10 AIR QUALITY AND CLIMATE

10.1 INTRODUCTION

This Chapter identifies, describes and assesses the likely direct and indirect significant effects of the Proposed Development (**Figure 1.2**) on air and on climate in **Section 10.2** and **Section 10.3** respectively. The Proposed Development refers to all elements of the application for the construction of Tirawley Wind Farm (**Chapter 2: Development Description**). Where negative effects are predicted, the chapter identifies appropriate mitigation strategies therein. The assessment considers the potential effects during the following phases of the Proposed Development:

- Construction of the Proposed Development
- Operation of the Proposed Development
- Decommissioning of the Proposed Development

Common acronyms used throughout this EIAR can be found in **Appendix 1.4.** This Chapter of the EIAR is supported by Figures provided in **Volume III** and by the following Appendix documents provided in Volume IV of this EIAR:

Appendix 10.1 Scottish Government – Carbon Calculator Input and Output Data

10.1.1 Statement of Authority

This chapter has been prepared by Jennings O'Donovan & Partners Limited (JOD). It was prepared by Angelika Thiel with the assistance of Darren Timlin of JOD.

This section has been prepared by Ms. Angelika Thiel with the assistance of Mr. Darren Timlin of JOD. Ms. Angelika Thiel has a Bachelor's degree in Geography from the Leibniz University of Hannover, Germany. She has worked in environmental consultancy for over 2 years, and her key capabilities are in report writing, field work and assisting with project management and GIS.

Mr. Darren Timlin is a Graduate Environmental Scientist and holds a Bachelor (Hons.) Degree in Environmental Science from the Atlantic Technological University. Darren has 3 years' experience drafting EIAR's and Screening Reports, Appropriate Assessments for Wind Farms, Hydrogen Plants and Power Generation Plants. He forms part of the Environmental team responsible for preparing the EIAR Chapters. Darren has experience drafting EIAR's and Screening Reports, Appropriate Assessments for Wind Farms, Hydrogen Plants and Power Generation Plants. He has experience in the use of Arc GIS Pro and Auto CAD 2D.

This Chapter has been reviewed by Mr. David Kiely. Mr. Kiely has 43 years' experience in the civil engineering and environmental sector. He obtained a bachelor's degree in civil engineering and a Masters in Environmental Protection, has overseen the construction of over 50 wind farms and has carried out numerous soils and geology assessments for EIARs. He has been responsible for the overall preparation of in excess of 60 EIA Reports (EIARs).

10.1.2 Background and Objectives

Air quality in Ireland is generally of a high standard across the country and is amongst the best in Europe; however, levels of some pollutants remain of concern, with those produced by traffic approaching limit values in urban areas. The combustion of fossil fuels for energy results in the release of several gases which contribute to poor air quality, climate change and acid rain, including carbon dioxide (CO_2), sulphur dioxide (SO_2), nitrogen oxides (NOx), and Particulate Matter (PM_{10} and $PM_{2.5}$).

This chapter assesses the following as per the EIA Directive:

- The air quality environment of the area of the Project and the potential effects on air quality during the construction, operation and decommissioning phases of the Project. This assessment includes mitigation measures, residual effects and cumulative impacts of the Project.

10.1.3 Relevant Legislation and Guidance

The assessment has been prepared in accordance with the relevant legislation and having regard to the relevant guidance listed below:

- The Ambient Air Quality and Cleaner air for Europe (recast) Directive 2024/2881[1].
- The Clean Air for Europe (CAFE) Directive[2], as amended by Commission Directive (EU) 2015/1480, as amended (the "CAFE Directive").
- The Ambient Air Quality Standard Regulations 2022[3] (S.I. No. 739/2022).
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports[4] – June 2022 (EPA, 2022).

[1] **European Parliament and Council,** (2024). *Directive (EU) 2024/2881 on ambient air quality and cleaner air for Europe*. Available at: https://eur-lex.europa.eu/eli/dir/2024/2881/oj/eng [Accessed: 13/04/2026].
[2] European Commission, (1996). Council Directive 96/62/EC on ambient air quality assessment and management. Available at: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=uriserv:l28026 [Accessed: 13/04/2026].
[3] Department of Environment, Climate and Communications 2022). S.I. No. 739/2022 - Ambient Air Quality Standards Regulations 2022. Available at: https://www.irishstatutebook.ie/eli/2022/si/739/made/en/print [Accessed: 13/04/2026].
[4] Environmental Protection Agency, (2022). Guidelines on the information to be contained in Environmental Impact Assessment Reports. Available at: https://www.epa.ie/publications/monitoring--assessment/assessment/guidelines-on-the-information-to-be-contained-in-environmental-impact-assessment-reports-eiar.php [Accessed: 13/04/2026].

