10. AIR AND CLIMATE

10.1 Introduction

This chapter identifies, describes and assesses the potential significant direct and indirect effects on air quality and climate arising from the construction, operation and decommissioning of the Proposed Development. The full description of the Proposed Development is detailed in Chapter 4.

10.1.1 Background

The Wind Farm Site is located approximately 2 kilometres southwest of Ballymore, Co. Westmeath, 6.6 kilometres to the north of Moate, Co Westmeath and 12.2 kilometres northeast of Athlone, Co. Westmeath. The Grid Connection includes for underground 110kV cabling from the proposed onsite 110kV substation within the Wind Farm Site to the existing Thornsberry 110kV substation in the townland of Derrynagall or Ballydaly, County Offaly.

As detailed in Section 1.1.1 in Chapter 1, for the purposes of this EIAR, the various project components are described and assessed using the following references: 'Proposed Development', 'the Site', 'Wind Farm Site' and 'Grid Connection'.

The townlands in which the Proposed Development is located are listed in Table 1.1 in Chapter 1 of this EIAR. Current land-use on the Wind Farm Site comprises coniferous forestry, and agriculture. Current land-use along the Grid Connection comprises of public road corridor, public open space, discontinuous urban fabric and agriculture. Land-use in the wider landscape of the Site comprises a mix of agriculture, peat cutting, quarrying, low density residential and commercial forestry. Due to the non-industrial nature of the Proposed Development and the general character of the surrounding environment, air quality sampling was deemed to be unnecessary for this EIAR. It is expected that air quality in the existing environment is good, since there are no major sources of air pollution (e.g. heavy industry) in the vicinity of the Site.

The production of energy from wind turbines has no direct emissions as is expected from coal or oil-based power stations. Harnessing more energy by means of wind farms will reduce dependency on oil, gas and coal power stations, thereby resulting in a reduction in harmful emissions that can be damaging to human health and the environment. Some minor indirect emissions associated with the construction of the Proposed Development include vehicular and dust emissions.

10.1.2 Relevant Guidance

The air quality and climate section of this EIAR is carried out in accordance with the 'EIA Directive' as amended by Directive 2014/52/EU and has been prepared in accordance with guidance listed in Section 1.7.2 of Chapter 1: Introduction. Due to the nature of the Proposed Development, a wind farm project, the following methodology and guidance was utilised for the climate section of this EIAR:

- 'Calculating Carbon Savings from Wind Farms on Scottish Peat Lands' (University of Aberdeen and the Macauley Institute 2008); and
- 'Wind Farms and Carbon Savings' (Scottish Natural Heritage, 2003).

Consideration has also been given to the 'Air Quality Assessment of Proposed National Roads – Standard PE-ENV-01107' (Transport Infrastructure Ireland, December 2022).

10.1.3 Statement of Authority

This section of the EIAR has been prepared by Ellen Costello and Tom Madden and reviewed by Michael Watson, all of MKO. Ellen is a Project Environmental Scientist with over three years of consultancy experience with MKO and has been involved in a number of wind energy EIAR applications including the compilation of numerous chapters including the preparation of air and climate assessments and reports for EIAs. Ellen holds a BSc. in Earth Science and a MSc. in Climate Change: Integrated Environmental and Social Science Aspects. Tom is an Environmental Scientist with over 4 years' experience in professional environmental consultancies. Tom holds a BSc (Hons) in Environmental Science from the University of Limerick. Prior to joining MKO, Tom worked with environmental consultancies in Dublin and Carlow where he gained experience from working on a wide range of different projects. Michael is a project director and head of the Environmental Team in MKO. Michael has over 20 years' experience in the environmental sector and has been working with MKO since 2014. Michael's professional experience includes managing Environmental Impact Assessments, EPA licence applications, environmental due diligence and general environmental assessment on behalf of clients in the wind farm, waste management public sector, and commercial and industrial sectors nationally.

10.2 Air Quality

10.2.1 Air Quality Standards

In 1996, the Air Quality Framework Directive (96/62/EC) was published. This Directive was transposed into Irish law by the Environmental Protection Agency Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999. The Directive was followed by four Daughter Directives, which set out limit values for specific pollutants:

- The first Daughter Directive (1999/30/EC) addresses sulphur dioxide, oxides of nitrogen, particulate matter and lead.
- The second Daughter Directive (2000/69/EC) addresses carbon monoxide and benzene. The first two Daughter Directives were transposed into Irish law by the Air Quality Standards Regulations 2002 (SI No. 271 of 2002).
- A third Daughter Directive, Council Directive (2002/3/EC) relating to ozone was published in 2002 and was transposed into Irish law by the Ozone in Ambient Air Regulations 2004 (SI No. 53 of 2004).
- The fourth Daughter Directive, published in 2007, relates to polyaromatic hydrocarbons (PAHs), arsenic, nickel, cadmium and mercury in ambient air.

The Air Quality Framework Directive and the first three Daughter Directives have been replaced by the Clean Air for Europe (CAFE) Directive (Directive 2008/50/EC on ambient air quality), which encompasses the following elements:

- The merging of most of the existing legislation into a single Directive (except for the Fourth Daughter Directive) with no change to existing air quality objectives.
- New air quality objectives for PM2.5 (fine particles) including the limit value and exposure concentration reduction target.
- The possibility to discount natural sources of pollution when assessing compliance against limit values.
- The possibility for time extensions of three years (for particulate matter PM10) or up to five years (nitrogen dioxide, benzene) for complying with limit values, based on conditions and the assessment by the European Commission.

Table 10-1 below sets out the limit values of the CAFE Directive, as derived from the Air Quality Framework Daughter Directives. Limit values are presented in micrograms per cubic metre ($\mu g/m^3$) and

parts per billion (ppb). The notation PM_{10} is used to describe particulate matter or particles of ten micrometres or less in aerodynamic diameter. $PM_{2.5}$ represents particles measuring less than 2.5 micrometres in aerodynamic diameter.

The CAFE Directive was transposed into Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011) as amended by the Air Quality Standards (Amendments) and Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations, 2016 (S.I. 659 2016). These Regulations supersede the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and the Ambient Air Quality Assessment and Management Regulations 1999 (S.I. No. 33 of 1999).

Table 10-1 Limit values of Directive 2008/50/EC, 1999/30/EC and 2000/69/EC (Source: https://www.epa.ie/air/quality/standards/)

Pollutant	Limit Value Objective	Averaging Period	Limit Value (µg/m3)	Limit Value (ppb)	Basis of Application of Limit Value	Attainment Date
Sulphur dioxide (SO_2)	Protection of Human Health	1 hour	350	132	Not to be exceeded more than 24 times in a calendar year	1st Jan 2005
Sulphur dioxide (SO_2)	Protection of human health	24 hours	125	47	Not to be exceeded more than 3 times in a calendar year	1st Jan 2005
Sulphur dioxide (SO_2)	Upper assessment threshold for the protection of Human Health	24 hours	75	28	Not to be exceeded more than 3 times in a calendar year	1st Jan 2005
Sulphur dioxide (SO_2)	Lower assessment threshold for the protection of human health	24 hours	50	19	Not to be exceeded more than 3 times in a calendar year	1st Jan 2005
Sulphur dioxide (SO_2)	Protection of vegetation	Calendar year	20	7.5	Annual mean	19th Jul 2001

Pollutant	Limit Value Objective	Averaging Period	Limit Value (µg/m3)	Limit Value (ppb)	Basis of Application of Limit Value	Attainment Date
Sulphur dioxide (SO_2)	Protection of vegetation	1st Oct to 31st Mar	20	7.5	Winter mean	19th Jul 2001
Nitrogen dioxide (NO_2)	Protection of human health	1 hour	200	105	Not to be exceeded more than 18 times in a calendar year	1st Jan 2010
Nitrogen dioxide (NO_2)	Protection of human health	Calendar year	40	21	Annual mean	1st Jan 2010
Nitrogen dioxide (NO_2)	Upper assessment threshold for the protection of human health	1 hour	140	73	Not to be exceeded more than 18 times in a calendar year	1st Jan 2010
Nitrogen dioxide (NO_2)	Lower assessment threshold for the protection of human health	1 hour	100	52	Not to be exceeded more than 18 times in a calendar year	1st Jan 2010
Nitrogen monoxide (NO) and nitrogen dioxide (NO_2)	Protection of ecosystems	Calendar year	30	16	Annual mean	19th Jul 2001
Particulate matter 10 (PM_{10})	Protection of human health	24 hours	50	-	Not to be exceeded more than 35 times in a calendar year	1st Jan 2005
Particulate matter 10 (PM_{10})	Upper assessment threshold for the protection	24 hours	30	-	Not to be exceeded more than 7 times in a	Based on the indicative limit values for 1

Pollutant	Limit Value Objective	Averaging Period	Limit Value (µg/m3)	Limit Value (ppb)	Basis of Application of Limit Value	Attainment Date
	of human health				calendar year	January 2010
Particulate matter 10 (PM_{10})	Lower assessment threshold for the protection of human health	24 hours	20	-	Not to be exceeded more than 7 times in a calendar year	Based on the indicative limit values for 1 January 2010
Particulate matter 2.5 ($PM_{2.5}$)	Protection of human health	Calendar year	40	-	Annual mean	1st Jan 2005
Particulate matter 2.5 ($PM_{2.5}$) Stage 1	Protection of human health	Calendar year	25	-	Annual mean	1st Jan 2015
Particulate matter 2.5 ($PM_{2.5}$) Stage 2	Protection of human health	Calendar year	20	-	Annual mean	1st Jan 2020
Lead (Pb)	Protection of human health	Calendar year	0.5	-	Annual mean	1st Jan 2005
Carbon Monoxide (CO)	Protection of human health	8 hours	10,000	8,620	-	1st Jan 2005
Benzene (C_6H_6)	Protection of human health	Calendar Year	5	1.5	-	1st Jan 2010

* AOT40 is a measure of the overall exposure of plants to ozone. It is the sum of the differences between hourly ozone concentration and 40 ppb for each hour when the concentration exceeds 40 ppb during a relevant growing season, e.g. for forest and crops.

