result of greater export capacity of renewable electricity from the CGEP. Offset to CO2 emissions. Potential for greater amount of tree felling to provide an additional compound.	No additional capacity to the CGEP resulting in less benefit to air quality and climate. Less offset to CO2 emissions.
Noise & Vibration	Potential for noise from operational BESS at two substation locations. No significant impact at residential properties.	Potential for noise from operational BESS at single substation locations. No significant impact at residential properties.	Additional source of noise during construction and operational phase as a result of additional compound.	No additional noise impact from BESS at the CGEP.
Biodiversity	Imperceptible impact following implementation of mitigation measures.	Imperceptible impact following implementation of mitigation measures.	Additional land take required for compound. Imperceptible impact following implementation of mitigation measures.	No additional impact.
Land, Soils, Geology	Imperceptible impact following implementation of mitigation measures.	Imperceptible impact following implementation of mitigation measures.	Additional ground works required for additional compound. Imperceptible impact following implementation of mitigation measures.	No additional impact.
Hydrology & Water Quality	Imperceptible impact following implementation of mitigation measures.	Imperceptible impact following implementation of mitigation measures.	Additional ground works required for additional compound and potential for additional tree felling which increases potential for migration of silt to water courses. Imperceptible impact following	No additional impact.

Environmental Consideration	2 no. BESS at substation compounds at Knockacullata and Lackendarry North	1 no. Bess at substation compound at Lackendarragh North (Chosen Option);	BESS Located at an Additional Separate Compound	Do-nothing Scenario (no BESS is included in the CGEP)
			implementation of mitigation measures.	
Population & Human Health	BESS located ca. 600m from the nearest dwelling at Knockacullata and ca. 680m from the nearest dwelling at Lackendarragh North. No likely impact following implementation of mitigation measures.	BESS located ca. 680m from the nearest dwelling at Lackendarragh North. No likely impact following implementation of mitigation measures.	Potential for additional compound to be located in proximity to dwellings. No likely impact following implementation of mitigation measures.	No additional impact
Material Assets	Positive impact to material assets due to offset to fossil fuel consumption and importation.	Greater efficiency of BESS system results in a greater positive impact to material assets due to offset to fossil fuel consumption and importation.	Positive impact to material assets due to offset to fossil fuel consumption and importation. Potential imperceptible impact as a result of additional land-take and forestry felling.	No additional offset to fossil fuel consumption and importation.
Traffic & Transport	Slight and non-significant temporary impact due to construction and decommissioning activities.	Slight and non-significant temporary impact due to construction and decommissioning activities.	Slight and non-significant temporary impact due to construction and decommissioning activities.	No additional impact
Archaeology & Cultural Heritage	No impact envisaged.	No impact envisaged.	No impact envisaged.	No additional impact
Landscape & Visual	No impact envisaged due to screening from adjacent forestry.	No impact envisaged due to screening from adjacent forestry.	No likely impact envisaged.	No additional impact
Telecoms & Aviation	No impact envisaged.	No impact envisaged.	No impact envisaged.	No additional impact