- Environmental Protection Agency (2025) Air Quality in Ireland Report 2024[5].
- WHO global air quality guidelines[6] (2021) Particulate matter (PM2.5 and PM 10), ozone, nitrogen dioxide, sulphur dioxide and carbon monoxide.
- IAQM (2024) Guidance on the assessment of dust from demolition and construction[7], version 2.2.
- IAQM (2016) Guidance on the Assessment of Mineral Dust Impacts for Planning[8], Institute of Air Quality Management 2016.
- Government of Ireland (2023) Clean Air Strategy for Ireland[9].
- Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106[10] (TII, 2022a).
- Mayo County Council Climate Action Plan 2024-2029 https://www.mayo.ie/getmedia/dfab91e5-939b-41c7-883e-0cee6e359900/139306-Mayo-County-Council-Climate-Action-Plan_2024_V2_Final.pdf.
- Mayo County Development Plan 2022-2028 https://www.mayo.ie/planning/county-development-plans/2022-2028.
- Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106 (TII, 2022a).

10.1.4 Background to the Relevant Legislation and Guidance

The Ambient Air Quality and Clean Air for Europe (CAFE) Directive (Directive 2008/50/EC), as amended by Commission Directive (EU) 2015/1480 incorporates revised provisions for sulphur dioxide (SO_2), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM10 and PM2.5), benzene (C6H6) and carbon monoxide (CO). This replaced the Air Quality Framework Directive (96/62/EC) and first three Daughter Directives (1999/30/EC, 2000/69/EC, 2002/3/EC).

The Fourth Daughter Directive (2004/107/EC) will be incorporated into the CAFE Directive at a later date and stands alone as a separate EU Directive. The Fourth Daughter Directive (2004/107/EC) relates to arsenic (As), cadmium (Cd), nickel (Ni), and mercury (Hg) and

[5] Environmental Protection Agency, (2025). Air Quality in Ireland 2024. Available at: https://www.epa.ie/publications/monitoring--assessment/air/air-quality-in-ireland-2024.php [Accessed 26th February 2026].
[6] World Health Organization, (2021). WHO global air quality guidelines: PM2.5, PM10, ozone, NO_2, SO_2 and CO. Available at: https://www.who.int/publications/i/item/9789240034228 [Accessed: 13/04/2026].
[7] Institute of Air Quality Management, (2024). Guidance on the assessment of dust from demolition and construction. Available at: https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-Dust-Guidance-Jan-2024.pdf [Accessed: 13/04/2026].
[8] Institute of Air Quality Management, (2016). Guidance on the assessment of mineral dust impacts for planning. Available at: https://iaqm.co.uk/text/guidance/mineralsguidance_2016.pdf [Accessed: 13/04/2026].
[9] Department of Climate, Energy and the Environment, (2023). Clean Air Strategy for Ireland. Available at: https://assets.gov.ie/static/documents/clean-air-strategy.pdf [Accessed: 13/04/2026].
[10] Transport Infrastructure Ireland, (2025). TII Publications Document ID 3217. Available at: https://www.tiipublications.ie/document/?id=3217 [Accessed: 13/04/2026].

polycyclic aromatic hydrocarbons (PAH) in ambient air and has been transposed into Irish legislation by the 'Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations 2009 (S.I. No. 58 of 2009)'.

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).

The Clean Air for Europe (CAFE) Directive (Directive 2008/50/EC on ambient air quality), (as amended by Directive EU 2015/1480) 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 $PM_{2.5}$ (fine particulate matter) 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 PM_{10}) or up to five years (Nitrogen dioxide, benzene) for complying with limit values, based on conditions and the assessment by the European Commission.

The limit values of the CAFE Directive are set out in **Table 10.1**. Limit values are presented in micrograms per cubic metre (µg/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.