The Ozone Daughter Directive 2002/3/EC is different from the other Daughter Directives in that it sets target values and long-term objectives for ozone rather than limit values. Table 10-2 presents the limit and target values for ozone.

Table 10-2 Target values for Ozone Defined in Directive 2008/50/EC

Objective	Parameter	Target Value for 2010	Target Value for 2020
Protection of human health	Maximum daily 8-hour mean	120 mg/m^3 not to be exceeded more than 25 days per calendar	120 mg/m^3

		year averaged over 3 years	
Protection of vegetation	AOT40 calculated from 1 hour values from May to July	18,000 mg/m^3.h averaged over 5 years	6,000 mg/m^3.h
Information Threshold	1-hour average	180 mg/m^3	-
Alert Threshold	1-hour average	240 mg/m^3	-

AOT_{40} is a measure of the overall exposure of plants to ozone. It is the sum of the excess hourly concentrations greater than 80 g/m^3 and is expressed as g/m^3 hours.

10.2.1.1 Air Quality and Health

The Environmental Protection Agency (EPA) report *'Air Quality in Ireland 2021'* noted that in Ireland, the premature deaths attributable to poor air quality are estimated at 1,300 people per annum. The European Environmental Agency (EEA) Report, *'Air Quality in Europe – 2021 Report'* highlights the negative effects of air pollution on human health. The report assessed that poor air quality accounted for premature deaths of approximately 307,000 people in the 27 EU Member States in 2019, with regards to deaths relating to $PM_{2.5}$. The estimated impacts on the population in Europe of exposure to NO_2 and O_3 concentrations in 2019 were around 40,400 and 16,800 premature deaths per year, respectively. From this, 1,300 Irish deaths were attributable to fine particulate matter ($PM_{2.5}$), 30 Irish deaths were attributable to nitrogen oxides (NO_2) and 50 Irish deaths were attributable to Ozone (O_3) (Source: *'Air Quality in Europe – 2021 Report'*, EEA, 2021).

These emissions, along with others including sulphur oxides, carbon monoxide, benzene and lead are produced during fossil fuel-based electricity generation and traffic in various amounts, depending on the fuel and technology used. Whilst there is the potential of such emissions to be generated from the site operations, a number of mitigation measures will be implemented at the Proposed Development site to reduce the impact from dust and vehicle emissions, which are discussed in Section 10.2.3 below.

10.2.2 Air Quality Zones

The EPA has designated four Air Quality Zones for Ireland:

- Zone A: Dublin City and environs
- Zone B: Cork City and environs
- Zone C: 16 urban areas with population greater than 15,000
- Zone D: Remainder of the country.

These zones were defined to meet the criteria for air quality monitoring, assessment and management described in the Framework Directive and Daughter Directives. The site of the Proposed Development lies within Zone D, which represents rural areas located away from large population centres.

The air quality in the vicinity of the Proposed Development site is typical of that of rural areas in Midlands of Ireland, i.e. Zone D. The EPA publishes Air Monitoring Station Reports for monitoring locations in all four Air Quality Zones. The most recent report on air quality in Ireland, *'Air Quality in Ireland 2021'* was published by the EPA in 2022. The EPA reports provide SO_2, PM_{10}, NO_2 and O_3 concentrations for areas in Zone D. Values for each of these elements recorded within the Zone D monitoring stations listed in the report, have been averaged to give representative values for Zone D. Similar measurement values for all air quality parameters would be expected for the Proposed Development site as it lies in a rural location, within Zone D.

10.2.2.1 Sulphur Dioxide (SO_2)

Sulphur dioxide data for Cork Harbour, Kilkitt, Askeaton, Edenderry and Letterkenny in 2021 is presented in Table 10-3.

Table 10-3 Average Sulphur Dioxide Data for Zone D Sites in 2021

Parameter	Measurement (ug/m^3)
Annual Mean	4.16
Hourly Values >350	0
Hourly Max	94.80
Daily Values >123	0
Daily Max	25.54

During the monitoring period there were no exceedances of the daily limit values for the protection of human health. As can be observed from Table 10-3 the average maximum hourly value recorded during the assessment period was 94.80 µg/m^3. In addition, there were no exceedances of the annual mean limit for the protection of ecosystems. It would be expected that SO_2 values at the Proposed Development site would be similar or lower than those recorded for the Zone D sites above.

10.2.2.2 Particulate Matter (PM_{10})

Sources of particulate matter include vehicle exhaust emissions, soil and road surfaces, construction works and industrial emissions. The EPA report provides annual mean PM_{10} concentration for sixteen Zone D towns, Tipperary Town, Carrick-on-shannon, Enniscorthy, Birr, Askeaton, Macroom, Castlebar, Cobh Carrignafoy, Claremorris, Kilkitt, Cavan, Roscommon Town, Edenderry, Mallow, Longford and Cobh Cork Harbour. Particulate matter (PM_{10}) data for 2021 is presented in Table 10-4.

Table 10-4 Average Particulate Matter (PM_{10}) Data for Zone D Sites in 2021

Parameter	Measurement (ug/m^3)
Annual Mean	11.94
% Data Capture	91
Values >50 ug/m3	Max 4
Daily Max	60.57

Note: PM_{10} daily limit for the protection of human health: No more than 35 days >50 µg/m^3

The daily limit of 50 µg/m^3 for the protection of human health was not exceeded more than 35 times during the monitoring period. It would be expected that PM_{10} values at the Proposed Development site would be similar or lower than those recorded for the Zone D sites above.

10.2.2.3 Nitrogen Dioxide (NO_2)

Nitrogen dioxide data from Emo Court, Birr, Castlebar, Carrick-on-Shannon, Kilkitt and Edenderry in 2021 is presented in Table 10-5 below.

Table 10-5 Average Nitrogen data for Zone D Sites in 2021

Parameter	Measurement (µg/m^3)
Annual Mean	7.52
NO_2 Values >200	0
Values >140 (UAT)	0
Values >100 (LAT)	0
Hourly Max.	63

The annual NO_2 value was below the annual mean limit value for the protection of human health of 40 µg/m^3. Furthermore, the lower and upper assessment thresholds of 100 and 140 µg/m^3 were not exceeded during the monitoring period. The average hourly max. NO_2 value of 63 µg/m^3 measured during the monitoring period was below the hourly max threshold of 200 µg/m^3. It would be expected that NO_2 values at the Proposed Development site would be similar or lower than those recorded for the Zone D sites above.

10.2.2.4 Carbon Monoxide (CO)

The EPA Report provides rolling 8-hour carbon monoxide concentrations for Birr, a Zone D site. Carbon Monoxide data for 2021 is presented in Table 10-6 below.

Table 10-6 Carbon Monoxide Data for Birr – Zone D Site in 2021

Parameter	Measurement
Annual Mean	0.3 mg/m^3
Median	0.3 mg/m^3
% Data Capture	98.2%
Values > 10	0
Max	1.2 mg/m^3

The average concentration of carbon monoxide was 0.3 mg/m^3. The carbon monoxide limit value for the protection of human health is 10,000 µg/m^3 (or 10 mg/m^3). On no occasions were values in excess of the 10 mg limit value set out in Directives 2000/69/EC or 2008/69/EC. It would be expected that CO values at the Proposed Development site would be similar or lower than those recorded for the Zone D site above.

10.2.2.5 Ozone (O_3)

The EPA Report provides rolling 8-hour ozone concentrations for seven Zone D sites, Emo Court, Kilkitt, Carnsore Point, Mace Head, Castlebar, Valentia and Malin Head. Ozone (O_3) data for 2021 is presented in Table 10-7. As can be observed from Table 10-7, there were 11 days of exceedances of the maximum daily eight hour mean limit of 120 µg/m^3 at two locations. The legislation stipulates that this limit should not be exceeded on more than 25 days. It would be expected that O_3 values at the Proposed Development site would be similar or lower than those recorded for Zone D sites below.

Table 10-7 Average Ozone Data for Zone D Sites in 2021

Parameter	Measurement
Annual Mean	60 µg/m^3
Median	62 µg/m^3
% Data Capture	89%
No. of days >120	Max 11 days (Kilkitt & Valentia)

10.2.2.6 Dust

There are no statutory limits for dust deposition in Ireland. However, EPA guidance suggests that a deposition of 10 mg/m^2/hour can generally be considered as posing a soiling nuisance. This equates to 240 mg/m^2/day. The EPA recommends a maximum daily deposition level of 350 mg/m^2/day when measured according to the TA Luft Standard 2002.

The extent of dust generation at any site depends on the type of activity undertaken, the location, the nature of the dust, i.e., soil, sand, etc., and the weather. In addition, dust dispersion is influenced by external factors such as wind speed and direction and/or, periods of dry weather. Dust has the potential to be generated during the construction phase of the Proposed Development from on-site activities such as excavation and backfilling. Construction traffic movements also have the potential to generate dust as they travel along the Proposed Development site roads.

The potential dust-related effects on local air quality and the relevant associated mitigation measures are presented in Sections 10.2.3.2. below.

10.2.3 Likely Significant Effects and Associated Mitigation Measures

10.2.3.1 'Do-Nothing' Effect

If the Proposed Development were not to proceed, no changes would be made to the current land-use practice of agriculture and coniferous forestry. In doing so, the environmental effects in terms of emissions are likely to be neutral. However, the opportunity to reduce emissions of carbon dioxide, oxides of nitrogen (NO_x), and sulphur dioxide (SO_2) to the atmosphere would be lost due to the continued dependence on electricity derived from coal, oil and gas-fired power stations, rather than renewable energy sources such as the Proposed Development. This will result in an indirect negative impact on air quality nationally, regionally and locally.