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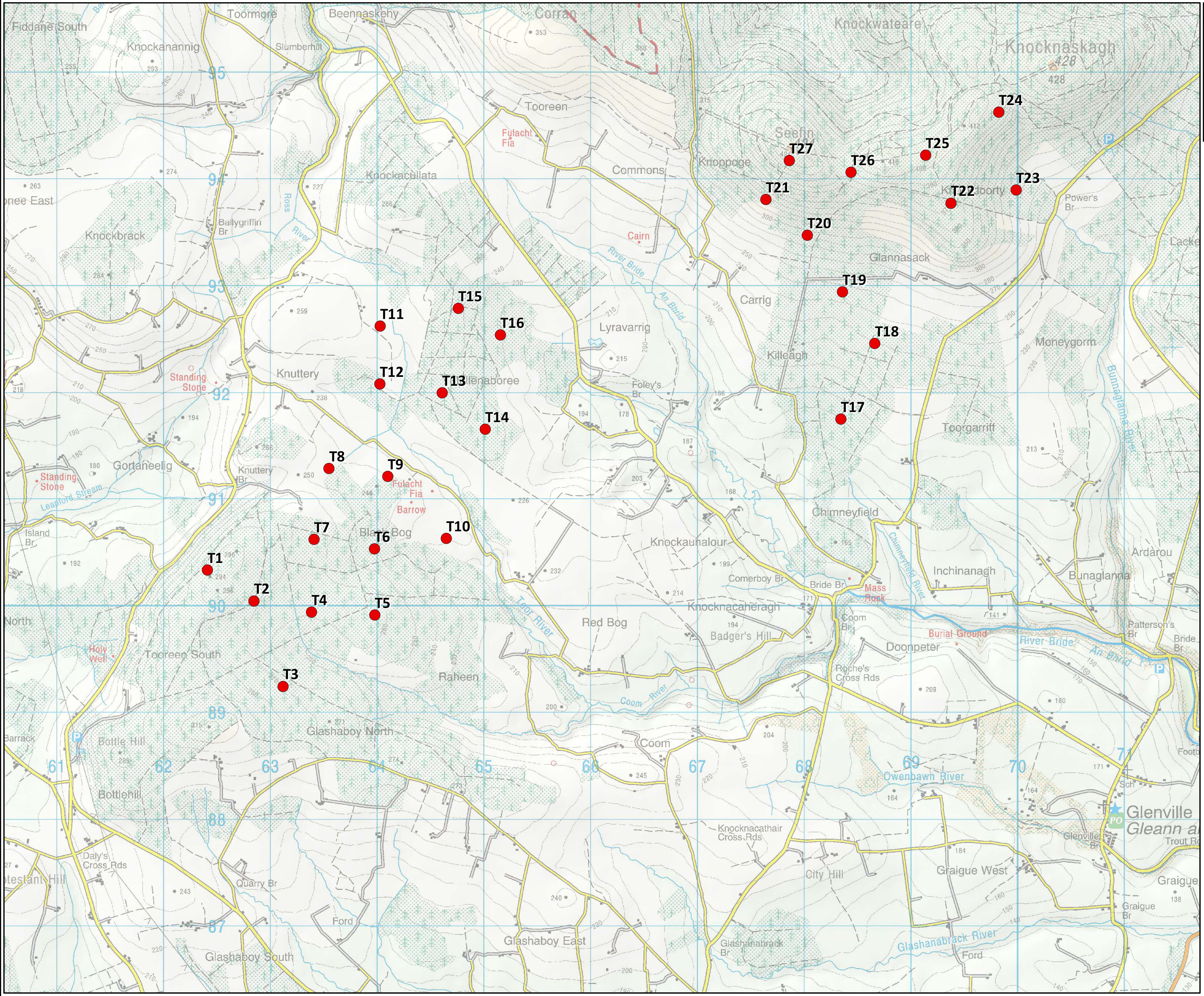

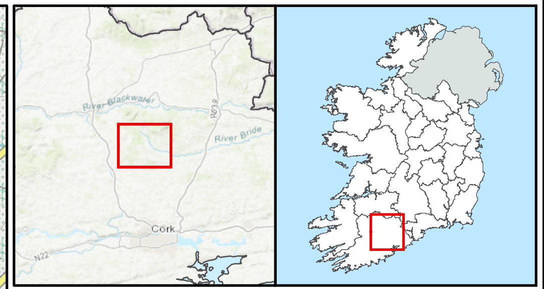

Proposed Turbine Layout

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FIGURE NO: 2.8	
CLIENT: Coom Green Energy Park Ltd.	
SCALE: 1:35000	**REVISION:** 0
DATE: 20/10/2020	**PAGE SIZE:** A3