Table 10.1: Limit values of CAFE Directive 2008/50/EC (Source: EPA)

Pollutant	Limit Value Objective	Averaging Period	Limit Value (µg/m^3)	Limit Value (ppb)	Basis of Application of Limit Value
Sulphur Dioxide (SO_2)	Protection of human health	1 hour	350	132	Not to be exceeded more than 24 times in a calendar year
Sulphur Dioxide (SO_2)	Protection of human health	24 hours	125	47	Not to be exceeded more than 3 times in a calendar year
Sulphur Dioxide (SO_2)	Protection of vegetation	Calendar Year	20	7.5	Annual mean

Pollutant	Limit Value Objective	Averaging Period	Limit Value (µg/m^3)	Limit Value (ppb)	Basis of Application of Limit Value
Sulphur Dioxide (SO_2)	Protection of vegetation	1 Oct to 31 Mar	20	7.5	Winter mean
Nitrogen dioxide (NO_2)	Protection of human health	1 hour	200	105	Not to be exceeded more than 18 times in a calendar year
Nitrogen dioxide (NO_2)	Protection of human health	Calendar year	40	21	Annual mean
Nitric oxide (NO) + Nitrogen dioxide (NO_2)	Protection of ecosystems	Calendar year	30	16	Annual mean
PM_{10}	Protection of human health	24 hours	50	-	Not to be exceeded more than 35 times in a calendar year
PM_{10}	Protection of human health	Calendar year	40	-	Annual mean
$PM_{2.5}$ - Stage 1	Protection of human health	Calendar year	25	-	Annual mean
$PM_{2.5}$ - Stage 2	Protection of human health	Calendar year	20	-	Annual mean
Lead (Pb)	Protection of human health	Calendar year	0.5	-	Annual mean
Carbon Monoxide (CO)	Protection of human health	8 hours	10,000	8620	Not to be exceeded
Benzene (C_6H_6)	Protection of human health	Calendar year	5	1.5	Annual mean

Table 10.2 presents the limit and target values for ozone as per the Ambient Air Quality and Cleaner Air for Europe (CAFÉ) Directive (2008/50/EC).

Table 10.2: Target values for Ozone Defined in Directive 2008/50/EC

Objective	Parameter	Target Value from 2010	Target Value from 2020 onwards
Protection of human health	Maximum daily 8-hour mean	120 µg /m^3 not to be exceeded more than 25 days per calendar year averaged over 3 years	120 µg /m^3
Protection of vegetation	*AOT_{40} calculated from 1-hour values from May to July	18,000 µg /m^3 h^{-1} averaged over 5 years	6,000 µg /m^3 h^{-1}
Information Threshold	1-hour average	180 µg /m^3	180 µg /m^3
Alert Threshold	1-hour average	240 µg /m^3	240 µg /m^3

*AOT_{40} (Accumulated dose of ozone Over a Threshold of 40 ppb) is a measure of the overall exposure of plants to ozone. It is the sum of the excess hourly concentrations greater than 80 µg/m^3 and is expressed as µg/m^3 hours.

The EU has proposed a new Cleaner Air for Europe Directive. Once adopted, the new law will set 2030 EU air quality standards aligned more closely with WHO global air quality guidelines. Key points include:

- Lower limit values for 2030 for key health impacting pollutants including particulate matter ($PM_{2.5}$) and nitrogen dioxide (NO_2), more closely aligned with WHO guidelines
- New pollutants added to monitoring requirements including Ultrafine Particles (UFP), black carbon and ammonia
- Further improvements to the EU legal framework for air quality including better public information on air quality, strengthened air quality plans, requirements for air quality modelling and air quality roadmaps to improve air quality management
- A review of air quality limit values must be carried out by 2023 to look at options for alignment with WHO guidelines and the latest scientific elements[11].

10.1.5 Assessment Structure

In line with the EIA Directive (as amended) and current EPA guidelines listed in **Chapter 1, Section 1.7,** the structure of this air and climate chapter is as follows:

- Assessment Methodology and Significance Criteria
- Description of baseline conditions at the Wind Farm Site
- Do nothing Effect Assessment
- Identification and assessment of effects to air and climate associated with the Proposed Development during the construction, operational and decommissioning phases of the Proposed Development
- Mitigation measures to avoid or reduce the effects identified
- Identification and assessment of cumulative effects if and where applicable
- Conclusion as to likely significant effects of the Proposed Development on air and climate.

The desktop study as outlined in **Section 10.2** and **Section 10.3**, together with the other assessments detailed in this chapter, provide the planning authority with sufficient details regarding Air Quality and Climate assessment for the Proposed Development.

10.1.6 Assessment Methodology

In this section, a description of the methods employed for each part of the assessment, are outlined. The methodology complies with guidance and best practice.

[11] EPA (2024), Air Quality in Ireland Report 2023, Available at: https://www.epa.ie/publications/monitoring--assessment/air/Air_Quality_Report_23_v13_flat.pdf [Accessed: 13/04/2026].