10.2.3.2 Construction Phase

10.2.3.2.1 *Exhaust Emissions*

1. Wind Farm Site (Turbines and associated foundations and hard-standing areas, Meteorological Mast, Junction Accommodation Works, Access Roads, Temporary Construction Compound, Underground Cabling, Spoil Management, Site Drainage, Tree Felling, and all ancillary works and apparatus)

The construction of turbines, site roads and other onsite infrastructure (as outlined in Chapter 4 of this EIAR) will require the operation of construction vehicles and plant on the Wind Farm Site. Exhaust emissions associated with vehicles and plant will arise as a result of construction activities. This potential

effect will not be significant and will be restricted to the duration of the construction phase and localised to works locations. Therefore, this is considered a short-term slight negative effect. Mitigation measures to reduce this impact are presented below.

2. Grid Connection (Onsite Substation, Temporary Construction Compound and Underground Electrical Cabling Route)

The construction of the onsite substation and temporary construction compound (as outlined in Chapter 4 of this EIAR) will require the operation of construction vehicles and plant on the Wind Farm Site. Exhaust emissions associated with vehicles and plant will arise as a result of construction activities. This potential effect will not be significant and will be restricted to the duration of the construction phase and localised to works locations. Therefore, this is considered a short-term slight negative effect. Mitigation measures to reduce this impact are presented below.

The construction of the underground electrical cabling route will require the use of construction machinery, thereby giving rise to exhaust emissions. This is a short-term slight negative effect, which will be reduced through use of the best practice mitigation measures as presented below.

3. Transport to Site

The transport of turbines and construction materials to the Site, which will occur on specified routes only (see Section 4.4 in Chapter 4 of this EIAR), will also give rise to exhaust emissions associated with the transport vehicles. This constitutes a slight negative effect in terms of air quality. Mitigation measures in relation to exhaust emissions are presented below.

4. Waste Disposal

Construction waste will arise from the Proposed Development mainly from excavation and unavoidable construction waste including material surpluses and damaged materials and packaging waste. Waste management will be carried out in accordance with *Best Practice Guidelines on the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects* (2021) produced by the EPA.

Mitigation:

- All construction vehicles and plant will be maintained in good operational order while onsite, thereby minimising any emissions that arise.
- Turbines and construction materials will be transported to the Site on specified routes only, unless otherwise agreed with the Planning Authority.
- When stationary, delivery and on-site vehicles will be required to turn off engines.
- Users of the Site will be required to ensure that all plant and vehicles are suitably maintained to ensure that emissions of engine generated pollutants is kept to a minimum.
- The expected waste volumes generated onsite are unlikely to be large enough to warrant source segregation at the Proposed Development site. Therefore, all wastes streams generated onsite will be deposited into a single waste skip which will be covered. This waste material will be transferred to a licensed /permitted Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste will be sorted into individual waste streams for recycling, recovery or disposal.
- The MRF facility will be local to the Proposed Development site to reduce the amount of emissions associated with vehicle movements. The nearest licensed waste facility to the Wind Farm Site is Ballydonagh Landfill which is located approximately 11.25km to the south-west of the Wind Farm Site.
- Waste associated with the construction of the Grid Connection underground electrical cabling route will be disposed of at the closest MRF to where waste is generated along the underground electrical cabling route. There are two licensed

waste facilities in the vicinity of the underground electrical cabling route, and these are the Ballydonagh Landfill as outlined above and the Derryclure Landfill which is located approximately 6.5km to the south of the Thornsberry 110kV substation at Tullamore.

Residual Effect

Following implementation of the mitigation measures above, residual impacts of exhaust emissions for the construction phase of the Proposed Development will have a short-term imperceptible negative effect.

Significance of Effects

Based on the assessment above there will be no significant effects.

10.2.3.2.2 *Dust Emissions*

1. Wind Farm Site (Turbines and associated foundations and hard-standing areas, Meteorological Mast, Junction Accommodation Works, Access Roads, Temporary Construction Compound, Underground Cabling, Spoil Management, Site Drainage, Tree Felling, and all ancillary works and apparatus)

The construction of turbines, site roads and other onsite infrastructure will give rise to dust emissions during the construction phase. This potential effect will not be significant and will be restricted to the duration of the construction phase. Therefore, this is a short-term slight negative effect. Dust suppression mitigation measures to reduce this impact are presented below.

An area of 6.4 hectares of coniferous forestry will be required to be felled as part of the Proposed Development. This felling will be carried out in accordance with Forest Service guidelines and in compliance with any Felling Licence granted by the Forest Service.

2. Grid Connection (Onsite Substation, Temporary Construction Compound and Underground Electrical Cabling Route)

The construction of the onsite substation and temporary construction compound (as outlined in Chapter 4 of this EIAR) will require the operation of construction vehicles and plant on the Wind Farm Site. Exhaust emissions associated with vehicles and plant will arise as a result of construction activities. This potential effect will not be significant and will be restricted to the duration of the construction phase and localised to works locations. Therefore, this is considered a short-term slight negative effect. Mitigation measures to reduce this impact are presented below. The construction of the underground electrical cabling route will give rise to localised dust emission during its construction. This is a short-term slight negative effect. Mitigation measures to reduce this impact are presented below.

3. Transport to Site

The transport of turbines and construction materials to the Site will also give rise to some localised dust emissions during periods of dry weather. This is a short-term slight negative effect. Mitigation measures to reduce the significance of this impact are presented below.

Mitigation

- In periods of extended dry weather, dust suppression may be necessary along haul roads, site roads, and other infrastructure to ensure dust does not cause a nuisance. If necessary, water will be taken from stilling ponds in the Wind Farm Site's drainage system and will be pumped into a bowser or water spreader to dampen down haul

roads, and site compounds to prevent the generation of dust where required. Water bowser movements will be carefully monitored to avoid, insofar as reasonably possible, increased runoff.
- All plant and materials vehicles shall be stored in dedicated areas (on Site).
- Areas of excavation will be kept to a minimum, and stockpiling will be minimised by coordinating excavation, spreading and compaction.
- Turbines and construction materials will be transported to the Site on specified haul routes only.
- The agreed haul route roads adjacent to the Site will be regularly inspected for cleanliness and cleaned as necessary.
- The Site access roads will be checked weekly for damage/potholes and repaired as necessary.
- The transport of construction materials to the Site that have significant potential to cause dust, will be undertaken in tarpaulin or similar covered vehicles where necessary.
- The transportation of dry excavated material from the Site to the designated on-site spoil management areas, which may have potential to generate dust will be minimised. If necessary, excavated material will be dampened prior to transport to the spoil management areas.
- A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase (see Appendix 4-2). The CEMP includes dust suppression measures.

Residual Effect

Following implementation of mitigation measures as outlined above, residual effects of dust generation from the construction phase will have a Short-term Imperceptible Negative Effect.

Significance of Effects

Based on the assessment above there will be no significant effects.

10.2.3.3 Operational Phase

10.2.3.3.1 *Exhaust Emissions*

Exhaust emissions associated with the operational phase of the Proposed Development will arise from machinery and vehicles that are intermittently required onsite for maintenance. This will give rise to a long-term imperceptible negative effect.

Mitigation

- Any vehicles or plant brought onsite during the operational phase will be maintained in good operational order that comply with the Road Traffic Acts 1961 as amended, thereby minimising any emissions that arise.
- When stationary, delivery and on-site vehicles will be required to turn off engines.

Residual Effects

Long-term Imperceptible Negative Effect.

Significance of Effects

Based on the assessment above there will be no significant effects.

10.2.3.3.2 *Air Quality*

The Proposed Development, by providing an alternative to electricity derived from coal, oil or gas-fired power stations, will result in emission savings of carbon dioxide (CO_2), oxides of nitrogen (NO_x), and sulphur dioxide SO_2. The production of renewable energy from the Proposed Development will have a long-term significant positive impact on air quality. Further details on the carbon dioxide savings associated with the Proposed Development are presented in Section 10.3.3.3 below.

Residual Effect

Long-term Significant Positive Effect. For the purposes of this EIAR, a rated output of 6.2 MW has been chosen (a mid-range capacity) to calculate the power output of the proposed 9-turbine renewable energy development, which would result in an estimated installed capacity of 55.8 MW. Whilst there are potentially higher rated turbines, the residual impact will not be altered.

Significance of Effects

Based on the assessment above there will be a significant positive effect.

10.2.3.3.3 *Human Health*

Whilst the operational phases of the Proposed Development will give rise to minor increases in dust and vehicle emissions, the implementation of the mitigation measures discussed above, and good management practices can prevent or minimise potential effects off-site. Good management practice consists of good site design and layout, adopting appropriate working methods, choosing the right equipment and ensuring that the workforce understands the company's responsibilities and is familiar with good working practice and dust suppression techniques. The potential for health effects are considered negligible as the potential for both exhaust and dust emissions will be limited and controlled through site layout design and mitigation measures.

Exposure to chemicals such as SO_2 and NO_x, Pb, benzene and O_3 are thought to be harmful to human health. The production of clean renewable energy from the Proposed Development will offset the emission of these harmful chemicals by fossil fuel powered sources of electricity and, therefore, will have a long term slight positive impact on human health. Further information on the impact of the Proposed Development on Human Health is contained in Chapter 5: Population and Human Health.

Residual Effect

Long-term Slight Positive Effect.

Significance of Effects

Based on the assessment above there will be no significant effects.

10.2.3.4 Decommissioning Phase

The wind turbines proposed as part of the Wind Farm Site are expected to have a lifespan of approximately 30 years. Following the end of their useful life, the wind turbines may be replaced with a new set of turbines, subject to planning permission being obtained, or the Wind Farm Site may be

decommissioned fully. The Grid Connection onsite substation and underground electrical cabling will remain in place as it will be under the ownership of EirGrid.