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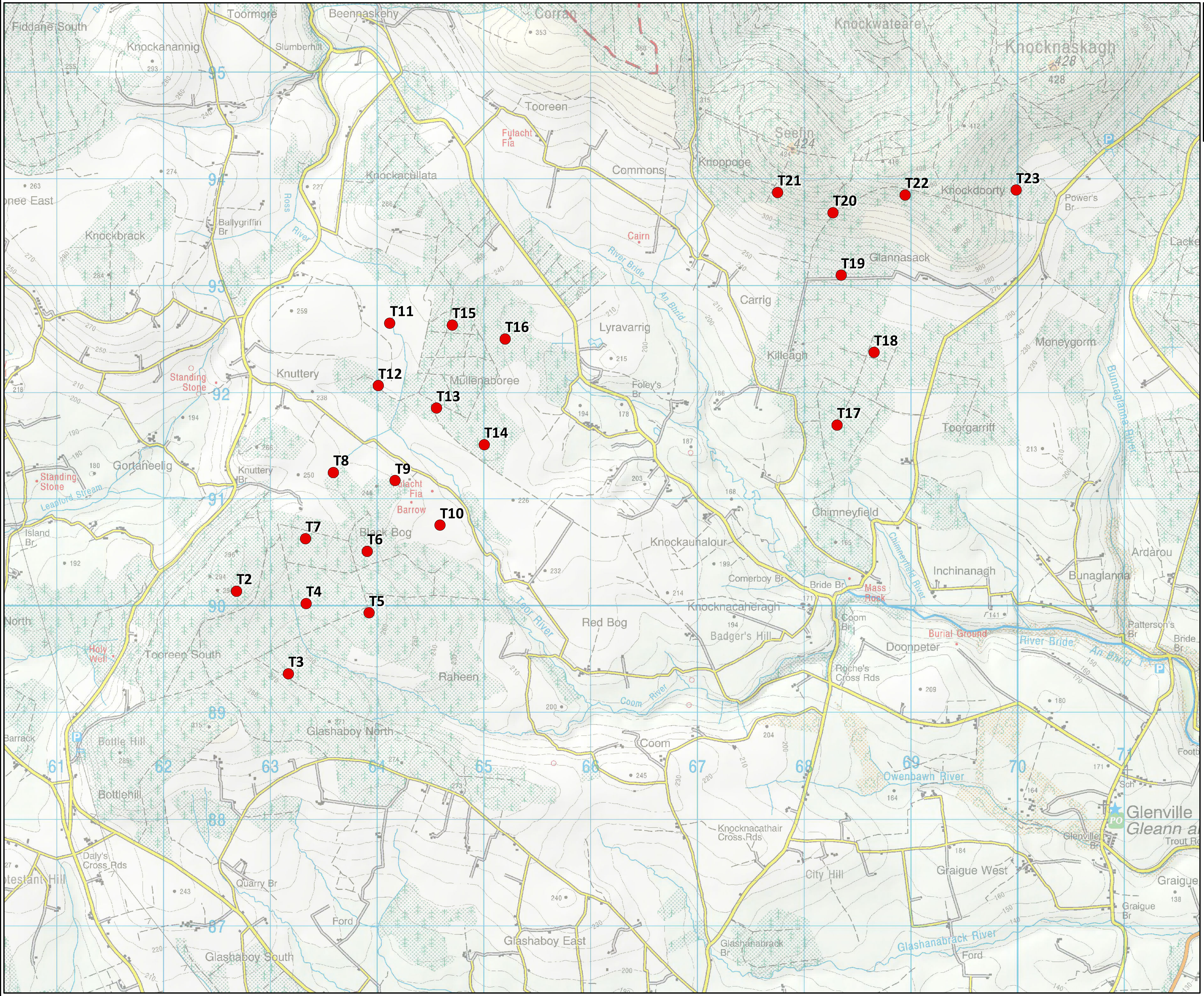

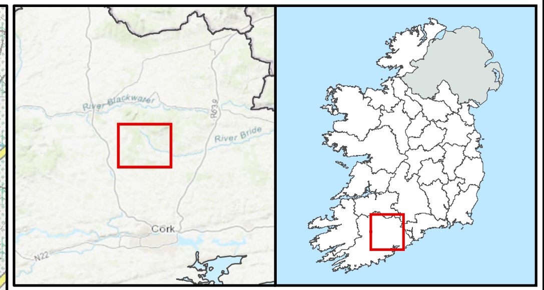

Proposed Turbine Layout

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SCALE: 1:35000	REVISION: 0
DATE: 20/10/2020	PAGE SIZE: A3