The following data and reports were employed to assess the baseline Air Quality and Climate:

- Air quality limited limit values of the CAFÉ Directive 2008/50/EC are compared with the recorded local and national emission values for year 2022
- Review of all relevant WHO and EPA Air Quality reports
- Review of Air Quality Zones in Ireland
- A review of the contributors to the local air quality conditions
- A review of local and national climate conditions

The following tool was employed to assess climate effects of the Proposed Development: Carbon Calculator for wind farms[12], developed under the guidance of the Scottish Government, Scottish Environment Protection Agency (SEPA), Scottish Natural Heritage (SNH) and Forestry Research. The tool's purpose is to assess, in a comprehensive and consistent way, the carbon effect of wind farm developments. This is accepted as best practice in Ireland.

Do Nothing Effect Assessment

This section outlines the potential effect if the Proposed Development does not proceed, including the likely natural evolution of the site in the absence of the Proposed Development, based on the baseline scenario.

Significance of Effects

The significance of effects resulting from the Proposed Development is determined through consideration of a combination of the sensitivity of the receiving environment and the predicted level of change from the baseline state, as outlined in **Chapter 1, Introduction, Table 1.4** and **1.5**. Where negative effects are predicted, appropriate mitigation approaches are identified.

Mitigation Measures

The mitigation hierarchy approach, as outlined in Chapter 1 of Avoidance, Reduction/ Elimination and Remedy aims to avoid significant effect through embedded mitigation (avoidance) and where avoidance is not possible, through mitigation measures. Remedy the lowest rung of the mitigation hierarchy is only considered where mitigation measures are not feasible or possible.

[12]SEPA, 2023, Carbon calculator for wind farms, Available at: https://www.gov.scot/publications/carbon-calculator-for-wind-farms-on-scottish-peatlands-factsheet/ [Accessed: 13/04/2026].

Cumulative Assessment

Other large developments (operational and in the planning process) within 10 km of the Wind Farm Site (**Appendix 1.5**) and cumulative wind farms (operational and in the planning process) within 20 km of the Wind Farm Site (**Appendix 1.2**). This assessment considers all phases of the Proposed Development (construction, operation and decommissioning) in conjunction with these nearby projects. Cumulative Effects – identifying the potential for effects of the project to combine with those from other existing, permitted and /or proposed projects to affect the air quality and climate. A 20 km radius from the Wind Farm Site for large scale developments was set out, as is consistent with the EPA "Guidelines on the information to be contained in environmental impact assessment reports" (2022) and best practice.

The geographic extent of the cumulative assessment is considered on a case-by-case basis, in line with the following:

- Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022).
- Guidance on the Preparation of the Environmental Impact Assessment Report (European Union 2017) (Directive 2011/92/EU as amended by 2014/52/EU); and
- Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (European Commission 1999).

10.2 AIR QUALITY

10.2.1 Air Quality & Health

Environmental Protection Agency (EPA, 2020)[13], European Environmental Protection Agency (EEA, 2024)[14] and World Health Organisation (WHO, 2014) reports estimate that poor air quality accounted for premature deaths of approximately 600,000 people in Europe in 2012, with 1,300 Irish deaths predominantly due to fine particulate matter ($PM_{2.5}$) in 2020 and 30 Irish deaths attributable to Ozone (O_3) in 2016[15&16]. Air pollution concentration in 2021 remained well above the levels recommend by the World Health Organization (WHO). The most recent EEA study (2024) of air pollution across Europe has shown in 2022,

[13] Environmental Protection Agency, (2020). Ireland's Environment 2020 – An Integrated Assessment. Available at: https://www.epa.ie/publications/monitoring--assessment/assessment/state-of-the-environment/EPA_Irelands_Environment_2020.pdf [Accessed: 13/04/2026].

[14] European Environment Agency, (2024). Harm to human health from air pollution in Europe: burden of disease status. Available at: https://www.eea.europa.eu/en/analysis/publications/harm-to-human-health-from-air-pollution-2024 [Accessed: 13/04/2026].

[15] World Health Organization, (2014). Almost 600,000 deaths due to air pollution in Europe – new WHO global report. Available at: https://www.euro.who.int/en/health-topics/environment-and-health/air-quality/news/news/2014/03/almost-600-000-deaths-due-to-air-pollution-in-europe-new-who-global-report[Accessed: 13/04/2026].

[16] Environmental Protection Agency, (2016). Ireland's Environment 2016 – An Assessment. Available at: https://www.epa.ie/publications/monitoring--assessment/assessment/state-of-the-environment/SoE_Report_2016-1.pdf [Accessed: 13/04/2026].