The works required during the decommissioning phase are described in Section 4.9 in Chapter 4: Description of the Proposed Development. Any impact and consequential effect that occurs during the decommissioning phase are similar to that which occur during the construction phase, be it of less impact. The mitigation measures prescribed for the construction phase of the Proposed Development will be implemented during the decommissioning phase thereby minimising any potential impacts.

A Decommissioning Plan is included as in Appendix 4-6 of this EIAR for the decommission of the Proposed Development, the detail of which will be agreed with the local authority prior to any decommissioning. The potential for effects during the decommissioning phase of the proposed renewable energy development has been fully assessed in the EIAR.

10.3 Climate

Climate legislation and policy is outlined in detail in Chapter 2 of this EIAR. A summary of the same is provided in the following sections.

10.3.1 Climate Change and Greenhouse Gases

Although variation in climate is thought to be a natural process, the rate at which the climate is changing has been accelerated rapidly by human activities. Climate change is one of the most challenging global issues facing us today and is primarily the result of increased levels of greenhouse gases in the atmosphere. These greenhouse gases come primarily from the combustion of fossil fuels in energy use. Changing climate patterns are thought to increase the frequency of extreme weather conditions such as storms, floods and droughts. In addition, warmer weather trends can place pressure on animals and plants that cannot adapt to a rapidly changing environment. Moving away from our reliance on coal, oil and other fossil fuel-driven power plants is essential to reduce emissions of greenhouse gases and combat climate change.

10.3.1.1 Greenhouse Gas Emission Targets

Ireland is a Party to the Kyoto Protocol, which is an international agreement that sets limitations and reduction targets for greenhouse gases for developed countries. It is a protocol to the United Nations Framework for the Convention on Climate Change. The Kyoto Protocol came into effect in 2005, as a result of which, emission reduction targets agreed by developed countries, including Ireland, are now binding.

Under the Kyoto Protocol, the EU agreed to achieve a significant reduction in total greenhouse gas emissions in the period 2008 to 2012. These EU emission targets are legally binding in Ireland. Ireland's contribution to the EU commitment for the period 2008 – 2012 was to limit its greenhouse gas emissions to no more than 13% above 1990 levels.

10.3.1.1.1 *Doha Amendment to the Kyoto Protocol*

In Doha, Qatar, on 8th December 2012, the "Doha Amendment to the Kyoto Protocol" was adopted. The amendment includes:

- New commitments for Annex I Parties to the Kyoto Protocol who agreed to take on commitments in a second commitment period from 1 January 2013 to 31 December 2020;
- A revised list of greenhouse gases (GHG) to be reported on by Parties in the second commitment period; and
- Amendments to several articles of the Kyoto Protocol which specifically referenced issues pertaining to the first commitment period and which needed to be updated for the second commitment period.

During the first commitment period, 37 industrialised countries and the European Community committed to reduce GHG emissions to an average of 5% below 1990 levels. During the second commitment period, Parties committed to reduce GHG emissions by at least 18% below 1990 levels in the eight-year period from 2013 to 2020. The composition of Parties in the second commitment period is different from the first; however, Ireland and the EU signed up to both the first and second commitment periods.

Under the protocol, countries must meet their targets primarily through national measures, although market-based mechanisms (such as international emissions trading) can also be utilised.

10.3.1.1.2 COP21 Paris Agreement

COP21 was the 21st session of the Conference of the Parties (COP) to the United Nations Convention. Every year since 1995, the COP has gathered the 196 Parties (195 countries and the European Union) that have ratified the Convention in a different country, to evaluate its implementation and negotiate new commitments. COP21 was organised by the United Nations in Paris and held from 30th November to 12th December 2015.

COP21 closed on 12th December 2015 with the adoption of the first international climate agreement (concluded by 195 countries and applicable to all). The twelve-page text, made up of a preamble and 29 articles, provides for a limitation of the temperature rise to below 2°C above pre-industrial levels and even to tend towards 1.5°C. It is flexible and takes into account the needs and capacities of each country. It is balanced as regards adaptation and mitigation, and durable, with a periodical ratcheting-up of ambitions.

10.3.1.1.3 COP25 Climate Change Conference- Madrid

The 25th United Nations Climate Change conference COP25 was held in Madrid and ran from December 2nd to December 13th, 2019. While largely regarded as an unsuccessful conference, the European Union launched its most ambitious plan, 'The European Green New Deal' which aims to lower CO_2 emissions to zero by 2050. The deal includes proposals to reduce emissions from the transport, agriculture and energy sectors and will affect the technology chemicals, textiles, cement, and steel industries. Measures such as fines and pay-outs by member states who rely on coal power will be in place to encourage the switch to renewable clean energies such as wind. On the 4th of March 2020, the European Commission put forward the proposal for a European climate law. This aims to establish the framework for achieving EU climate neutrality. It aims to provide a direction by setting a pathway to climate neutrality and to this end, aims to set in legislation the EU's 2050 climate-neutrality objective.

10.3.1.1.4 COP27 Climate Change Conference - Sharm El-Sheikh

COP27 took place in Sharm el-Sheikh from the 6th of November 2022 to the 20th of November. The Conference of the Parties (COP) is a supreme decision-making body of the United Nations Framework Convention on Climate Change (UNFCCC).

The three major topics of COP27 were:

- Closing the emissions gap to keep 1.5°C alive
- Loss and damage
- Climate finance

The summit took place a year after its precedent COP26 summit in Glasgow, Scotland. In Glasgow, the final agreement was delayed due to the stance of China and India, among others, who were not comfortable with the 'phase out' of coal wording in the draft text. This led to the watering down of this commitment to a 'phase down' of coal use. The hope was that COP27 would work to include further language on coal and fossil fuel reduction efforts and be matched by increased ambition and action to meet agreed pledges. Initial texts represented more serious language than used at COP26 in Glasgow, however, the published final text retains the language of Glasgow, phase down, which does not use any binding language to reduce use and is still only applicable to coal, not oil and gas.

There has been the setting of a workplan for 2023 to help articulate the nature and components of a global collective goal on adaptation and resilience, however in order to achieve this, more work needs to be done by countries, cities and organisations as currently, the numbers on the NDCs don't add up.

Currently, no country has an NDC in place that is able to meet Paris Agreement goals, making net zero by 2050 difficult to envision and 2030 commitments near impossible.

10.3.1.1.5 *United Nations Sustainable Development Goals Report 2022*

Transforming our World: the 2030 Agenda for Sustainable Development which includes 17 Sustainable Development Goals (SDGs) and 169 targets was adopted by all UN Member States at a UN summit held in New York in 2015. The agenda is universally applicable with all countries having a shared responsibility to achieve the goals and targets which came into effect on January 1st, 2016. The goals and targets are to be actions over the 15-year period, are integrated and indivisible i.e., all must be implemented together by each Member State. On 7th July 2022, The United Nations published '*The Sustainable Development Goals Report 2022'* using current data, highlighting how the COVID-19 pandemic, the war in Ukraine and subsequent refugee crisis have hindered the achievements of the Sustainable Development Goals, especially in terms of climate action. The report stipulates that due to these unprecedent events, the severity and magnitude before humankind demands sweeping change not yet seen in human history.

The Sustainable Development Goals National Implementation Plan 2018-2020 was published by the Department of Communications, Climate Action & Environment in partnerships with OSI, Esri Ireland and the Central Statistics Office. The Plan sets out how Ireland will work to achieve the goals and targets of the Agenda for Sustainable Development both domestically and internationally. Relevant SDGs and how they are implemented into Irish National plans and policies can be found in Table 10-8. It should be noted that the Department (now the Department of the Environment, Climate and Communications) published the draft of the Second National Implementation Plan for the SDG Goals 2022-2024 on the 13th May 2022. It will set out arrangements for interdepartmental coordination, stakeholder engagement and actions needed for further SDG Implementation.

Table 10-8 United Nations Sustainable Development Goals adopted in 2015. https://sustainabledevelopment.un.org/sdgs

SDG	Targets	International Progress/ downfalls to Date (2022)	National Relevant Policy
SDG 7 Affordable and Clean Energy: *Ensure access to affordable, reliable, sustainable and modern energy for all*	› By 2030, ensure universal access to affordable, reliable and modern energy services › By 2030, increase substantially the share of renewable energy in the global energy mix › By 2030, double the global rate of improvement in energy efficiency › By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and	Total renewable energy consumption increased by a quarter between 2010 and 2019, but the share of renewables in total final energy consumption is only 17.7% (2019). International financial flows to developing countries for renewables declined for a second year in a row. Progress in energy efficiency needs to accelerate to achieve global climate goals. As annual energy-intensity improvement rates were 1.9% from 2010 to 2019	*Ireland's Transition to a Low Carbon Energy Future 2015-2030* *Strategy to Combat Energy Poverty in Ireland* *Ireland's Transition to a Low Carbon Energy Future 2015- 2030* *National Mitigation Plan* *National Energy Efficiency Action Plan for Ireland # 4 2017-2020* *Better Energy Programme*

SDG	Targets	International Progress/ downfalls to Date (2022)	National Relevant Policy
	advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology › By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support	but an improvement of 3.2% is required by 2030.	*One World, One Future* *The Global Island* *Economic Recovery Plan* *Project Ireland 2040: National Planning Framework* *Project 2040: National Development Plan 2021-2030*
SDG 12 Responsible Consumption and production: *Ensure sustainable consumption and production patterns*	Unsustainable patterns of consumption and production are the root cause of triple planetary crisis: 1) Climate Change 2) Biodiversity Loss 3) Pollution By 2030, achieve the sustainable management and efficient use of natural resources. Promote public procurement practices that are sustainable, in accordance with national policies and priorities.	Reliance on natural resources increasing; rising over 65% globally from 2000 to 2019.	*Waste Action Plan for a Circular Economy*
SDG 13 Climate Action: *Take urgent action to combat climate*	› Strengthen resilience and adaptive capacity to climate-related hazards and natural	As of March 2020, 189 parties had ratified the Paris Agreement. Parties to the Paris Agreement are expected to prepare,	*National Adaptation Framework* *Building on Recovery: Infrastructure and*