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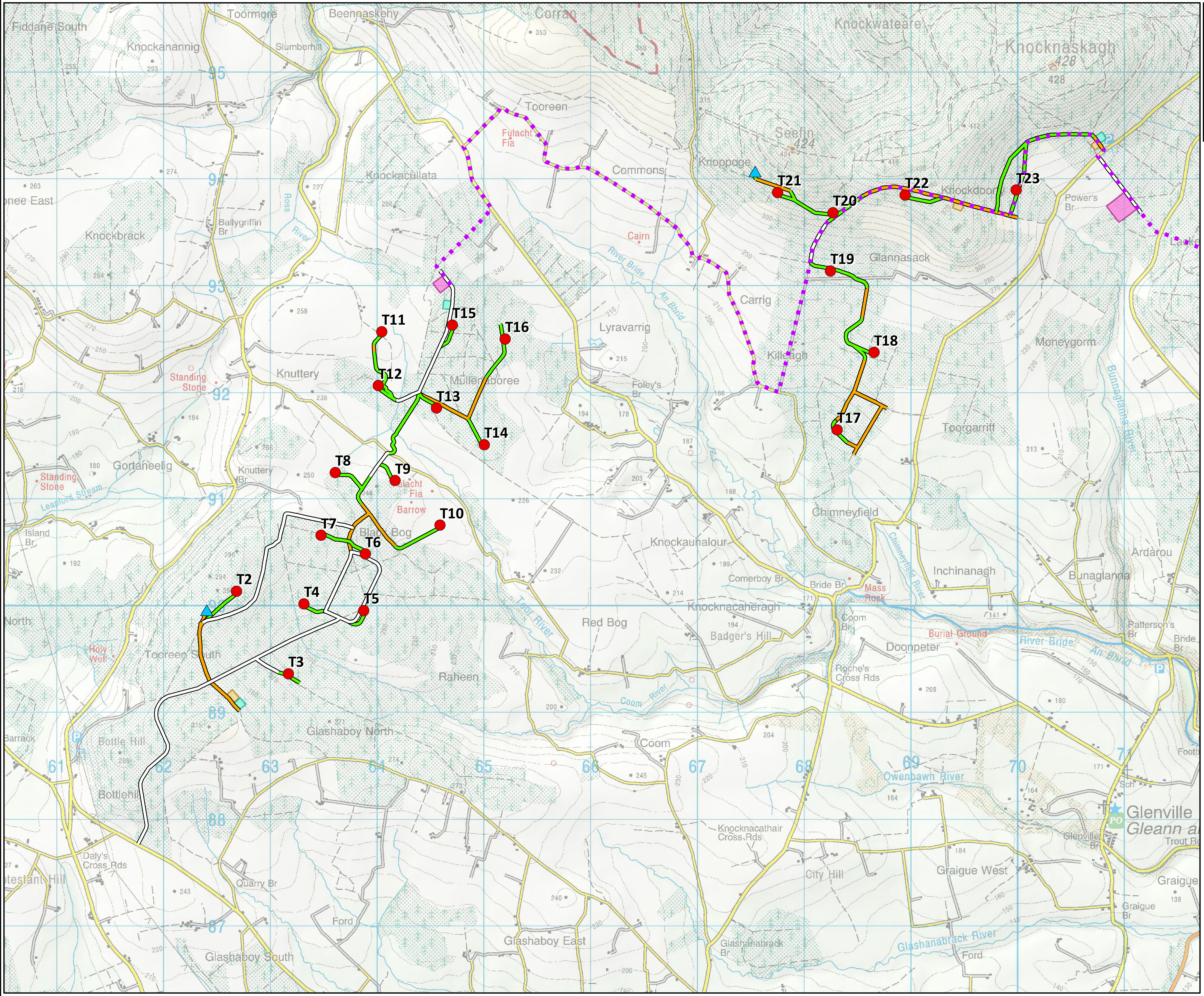

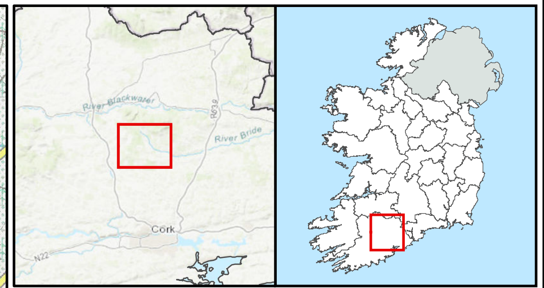

- Proposed Turbine Layout
- Proposed Permanent Met Masts
- Proposed Cable Route
- Existing Road
- Proposed Existing Road Upgrade
- Proposed New Road
- Proposed Borrow Pit
- Proposed Temporary Compound
- Proposed Substation

0 0.5 1 2 Kilometers

TITLE:	Design Iteration 3
PROJECT:	Coom Green Energy Park, Co. Cork
FIGURE NO:	2.10
CLIENT:	Coom Green Energy Park Ltd.
SCALE: 1:35000	REVISION: 0
DATE: 20/10/2020	PAGE SIZE: A3