SDG	Targets	International Progress/ downfalls to Date (2022)	National Relevant Policy
*change and its impacts** **Acknowledging that the United Nations Framework Convention on Climate Change is the primary international, intergovernmental forum for negotiating the global response to climate change.*	disasters in all countries › Integrate climate change measures into national policies, strategies and planning › Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilising jointly $100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible	communicate and maintain successive nationally determined contributions, and 186 parties had communicated their first nationally determined contributions to the secretariat of the United Nations Framework Convention on Climate Change, while three parties had communicated its second. Under the Agreement, all parties are required to submit new nationally determined contributions, containing revised and much more ambitious targets, by 2020. Climate finance falls short of $100 billion yearly commitment. Developed countries provided $79.6 billion in climate finance in 2019. Energy-related CO_2 emissions increased 6% in 2021, reaching highest level ever. In 2021, the global mean temperature was about 1.11 ± 0.13 °C above pre-industrial level (from 1850 to 1900), making it one of the seven warmest years on record (2015-2021). In 2020, concentrations of global greenhouse gases reached new highs, and real-time data point to continued increases. In 2020, social and economic disruptions caused by COVID-19 lowered energy demand around the world. As a result, global carbon	*Capital Investment 2016-2021* *National Mitigation Plan* *National Biodiversity Action Plan 2017-2021* *National Policy Position on Climate Action and Low Carbon Development* *Project 2040: National Development Plan 2021-2030*

SDG	Targets	International Progress/ downfalls to Date (2022)	National Relevant Policy
		dioxide (CO_2) emissions declined by 5.2 per cent in 2020 – the equivalent of almost 2 billion metric tons, the largest decline ever and almost five times greater than the 2009 drop following the global financial crisis. But it was only a temporary reprieve. With the phasing out of COVID-related restrictions, demand for coal, oil and gas increased. Consequently, energy-related CO_2 emissions for 2021 rose by 6 per cent, reaching their highest level ever and completely wiping out the pandemic-related reduction seen in 2020. The Economic Co-Operation and Development (OECD)estimates that developed countries climate budget of $100 billion will not be met until 2023. While the $100 billion annual commitment is considered the bedrock of international climate finance, it is far below estimates put forth by the IPCC. The IPCC has estimated that $1.6 trillion to $3.8 trillion will be needed each year through 2050 for the world to transition to a low-carbon future and avoid warming exceeding 1.5 °C. As of December 2019, 81 countries are seeking support from the Green Climate Fund for national	

SDG	Targets	International Progress/ downfalls to Date (2022)	National Relevant Policy
		adaptation plans and other adaptation planning processes, with a combined value of $203.8 million.	

10.3.1.1.6 Climate Change Performance Index

Established in 2005, the Climate Change Performance Index (CCPI) is an independent monitoring tool which tracks countries climate protection performance. It assesses individual countries based on climate policies, energy usage per capita, renewable energy implementation and Greenhouse Gas Emissions (GHG) and ranks their performance in each category and overall. The 2023 CCPI was published in November 2022. While the CCPI 2023 indicated signs of potential reductions in global emissions, no country achieved its Paris Climate targets and therefore the first three places of the ranking system remain unoccupied.

Ireland, ranked 46th in 2022, has climbed 9 places to 37th for 2023, however still remains as a "low" performer in international performance. Ireland still remains at "very low" on the Greenhouse Gas Emissions ratings at 47th in the world and is one of the only two EU countries, along with Poland, to receive a "very low" performance rating. However, in the Renewable Energy rating table, Ireland is placed 23rd in the rankings in the "Medium" category.

10.3.1.1.7 Programme for Government

The Programme for Government was published in October 2020 and last updated April 2021. In relation to climate change the programme recognises that the next ten years are a critical period in addressing the climate crisis. It is an ambition of the programme to more than halve carbon emissions over the course of the decade (2020-2030). The programme notes that the government are committed to reducing greenhouse gas emissions by an average 7% per annum over the next decade in a push to achieve a net zero emissions by the year 2050. The programme also recognises the severity of the climate challenge as it clarifies that:

> *"Climate change is the single greatest threat facing humanity"*

10.3.1.1.8 Climate Action and Low Carbon Development (Amendment) Act 2021

The Climate Action and Low Carbon (Amendment) Act 2021 is a piece of legislation which commits the country to move to a climate resilient and climate neutral economy by 2050. This was passed into law in July 2021.

The Programme for Government has committed to a 7% average yearly reduction in overall greenhouse gas emissions over the next decade, and to achieve net zero emissions by 2050. This Act will manage the implementation of a suite of policies to assist in achieving this target.

The Act includes the following key elements, among others:

- Places on a statutory basis a 'national climate objective', which commits to pursue and achieve no later than 2050, the transition to a climate resilient, biodiversity-rich, environmentally sustainable and climate-neutral economy.
- Embeds the process of carbon budgeting into law, Government are required to adopt a series of economy-wide five-year carbon budgets, including sectoral targets for each relevant sector, on a rolling 15-year basis, starting in 2021.
- Actions for each sector will be detailed in the Climate Action Plan, updated annually.

- A National Long Term Climate Action Strategy will be prepared every five years.
- Government Ministers will be responsible for achieving the legally-binding targets for their own sectoral area with each Minister accounting for their performance towards sectoral targets and actions before an Oireachtas Committee each year.
- Strengthens the role of the Climate Change Advisory Council, tasking it with proposing carbon budgets to the Minister.

Provides that the first two five-year carbon budgets proposed by the Climate Change Advisory Council should equate to a total reduction of 51% emissions over the period to 2030, in line with the Programme for Government commitment.

10.3.1.1.9 Climate Change Advisory Council 2022

The Climate Change Advisory Council (CCAC) was established on 18th January 2016 under the Climate Action and Low Carbon Development Act 2015. The CCAC aims to provide independent evidence-based advice and recommendations on policy to support Ireland's Just Transition to a biodiversity-rich, environmentally sustainable, climate-neutral, and resilient society. This annual review assesses the progress of Ireland's national climate goals in 2021- the first year of the Carbon Budget 2021-2025 and its structure reflects the delineation of the Carbon Budget 2021-2030 into sectoral ceilings. The report highlights that there is a need for significant increase of existing and planned actions and to identify, quantify, resource, and implement further measures to ensure Irelands on track with its carbon budgets.

In July 2022, the government agreed to a target of 75% emission reductions by 2030, relative to 2018, for the electricity sector. The reports main 2030 target for the electricity sector is to increase renewable electricity to up to 80%, encompassing up to 8GW onshore wind capacity, at least 5GW offshore wind capacity and between 1.5 and 2.5 GW solar PV capacity supported by a range of actions.

10.3.1.1.10 Carbon Budgets

The first national carbon budget programme proposed by the Climate Change Advisory Council, approved by Government and adopted by both Houses of the Oireachtas in April 2022 comprises three successive 5-year carbon budgets. The total emissions allowed under each budget are shown in Table 10-9.

Table 10-9 Proposed Carbon Budgets of the Climate Change Advisory Council

	2021 – 2025 Carbon Budget 1	2026 – 2030 Carbon Budget 2	2031 – 2035 Provisional Carbon Budget 3
	All Gases		
Carbon Budget (Mt CO_2eq)	295	200	151
Annual Average Percentage Change in Emissions	-4.8%	-8.3%	-3.5%
The figures are consistent with emissions in 2018 of 68.3 Mt CO_2eq reducing to 33.5 Mt CO_2eq in 2030 thus allowing compliance with the 51% emissions reduction target by 2030			

10.3.1.1.11 Sectoral Emissions Ceilings

The Sectoral Emissions Ceilings were launched in September 2022. The objective of the initiative is to inform on the total amount of permitted greenhouse gas emissions that each sector of the Irish economy

can produce during a specific time period. The Sectoral Emissions Ceilings alongside the annual published Climate Action Plan provide a detailed plan for taking decisive action to achieve a 51% reduction in overall greenhouse gas emissions by 2030.

Section C of the Climate Action and Low Carbon Development (Amendment) Act 2021 provides the minister with a method of preparing the Sectoral Emissions Ceiling within the bounds of the carbon budget. The Sectoral Emission Ceilings for each 5-year carbon budget period was approved by the government on the 28th July 2022 and are shown in Table 10-10 below.

Table 10-10 Sectoral Emission Ceilings 2022

	Sectoral Emission Ceilings for each 5-year carbon budget period (MtCO2eq.)	
Sector	2021 – 2025 Carbon Budget 1	2026 – 2030 Carbon Budget 2
Electricity	40	20
Transport	54	37
Built Environment-Residential	29	23
Built Environment-Commercial	7	5
Industry	30	24
Agriculture	106	96
LULUCF[1]	Yet to be determined	Yet to be determined
Other (F-Gases, Waste & Petroleum refining)	9	8
Unallocated Savings		*-26*
Total[2]	Yet to be determined	Yet to be determined
Legally binding Carbon budgets and 2030 Emission Reduction Targets	295	200

[1] Finalising the Sectoral Emissions Ceiling for the land-use, Land-use Change and Forestry (LULUCF) sector has been deferred for up to 18 months to allow for the completion of the Land-use Strategy
[2] Once LULUCF sector figures are finalised, total figures will be available.

10.3.1.1.12 Climate Action Plan 2023

The Climate Action Plan 2023 (CAP 2023) was launched in December 2022. Following on from Climate Action Plans 2019 and 2021, CAP 2023 sets out the roadmap to deliver on Ireland's climate ambition. It aligns with the legally binding economy-wide carbon budgets and sectoral ceilings that were agreed by Government in July 2022 following the Climate Action and Low Carbon Development (Amendment) Act 2021, which commits Ireland to a *legally binding target of net-zero greenhouse gas emissions no later than 2050, and a reduction of 51% by 2030.* CAP 2023 sets out indicative ranges of emissions reductions for each sector of the economy.