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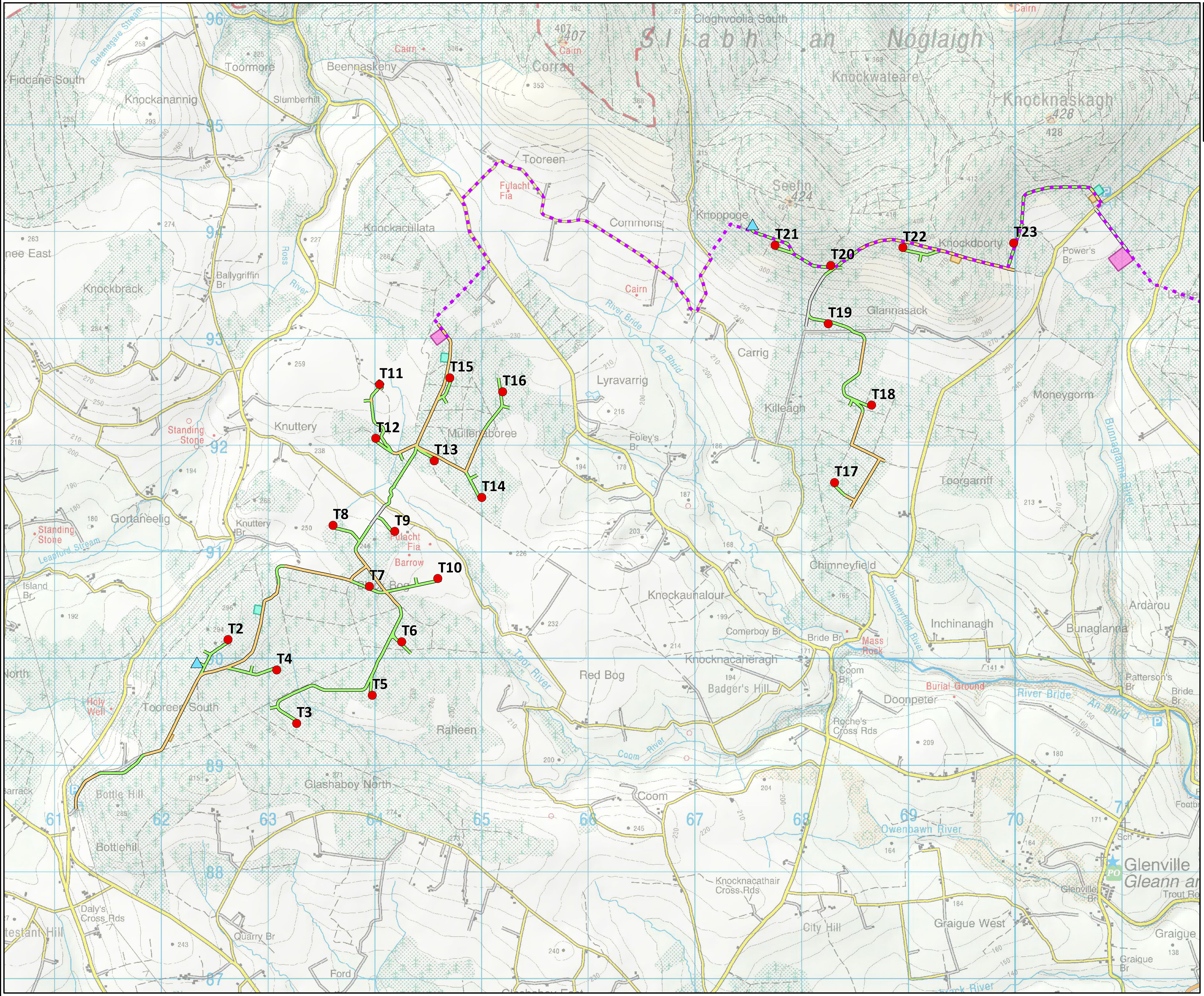