There have been Six Vital High Impact Sectors identified within CAP 2023 and these are as follows:

Powering Renewables – 75% Reduction in emissions by 2030

We will facilitate a large-scale deployment of renewables that will be critical to decarbonising the power sector as well as enabling the electrification of other technologies.

- *Accelerate the delivery of onshore wind, offshore wind, and solar.*
- *Dial up to 9 GW onshore wind, 8 GW solar, and at least 7 GW of offshore wind by 2030 (with 2 GW earmarked for green hydrogen production).*
- *Support at least 500 MW of local community-based renewable energy projects and increased levels of new micro-generation and small-scale generation.*
- *Phase out and end the use of coal and peat in electricity generation.*
- *New, dynamic Green Electricity Tariff will be developed by 2025 to incentivise people to use lower cost renewable electricity at times of high wind and solar generation.*

Building Better – 45% (Commercial/Public) and 40% (Residential) Reduction in Emissions by 2030

We will increase the energy efficiency of existing buildings, put in place policies to deliver zero-emissions new builds and continue to ramp up our retrofitting programme.

- *Ramp up retrofitting to 120,000 dwellings to BER B2 by 2025, jumping to 500,000 by 2030.*
- *Put heat pumps into 45,000 existing and 170,000 new dwellings by 2025, up to 400,000 existing and 280,000 new dwellings by 2030.*
- *Generation up to 0.8 TWh of district heating by 2025 and up to 2.5 TWh by 2030.*

Turning Transport Around – 50% Reduction in Emissions by 2030

We will drive policies to reduce transport emissions by improving our town, cities and rural planning, and by adopting the Avoid-Shift-Improve approach: reducing or avoiding the need for travel, shifting to public transport, walking and cycling and improving the energy efficiency of vehicles.

- *Change the way we use our road space.*
- *Reduce the total distance driven across all car journeys by 20%.*
- *Walking, cycling and public transport to account for 50% of our journeys.*
- *Nearly 1 in 3 private cars will be an Electric Vehicle.*
- *Increase walking and cycling networks.*
- *70% of people in rural Ireland will have buses that provide at least 3 trips to the nearby town daily by 2030.*

Making Family Farms More Sustainable – 25% Reduction in Emissions by 2030

We will support farmers to continue to produce world class, safe and nutritious food while also seeking to diversify income through tillage, energy generation and forestry.

- *Significantly reduce our use of chemical nitrogen as a fertilizer.*
- *Increase uptake of protected urea on grassland farms to 90-100%.*
- *Increase organic farming to up to 450,000 hectares, the area of tillage to up to 400,000 ha.*
- *Expand the indigenous biomethane sector through anaerobic digestion, reaching up to 5.7TWh of biomethane.*
- *Contribute to delivery of the land use targets for afforestation and reduced management intensity of organic soils.*

Greening Business and Enterprise – 35% Reduction in Emissions by 2030

We're changing how we produce, consume, and design our goods and services by breaking the link between fossil fuels and economic progress. Decarbonising industry and enterprise is key to Ireland's economy and future competitiveness.

- *Reduce clinker content in cement and substitute products with lower carbon content for construction materials, ensuring 35% reduction in emissions by 2030 (against 2018).*
- *Reduce fossil fuel use from 64% of final consumption (2021) to 45% by 2025 and further by 2030.*
- *Increase total share of heating to carbon neutral to 50-55% by 2025, up to 70-75% by 2030.*
- *Significantly grow the circular economy and bioeconomy.*

Changing Our Land-Use - Exact reduction target for this sector is yet to be determined.

The first phase of the land use review will tell us how we are using our land now. Then, we can map, with evidence, how it can be used most effectively to capture and store carbon and to produce better, greener food and energy.

- *Increase our annual afforestation rates to 8,000 hectares per annum from 2023 onwards.*
- *Rethink our Forestry Programme and Vision.*
- *Promote forest management initiatives in both public and private forests to increase carbon sinks and stores.*
- *Improve carbon sequestration of 450,000 ha of grasslands on mineral soils and reduce the management intensity of grasslands on 80,000 ha of drained organic soils.*
- *Rehabilitate 77,600 hectares of peatlands.*

10.3.1.1.13 Emissions Projections

In its approach to decarbonising, the EU has split greenhouse gas (GHG) emissions into two categories, the Emissions Trading System (ETS) and the non-ETS. Emissions from electricity generation and large industry in the ETS are subject to EU-wide targets which require that emissions from these sectors be reduced by 43% by 2030, relative to 2005 levels. Within the ETS, participants are required to purchase allowances for every tonne of emissions, with the amount of these allowances declining over time to ensure the required reduction of 43% in GHG emissions is achieved at EU-level[1].

Emissions from all other sectors, including agriculture, transport, buildings, and light industry are covered by the EU Effort Sharing Regulation (ERS[2]). This established binding annual GHG emission targets for Member States for the period 2021–2030. Ireland is required to reduce its emissions from these sectors by 30% by 2030, relative to 2005 levels. Under the EU Green Deal, the targets for the ETS and non-ETS sectors will be revised upwards in order to achieve the commitment, at EU level, to reach an economy-wide 2030 reduction in emissions of at least 55%, compared to 1990 levels[1].

The Environmental Protection Agency (EPA) publish Ireland's Greenhouse Gas Emission Projections and at the time of writing, the most recent report, *'Ireland's Greenhouse Gas Emissions Projections 2021–2040'* was published in June 2022. The report includes an assessment of Ireland's progress

[1] *Government of Ireland (2023) - Climate Action Plan 2023 https://www.gov.ie/en/publication/7bd8c-climate-action-plan-2023/*
[2] *Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013 (Text with EEA relevance)*

towards achieving its emission reduction targets out to 2030 set under the Effort Sharing Regulation (ESR).

The EPA has produced two scenarios in preparing these greenhouse gas emissions projections: a "With Existing Measures" (WEM) scenario and a "With Additional Measures" (WAM) scenario. These scenarios forecast Irelands greenhouse gas emissions in different ways. The WEM scenario assumes that no additional policies and measures, beyond those already in place by the end of 2020. This is the cut off point for which the latest national greenhouse gas emission inventory data is available, known as the 'base year' for projections. The WAM scenario has a higher level of ambition and includes government policies and measures to reduce emissions such as those in Ireland's Climate Action Plan 2021.

The EPA Emission Projections Update notes the following key trends:

- *Under the With Existing Measures scenario, the projections indicate that Ireland will cumulatively exceed its ESR emissions allocation of 384.3 Mt CO_2 eq by 78.3 Mt CO_2 eq over the 2021-2030 period without the use of flexibilities. If both the LULUCF and ETS flexibilities are used the exceedance will reduce to 52.3 Mt CO2 eq.*
- *Under the With Additional Measures scenario, the projections indicate that Ireland will cumulatively exceed the ESR emissions allocation by 24.2 Mt CO_2 eq over the 2021-2030 period.*
- *The projections show that Ireland can achieve compliance under the ESR (in the With Additional Measures scenario) – using both flexibilities but only with implementation of the Climate Action Plan 2021. Using both flexibilities gives a surplus under the ESR of only 1.6 Mt CO_2 eq, this is a small amount of headroom and only highlights the need for full and rapid implementation of policies and measures in the Climate Action Plan 2021.* (now Climate Action Plan 2023)

10.3.2 Climate and Weather in the Existing Environment

Ireland has a temperate, oceanic climate, resulting in mild winters and cool summers. The Met Éireann weather station at Mullingar which is located approximately 22.7 kilometres to the north-east of the site, is the nearest weather and climate monitoring station to the Proposed Development site that has meteorological data recorded for the 30-year period from 1981-2010 with the exception of 2007/2008 during which time the station was closed. Meteorological data recorded at Mullingar over the 30-year period from 1981 - 2010 is shown in Table 10-11 below. The wettest months are October and December, with April and July being the driest the driest. July is the warmest month with an average temperature of 15.2° Celsius.

Table 10-11 Data from Met Éireann Weather Station at Mullingar, 1981 to 2010

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
TEMPERATURE (degrees Celsius)													
Mean daily max	7.4	7.9	9.8	12.1	14.9	17.3	19.2	18.9	16.7	13.2	9.9	7.9	12.9
Mean daily min	1.5	1.5	2.8	4.1	6.3	9.2	11.1	10.8	8.9	6.2	3.5	2.2	5.7
Mean temperature	4.5	4.7	6.3	8.1	10.6	13.2	15.2	14.8	12.8	9.7	6.7	5.0	9.3
Absolute max.	13.8	15.4	19.1	21.6	25.0	28.3	29.7	29.1	25.0	20.1	17.3	14.6	29.7
Absolute Min.	-14.9	-6.6	-8.0	-4.4	-2.6	0.2	3.8	2.1	0.0	-4.4	-6.9	-12.4	-14.9
Mean No. of Days with Air Frost	9.9	8.9	5.5	3.1	0.4	0.0	0.0	0.0	0.0	1.5	5.4	8.2	43.0
Mean No. of Days with Ground Frost	17.9	16.2	14.0	10.8	5.1	0.8	0.0	0.1	1.7	6.3	12.1	15.4	100.4
RELATIVE HUMIDITY (%)													
Mean at 0900UTC	90.8	89.8	87.6	81.9	78.3	79.7	82.1	84.8	87.6	89.9	91.7	91.8	86.3
Mean at 1500UTC	83.4	77.8	72.8	68.1	67.1	69.1	69.9	70.6	72.1	77.0	82.2	85.9	74.7
SUNSHINE (Hours)													
Mean daily duration	1.8	2.5	3.2	4.9	5.8	5.0	4.6	4.6	3.9	3.2	2.2	1.6	3.6
Greatest daily duration	8.2	9.9	10.9	13.6	15.4	15.9	15.3	14.4	12.2	10.1	8.6	7.3	15.9
Mean no. of days with no sun	10.3	7.2	5.3	2.9	1.9	2.2	1.8	1.9	3.3	5.7	8.4	11.0	62.0
RAINFALL (mm)													
Mean monthly total	91.7	72.0	78.3	62.1	68.7	70.5	61.8	80.8	73.8	102.1	82.4	97.1	941.3
Greatest daily total	30.3	24.7	29.5	27.6	26.1	52.9	26.6	58.2	42.1	48.8	43.7	38.8	58.2

Mean num. of days with >= 0.2mm	19	17	20	15	16	16	16	17	17	19	18	19	209
Mean num. of days with >= 1.0mm	15	13	15	11	12	11	11	13	12	14	13	14	154
Mean num. of days with >= 5.0mm	6	5	5	4	5	4	3	5	4	6	6	7	60
WIND (knots)													
Mean monthly speed	9.0	9.1	9.1	7.7	7.3	6.7	6.4	6.3	6.7	7.5	7.8	8.3	7.6
Max. gust	67	71	59	56	58	48	48	50	51	59	62	73	58.5
Max. mean 10-minute speed	38	36	36	30	34	26	27	28	32	36	32	39	32.8
Mean num. of days with gales	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.8
WEATHER (Mean No. of Days With:)													
Snow or sleet	5.0	4.4	3.5	1.6	0.2	0.0	0.0	0.0	0.0	0.0	0.4	2.7	17.8
Snow lying at 0900UTC	2.7	0.9	0.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.0	5.7
Hail	0.6	0.9	2.0	2.0	1.1	0.2	0.1	0.1	0.1	0.5	0.2	0.3	8.1
Thunder	0.1	0.2	0.2	0.3	0.9	0.9	1.2	0.8	0.1	0.1	0.1	0.1	4.9
Fog	3.4	3.0	2.4	2.0	1.8	1.3	1.9	2.9	4.0	4.1	4.1	4.3	35.1

10.3.3 Calculating Carbon Losses and Savings from the Proposed Development

10.3.3.1 Background

In addition to the combustion of fossil fuels, greenhouse gases are also released through natural processes such as the decomposition of organic material (which is composed of carbon). Bogs and peatlands are known to store large amounts of carbon. There is no peat present within the development footprint at the Wind Farm Site.

As detailed in Section 8.3.3.1 in Chapter 8 of this EIAR: Land, Soils and Geology, a majority of the Wind Farm Site is underlain by till derived from limestone with localised pockets of lacustrine sediments. While there is fen peat identified on published soils and subsoils mapped within the Wind Farm Site, following site visits, this was not confirmed during hand augering and sandy free draining subsoil was identified in these locations. For this reason, the carbon balance between the use of a renewable energy and the loss of carbon stored in the peat is not assessed in this section of the EIAR. Carbon dioxide is released in the manufacture and transportation of turbines to the Wind Farm Site, and therefore a carbon loss/saving calculation for the Proposed Development has been undertaken.

10.3.3.2 Methodology for Calculating Losses

A methodology was published in June 2008 by scientists at the University of Aberdeen and the Macauley Institute with support from the Rural and Environment Research and Analysis Directorate of the Scottish Government, Science Policy and Co-ordination Division. The document, '*Calculating Carbon Savings from Wind Farms on Scottish Peat Lands*', was developed to calculate the impact of wind farm developments on the soil carbon stocks held in peat. This methodology was refined and updated in 2011 based on feedback from users of the initial methodology and further research in the area. The web-based version of the carbon calculator, which supersedes the excel based versions of the tool, was released in 2016. The tool provides a transparent and easy to follow method for estimating the impacts of wind farms on the carbon dynamics of peatlands. Previously guidance produced by Scottish Natural Heritage in 2003 had been widely employed to determine carbon payback in the absence of any more detailed methods.

Given the absence of peat underlying the Wind Farm Site, the Proposed Development will not give rise to any impact on peat habitat. The Macauley Institute methodology states that the total volume of peat impacted by the construction of a wind farm is strongly correlated to the extent of the peatland affected by drainage at a site. Therefore, in calculating the carbon loss/saving of the Proposed Development, all potential carbon losses associated with constructing a wind farm on peatland environments were discounted, but the carbon losses as a result of the manufacture, transportation and erection of the proposed turbines was included in the calculation, including as a result of the removal of vegetation.

Clear felling of existing forestry surrounding turbine locations may often be necessary to avoid reductions in the wind energy yield of the renewable energy proposal and to protect local bat populations. Forestry may be felled earlier than originally planned due to the Proposed Development, so limiting the nature and longevity of the resulting timber produced. If a forestry plantation was due to be felled with no plan to replant, the effect of the land use change is not attributable to the Proposed Development and is omitted from the calculation. If, however, the forestry is felled for the Proposed Development, the effects are judged to be attributable to the Proposed Development. Carbon losses as a result of felling are calculated from the area to be felled, the average carbon sequestered annually, and the lifetime of the Proposed Development. Alterations in soil carbon levels following felling are calculated using the equations for drainage and site restoration already described.

10.3.3.3 Calculating Carbon Losses and Savings

10.3.3.3.1 *Carbon Losses*

The Scottish Government online carbon calculator was used to assess the impacts of the Proposed Development in terms of potential carbon losses and savings taking into account drainage, habitat improvement, forestry felling and site restoration.

A copy of the outputs is provided as Appendix 10-1 of this EIAR. Where available and relevant, site-specific information was inserted into the online carbon calculator. Otherwise, default values were used.

The online calculator is pre-loaded with information specific to the CO_2 emissions from the United Kingdom's electricity generation plant, which is used to calculate emissions savings from proposed wind farm projects in the UK. Similar data to that used in the worksheet to calculate the CO_2 emissions from the UK electricity generation plant, was not allowable for input for the Irish electricity generation plant, and so the CO_2 emissions savings from the Proposed Development have been calculated separately from the worksheet as set out in Section 10.3.3.3.2 below.

The main CO_2 losses due to the Proposed Development are summarised in Table 10-10.

Table 10-12 CO_2 Losses from the Proposed Development

Origin of Losses	CO_2 Losses (tonnes CO_2 equivalent)	
	Expected	Maximum
Losses due to turbine life (e.g. manufacture, construction, decommissioning)	49,066	49,193
Losses due to backup	31,675	31,675
Losses due to reduced carbon fixing potential	1,187	2,096
Losses associated to forestry felling	2,534	2,646
Total	84,462	85,610

The worksheet model calculates that the Proposed Development will give rise to 84,462 tonnes of CO_2 equivalent losses over its 30-year life. Of this total figure, the proposed wind turbines directly account for 49,066 tonnes, or 58.1%. Losses due to backup account for 31,675 tonnes, or 38%. Losses from soil reduced carbon fixing potential accounts for 1.4% or 1,187 tonnes. Losses due to forestry felling account for 2,534 tonnes or 2.8%.

The figure of 1,187 tonnes of CO_2 arising from ground activities associated with the Proposed Development is calculated based on the entire development footprint being "Acid Bog", as this is one of only two choices the model allows (the other being Fen). The habitat that will be impacted by the Proposed Development footprint is predominantly comprised of improved agricultural grassland and a small area of forestry which is underlain by till derived from limestone. Given the absence of peat underlying the Wind Farm Site, the Proposed Development will not give rise to any impact on peat habitat. The model assumes that the habitat present is acid bog and as such, presents the 1,187 tonnes CO_2 value above. Therefore, the actual CO_2 losses are expected to be lower than this value.

The values discussed above are based on the assumption that the hydrology of the Wind Farm Site and habitats within the Wind Farm Site are restored on decommissioning of the Proposed Development after its expected 30-year useful life. Using the precautionary principle, the model was also used to calculate the CO_2 losses from the Proposed Development if the hydrology and habitats of the site were not to be restored, as may be the case if the turbines were replaced with newer models, rather than decommissioned entirely and taking account of any future site restoration activities. Following the precautionary principle, this would increase the expected carbon losses by an additional 1,148 tonnes, or 1.4% to 85,610 tonnes. Any failure to restore the Wind Farm Site habitats or hydrology for the reasons outlined above would be further offset by the carbon-neutral renewable energy that the new turbines would generate.

10.3.3.3.2 Carbon Savings

According to the model described above, the Proposed Development will give rise to total losses of 84,462 tonnes of carbon dioxide.

A simple formula can be used to calculate carbon dioxide emissions reductions resulting from the generation of electricity from wind power rather than from carbon-based fuels such as peat, coal, gas and oil. The formula is:

$$CO_2 \text{ (in tonnes)} = \frac{(A \times B \times C \times D)}{1000}$$

where: A = ... The rated capacity of the wind energy development in MW

B = ... The capacity or load factor, which takes into account the intermittent nature of the wind, the availability of wind turbines and array losses etc.

C = ... The number of hours in a year

D = ... Carbon load in grams per kWh (kilowatt hour) of electricity generated and distributed via the national grid.

For the purposes of this calculation, the rated capacity of the Proposed Development is assumed to be 55.8 MW (based on 9 No. 6.2 MW turbines).

A load factor of 0.35 (or 35%) has been used for the Proposed Development.

The number of hours in a year is 8,760.

The most recent data for the carbon load of electricity generated in Ireland is for 2021, and was published in Sustainable Energy Authority Ireland's (SEAI) December 2022 report, '*Energy in Ireland 2022*'. The emission factor for electricity in Ireland in 2021 was 347.8 g CO_2/kWh.

The calculation for carbon savings is therefore as follows:

$$CO_2 \text{ (in tonnes)} = \frac{(55.8x\ 0.35 \times 8{,}760 \times 347.8)}{1000}$$

$$= 59{,}503 \text{ tonnes per annum}$$

Based on this calculation, 59,503 tonnes of carbon dioxide will be displaced per annum from the largely carbon-based traditional energy mix by the Proposed Development. Over the proposed thirty-year lifetime of the development, therefore, 1,785,090 tonnes of carbon dioxide will be displaced from traditional carbon-based electricity generation.