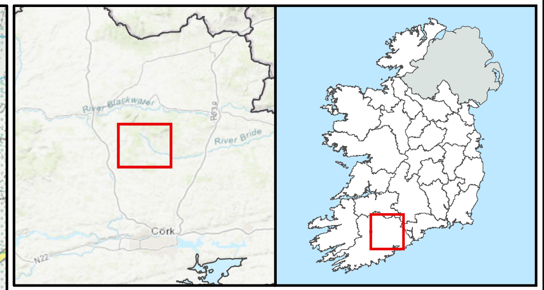

- Proposed Turbine Layout
- Proposed Permanent Met Masts
- Proposed Cable Route
- Existing Road
- Proposed Existing Road Upgrade
- Proposed New Road
- Proposed Borrow Pit
- Proposed Temporary Compound
- Proposed Substation

TITLE: Design Iteration 4	
PROJECT: Coom Green Energy Park, Co. Cork	
FIGURE NO: 2.11	
CLIENT: Coom Green Energy Park Ltd.	
SCALE: 1:35000	**REVISION:** 0
DATE: 20/10/2020	**PAGE SIZE:** A3

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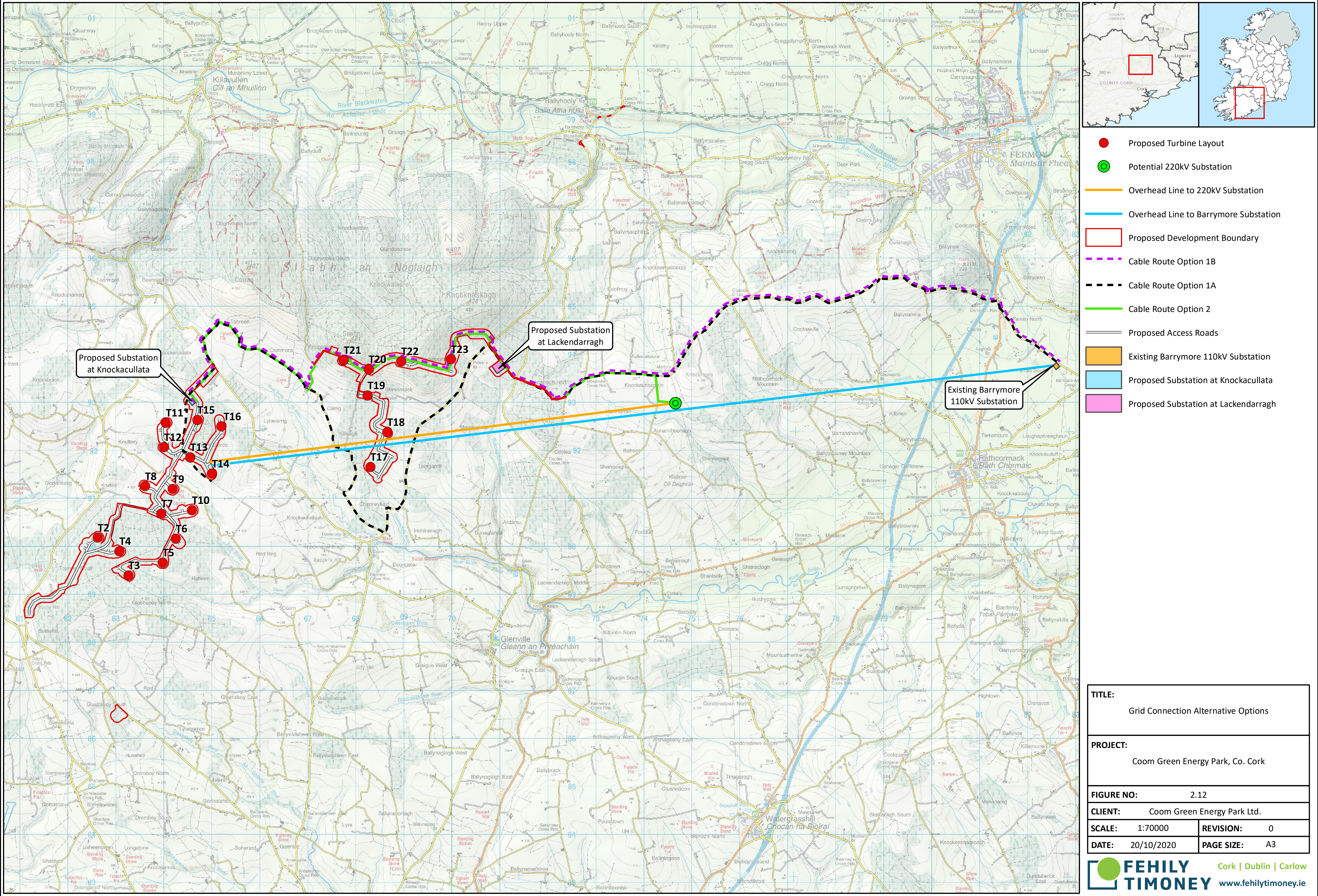

- Proposed Turbine Layout
- Potential 220kV Substation
- Overhead Line to 220kV Substation
- Overhead Line to Barrymore Substation
- Proposed Development Boundary
- Cable Route Option 1B
- Cable Route Option 1A
- Cable Route Option 2
- Proposed Access Roads
- Existing Barrymore 110kV Substation
- Proposed Substation at Knockacullata
- Proposed Substation at Lackendarragh

TITLE:	Grid Connection Alternative Options		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	2.12		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:70000	**REVISION:**	0
DATE:	20/10/2020	**PAGE SIZE:**	A3

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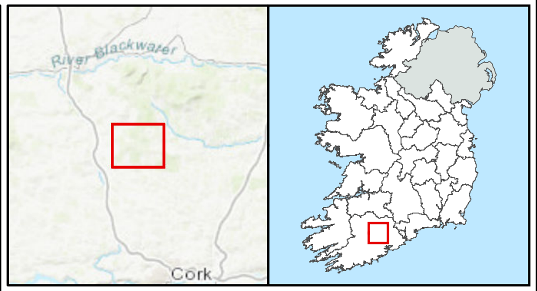

- Proposed Turbine Layout
- Proposed Permanent Met Masts
- No Land Control Either Site
- Potential Site Entrance
- Proposed Development Boundary
- Existing Road
- Proposed Existing Road Upgrade
- Proposed New Road
- Proposed Turning Heads and Passing Bays
- Proposed Turbine Hardstanding Area
- Proposed Borrow Pit
- Proposed Temporary Compound

TITLE:	Alternative Access Points for Western Turbine Cluster		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	2.13		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:20000	REVISION:	0
DATE:	24/11/2020	PAGE SIZE:	A3

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2.3.6 Conclusion of Alternatives Considered

Section 2.3 sets out the evolution of the proposed development through the alternatives considered. This includes the initial consideration of the need for renewable energy, the consideration of different processes to produce renewable energy, the site selection process at macro and micro level, and alternative layouts, scales and detail of the design processes.

Reasonable alternatives were considered with specific regard to the characteristics of the project and comparisons of environmental effects were set out where relevant. The alternatives chosen focused on mitigation by design in order to avoid potential impacts on the environment. Table 2-9 summarises the alternatives considered throughout the project development process.

Table 2-9: Extract from the Draft Guidelines on Information to be Contained in EIARs (EPA, 2017) – Consideration of Alternatives in an EIAR (Figure 3.4)

Topic	Environmental Consideration	Actions
Is this the Right Site or Route?	Environmental Considerations at this stage would include: • Avoidance of environmental sensitivities; • Access to environmental capacity; • Level of environmental capacity.	At a macro level, areas throughout the country were investigated for environmental capacity through the identification of designated sensitive sites, existing wind energy projects, grid capacity and electricity infrastructure, and relevant national and regional policy. Following the establishment of appropriate areas for on-shore wind energy development, county level criteria was examined which aimed to identify a site with supportive renewable energy policy, avoidance of Natura 2000 sites, low population density, access capacity, electricity infrastructure capacity and proximity, and viable wind speeds. A range of Coillte lands were examined against these criteria as well as the suitability of the lands to accommodate a wind energy development. Due to the subject site's high range of viability with regard to the above criteria, in combination with land availability, the developer chose the CGEP site to advance a proposal for a wind energy development.
Is this the Right Site Layout?	Environmental Considerations at this stage would include: • Proximity to site sensitivities; • Potential to affect off site environmental assets.	Industry guidelines and best practice were employed to produce an appropriate layout to maximise wind potential on the site. Following this, a range of constraints and criteria were considered, and alternatives examined to produce an appropriate layout for the CGEP. This was an iterative process, producing many alternative layouts as constraints were discovered throughout the project development process. This process involved site investigation, initial environmental impact assessment and public consultation.