Based on the Scottish Government carbon calculator as presented above in Section 10.3.3.2, 84,462 tonnes of CO_2 will be lost to the atmosphere due to changes in the soil and ground conditions and due to the construction and operation of the Proposed Development. This represents 4.7% of the total amount of carbon dioxide emissions that will be offset by the Proposed Development. The 84,462 tonnes of CO_2 that will be lost to the atmosphere due to changes in soil and ground conditions and due to the construction and operation of the Proposed Development will be offset by the Proposed Development in approximately 17 months of operation.

10.3.4 Likely Significant Effects and Associated Mitigation Measures

10.3.4.1 'Do-Nothing' Effect

If the Proposed Development were not to proceed, the opportunity to further significantly reduce emissions of greenhouse gas emissions, including carbon dioxide (CO_2), oxides of nitrogen (NO_x), and sulphur dioxide (SO_2) from fossil fuels to the atmosphere would be lost. The opportunity to contribute to Ireland's commitments under the Kyoto Protocol and EU law would also be lost. This would be a long-term slight negative effect.

10.3.4.2 Construction Phase

10.3.4.2.1 *Greenhouse Gas Emissions*

1. Wind Farm Site (Turbines and associated foundations and hard-standing areas, Meteorological Mast, Junction Accommodation Works, Access Roads, Temporary Construction Compound, Underground Cabling, Spoil Management, Site Drainage, Tree Felling, and all ancillary works and apparatus)

The construction of turbines, site roads and other onsite infrastructure (as outlined in Chapter 4 of this EIAR) will require construction materials (such as cement), and the operation of construction vehicles and plant on the Wind Farm Site. Greenhouse gas emissions, e.g. carbon dioxide (CO_2), carbon monoxide and nitrogen oxides associated with production of construction materials, and operation of vehicles and plant will arise as a result of the construction activities. This potential impact will be short-term and slight only, given the insignificant quantity of greenhouse gases that will be emitted to the atmosphere, and will be restricted to the duration of the construction phase. Mitigation measures to reduce this impact are presented below.

2. Grid Connection (Onsite Substation, Temporary Construction Compound and Underground Electrical Cabling Route)

The construction of the onsite substation and temporary construction compound (as outlined in Chapter 4 of this EIAR) will require construction materials (such as cement), and the operation of construction vehicles and plant on the Wind Farm Site. The construction of the underground electrical cabling route will also require the use of construction materials and construction machinery, thereby giving rise to emissions. This potential impact will be short-term and slight only, given the insignificant quantity of greenhouse gases that will be emitted, and will be restricted to the duration of the construction phase. Mitigation measures to reduce this impact are presented below.

3. Transport to Site

The transport of turbines and construction materials to the site, which will occur on specified routes only (see Section 4.4 in Chapter 4 of this EIAR), will also give rise to greenhouse gas emissions associated with the transport vehicles and exhaust emissions. This potential impact will be short-term and slight only, given the insignificant quantity of greenhouse gases that will be emitted, and will be

restricted to the duration of the construction phase. Mitigation measures to reduce this impact are presented below.

Mitigation

- All construction vehicles and plant will be maintained in good operational order while onsite, thereby minimising any emissions that arise.
- Turbines and construction materials will be transported to the Site on specified routes only unless otherwise agreed with the Planning Authority.
- The majority of aggregate materials for the construction of the Proposed Development will be obtained from the local quarries. This will significantly reduce the number of delivery vehicles accessing the site and the length of such journeys, thereby reducing the amount of emissions associated with vehicle movements.
- Where applicable, low carbon intensive construction materials will be sourced and utilised onsite.

Residual Effects

Following implementation of the mitigation measures above, residual impacts of greenhouse gas emissions arising from the construction phase of the Proposed Development will have a short-term imperceptible negative effect.

However, once emitted to the atmosphere, the greenhouse gas emissions that will arise from construction phase activities will have a permanent imperceptible negative effect on Climate.

When considering these greenhouse gas emissions within the context of the national Electricity Sector Emissions Ceilings detailed in Section 10.3.1.1.11, Carbon Budget 1 (2021-2025) has an Electricity Sector budget of 40 MtCO2eq. and Carbon Budget 2 (2026-2030) has an Electricity Sector budget of 20 MtCO2eq for large-scale deployment of renewables. As detailed in Section 10.3.3.3.2, the Proposed Development will displace carbon dioxide from fossil fuel-based electricity generation, over the proposed 30-year lifespan of the Proposed Development. Therefore, while there will be greenhouse gas emissions associated with the construction of the Proposed Development, this will take place under the Electricity sector emissions ceiling and will be offset by the operation of the Proposed Development within its operational life.

Significance of Effects

Based on the assessment above there will be no significant effects.

10.3.4.3 Operational Phase

10.3.4.3.1 *Greenhouse Gas Emissions*

The Proposed Development will generate energy from a renewable source. This energy generated will offset energy and the associated emission of greenhouse gases from electricity-generating stations dependent on fossil fuels, thereby having a positive effect on climate. As detailed in Section 10.3.3.3.2 above, the Proposed Development will displace carbon dioxide from fossil fuel-based electricity generation, over the proposed 30-year lifespan of the Proposed Development. The Proposed Development will assist in reducing carbon dioxide (CO_2) emissions that would otherwise arise if the same energy that the Proposed Development will generate were otherwise to be generated by conventional fossil fuel plants. This is a long-term significant positive effect on climate.

Some potential long-term slight negative impacts that may occur during the operational phase of the Proposed Development are the release of small amounts of carbon dioxide to the atmosphere due to

the potential alteration to the drainage of the site and the removal of carbon fixing vegetation. These impacts will be slight and will be nullified by the quantity of carbon dioxide that will be displaced by the Proposed Development and by the design and layout of the Proposed Development which has ensured the utilisation of as much of the existing roads within the Wind Farm Site as possible to gain access to the proposed turbine locations and minimise the construction of additional roads.

Residual Effect

Long-term Moderate Positive Effect on Climate as a result of reduced greenhouse gas emissions. For the purposes of this EIAR, a rated output of 6.2 MW has been chosen (a mid-range capacity) to calculate the power output of the proposed 9-turbine renewable energy development, which would result in an estimated installed capacity of 55.8 MW. Whilst there are potentially higher rated turbines, the residual effect will not be altered.

Significance of Effects

Based on the assessment above there will be no significant effects.

10.3.4.4 Decommissioning Phase

The wind turbines proposed as part of the Proposed Development are expected to have a lifespan of approximately 30 years. Following the end of their useful life, the wind turbines may be replaced with a new set of turbines, subject to planning permission being obtained, or the site may be decommissioned fully. The substation will remain in place as it will be under the ownership of EirGrid.

The works required during the decommissioning phase are described in Section 4.9 in Chapter 4: Description of the Proposed Development. Any impact and consequential effect that occurs during the decommissioning phase are similar to that which occur during the construction phase, be it of less impact. The mitigation measures prescribed for the construction phase of the Proposed Development will be implemented during the decommissioning phase thereby minimising any potential impacts.

A Decommissioning Plan is included as Appendix 4-6 of this EIAR, the detail of which will be agreed with the local authority prior to any decommissioning. The potential for effects during the decommissioning phase of the Proposed Development has been fully assessed in the EIAR.

10.4 Cumulative Assessment

Potential cumulative effects on air quality and climate between the Proposed Development and other permitted or proposed projects and plans in the area, (wind energy or otherwise), as set out in Section 2.7 in Chapter 2 of this EIAR, were also considered as part of this assessment. The developments considered as part of the cumulative effect assessment are described in Section 2.7 of this EIAR.

The nature of the Proposed Development is such that, once operational, it will have a long-term, moderate, positive impact on the air quality and climate.

During the construction phase of the Proposed Development and other permitted or proposed projects and plans in the area as set out in Section 2.7 in Chapter 2 of this EIAR, that are yet to be constructed, there will be minor emissions from construction plant and machinery and potential dust emissions associated with the construction activities. However, once the mitigation proposals, as outlined in Section 10.2.3 are implemented during the construction phase of the Proposed Development, there will be no cumulative negative effect on air quality. .

During the construction phase of the Proposed Development and other permitted or proposed projects and plans in the area as set out in Section 2.7 in Chapter 2 of this EIAR, that are yet to be constructed,

there will be greenhouse gas emissions arising from production of construction materials (such as cement), and the operation of construction vehicles and plant. These will be restricted to the duration of the construction phase, and as such will give rise to emission over a short-term duration. However, once emitted to the atmosphere, the greenhouse gas emissions that will arise from construction phase activities will have a permanent imperceptible negative effect on Climate.

When considering these greenhouse gas emissions within the context of the Electricity Sector Emissions Ceilings detailed in Section 10.3.1.1.11, Carbon Budget 1 (2021-2025) has an Electricity Sector budget of 40 MtCO2eq. and Carbon Budget 2 (2026-2030) has an Electricity Sector budget of 20 MtCO2eq for large-scale deployment of renewables. As detailed in Section 10.3.3.3.2, the Proposed Development will displace carbon dioxide from fossil fuel-based electricity generation, over the proposed 30-year lifespan of the Proposed Development. Therefore, while there will be greenhouse gas emissions associated with the construction of the Proposed Development, this will take place under the Electricity sector emissions ceiling and will be offset by the operation of the Proposed Development within its operational life. Thus, there will be no cumulative effects arising on climate from the Proposed Development and other permitted or proposed projects and plans in the area as set out in Section 2.7 in Chapter 2 of this EIAR,

There will be no net carbon dioxide (CO_2) emissions from operation of the Proposed Development. Exhaust emissions of carbon dioxide (CO_2), oxides of nitrogen (NO_x), sulphur dioxide (SO_2) or dust emissions during the operational phase of the Proposed Development will be minimal, relating to the use of operation and maintenance vehicles onsite, and therefore there will be no measurable negative cumulative effect with other developments on air quality and climate.

.