Topic	Environmental Consideration	Actions
Is this the Right Project Design?	Environmental Considerations at this stage would include: • Likely effects during construction; • Likely effects on site features; • Likely effects on neighbours.	The project design was an iterative process which produced 4 design iterations. Initially the maximum number of turbines were considered and then refined following constraints analysis. The scale of turbines was considered throughout the design process. The developer chose to propose fewer large-scale turbines as an alternative to a greater number of small-scale turbines as an approach to produce greater visual permeability in line with industrial practice. DI1 was produced containing 27 no. turbines. This was a draft design intended as a baseline for public consultation purposes and to aid in the commencement of detailed environmental assessment. Following this process, the design was refined further to incorporate stakeholders' concerns and avoid environmental constraints. An alternative design (DI2) was produced in light of this process, containing fewer turbines in a consolidated design. This included an increased setback distance of 750m from dwellings, commitment to zero shadow flicker, the removal of 1 no. turbine to maintain a 750m buffer from dwellings and the removal of 4 no. turbines due to potential impact on sensitive landscape. The final alternative design iterations (DI3 & DI4) were developed following detailed environmental impact assessment and aimed to avoid potential environmental impacts identified during this process. DI4 includes all mitigation measures as set out in this EIAR and is considered the optimal project design. Alternative grid connection options, TDR and site access options were considered, and optimum routes were chosen following identification of potential environmental impacts. The BESS system was removed from the substation compound at Knockacullata following concerns raised by local residents. The BESS was consolidated to one location at the Lackendarragh North substation compound, resulting in less proximity to nearby dwellings and greater efficiency for the export of stored renewable electricity.
Is this the Right Process Design?	Environmental Considerations at this stage would include: • Likely emissions to air and water • Likely generations of waste; • Likely effects on traffic.	Emissions as a result of the construction phase are predicted to be negligible as set out in Chapter 6 – Air and Climate Change. It is estimated that the capacity of approximately 105MW of electricity from the Coom Green Energy Park will result in the net displacement of approximately 137,371 tonnes of CO^2 per annum during operation. As set out in Chapter 10 – Hydrology and Water Quality, impacts on water quality as a result of the construction and operation of the CGEP are

Topic	Environmental Consideration	Actions
		considered not significant following implementation of mitigation measures. The appointed contractor will prevent, reduce, reuse and recover as much of the waste generated on site as practicable and ensure the appropriate transport and disposal of residual waste off site in line with the National Waste Management Guidelines and the European Waste Management Hierarchy. It is anticipated that the construction phase of the CGEP will result in an average increase of 113 trips per day over 24 months including both HGVs and LGVs, as set out in Chapter 13 – Traffic and Transportation. This is expected to produce a slight to moderate, negative, short-term impact on the local road network. The process design was influenced by the need for renewable energy as an alternative to fossil fuel consumption. Alternative renewable technologies were considered at the outset of the project. Viability of a number of technologies were considered. It was concluded that on-shore wind is the most viable and economical alternative at this location to reduce dependency on imported fossil fuels and reduce the nations carbon emissions, contributing to an overall positive impact on the environment. The mitigation measures set out throughout this EIAR are the result of choosing the alternative layouts, designs and processes which would have the least likely impact on the environment, assuring that development goes ahead in a sustainable manner. As an environmental comparison, a "Do-Nothing" alternative scenario was considered which would result in continued energy security vulnerability, a lack of offset of CO2 emissions and a lack of socio-economic benefits to the local area and greater Cork area.

2.4 Conclusion

This chapter of the EIAR has described the need for the development and the reasonable alternatives considered throughout the development process for the Coom Green Energy Park (CGEP). The need for the development is established in Section 2.2 and is centred on providing renewable electricity to the Irish national grid, in line with European and national policy objectives, the need to meet EU Renewable Energy targets and national targets as set out in the Climate Action Plan (2019) and the Climate Action and Low Carbon Development (Amendment) Bill (2020), and the need to circumvent climate change.

The reasonable alternatives considered throughout the development of the CGEP project are detailed in Section 2.3. The site selection process is detailed at a macro and micro level, describing how the subject site was selected as opposed to un-viable alternatives. The evolution of the layout, design and scale of the project is detailed with respect to site investigation, public consultation and constraints analysis. The development of alternative design iterations is set out in detail, potential environmental effects are compared, indicating the reasons for the selection of the final project design, including the intended grid connection route.

Alternative processes were considered including alternative renewable energy technologies and a "Do-Nothing" scenario as a baseline comparison to potential environmental impacts as set out throughout this EIAR.

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