European citizens remained exposed to air pollutant concentrations that were considerably above the levels recommended by the World Health Organization (WHO). Reducing air pollution to these WHO guideline levels would prevent a significant number of annual deaths in EU Member States (EU-27): 239,000 from exposure to fine particulate matter ($PM_{2.5}$); 70,000 from exposure to ozone (O_3) and 48,000 from exposure to nitrogen dioxide (NO_2). Air quality in Ireland is generally good and was compliant with 2024 air quality standards, meeting all EU legal requirements. However, Ireland is not yet meeting the stricter health guidelines from the WHO and are falling behind on targets set in Ireland's Clean Air Strategy for 2026 (Department of Climate, Energy and the Environment (DCEE), 2023) [17].

The Clean Air Strategy for Ireland – Progress Report 2025[18], published by the DECC, outlines the country's progress in improving air quality since the strategy's launch in 2023. It highlights significant achievements, including compliance with EU targets for key pollutants such as ammonia (NH_3) and sulphur dioxide (SO_2), largely due to improved agricultural practices and reduced fossil fuel use. Ambient air quality has improved nationwide, with fewer monitoring stations exceeding WHO guideline levels. However, challenges remain in urban transport and residential emissions, prompting targeted pilot projects and legislative updates. The report also details enhanced public engagement through new platforms like cleanair.ie[19], citizen science initiatives, and strategic communication efforts.

The revised EU Ambient Air Quality Directive is required to be transposed into Irish legislation by 2026, this revised directive aims to align EU air quality standards with WHO guidelines to reduce premature deaths from air pollution by 55% by 2030.

Ireland faces significant challenges in meeting updated EU targets, with projected compliance levels of only 93% for fine particulates matter (PM2.5) and 78%for nitrogen dioxide (NO_2.

Fine particulate matter, ozone, along with others including carbon dioxide (CO_2), nitrogen oxides (NO_x) and sulphur oxides (SO_x) are produced during the burning of fossil fuels for energy generation, transport or home heating. There are no such emissions associated with the operation of wind turbines. Therefore, wind turbines such as in the Project will result in

[17] Department of Climate, Energy and the Environment, (2025). Clean Air Strategy Progress Report 2025. Available at: https://assets.gov.ie/static/documents/2025_06_17_CAS_Progress_Report.pdf [Accessed: 13/04/2026].
[18] Department of Climate, Energy and the Environment, (2025). Clean Air Strategy Progress Report 2025. Available at: https://assets.gov.ie/static/documents/2025_06_17_CAS_Progress_Report.pdf [Accessed: 13/04/2026].
[19] Clean Air Website. Available at: https://cleanair.ie/ [Accessed: 13/04/2026].

lower environmental levels of such parameters, and consequential beneficial effects on human health, as the renewable electricity generated by the Project will offset the otherwise generated electricity from combustion of fossil fuels.

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: Other cities and large towns comprising Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, Balbriggan, Greystones, Leixlip and Portlaoise
- Zone D: Rural Ireland, i.e. the remainder of the State excluding Zones A, B and C.

These zones were defined to meet the criteria for air quality monitoring, assessment and management described in the CAFÉ Directive. The Proposed Development lies within Zone D, which represents Rural Ireland, i.e. the remainder of the State excluding Zones A, B and C[25].

10.2.2 Existing Air Quality Conditions

10.2.2.1 Existing Air Quality Conditions in Ireland

Generally, Ireland is recognised as having some of the best air quality in Europe. However, from time to time, and under certain weather conditions, it is possible to experience some air pollution in the larger towns and cities. The most recent published report on air quality in Ireland is the 'Air Quality in Ireland 2024' report published by the EPA in (September) 2025[26]. This report provides an overview of the ambient air quality in Ireland in 2024. It is based on monitoring data from 115 stations across Ireland. The measured concentrations are compared with both EU legislative standards and WHO air quality guidelines for a range of air pollutants.

Results from the monitoring campaign across Ireland during 2024 show:

- No levels above the EU limit value (CAFE Directive), as shown in **Table 10.1,** were recorded at any of the ambient air quality network monitoring sites in Ireland in 2024.

[25] EPA Air Quality Zones, Available at: Air Quality Zones | AirQuality.ie [Accessed: 17/09/2025]
[26] EPA (2025), Air Quality in Ireland 2024. Available at: https://www.epa.ie/publications/monitoring--assessment/air/EPA-Air-Quality-in-Ireland-Report-2024-INTERACTIVE.pdf

WHO guideline values were exceeded at a number of monitoring sites for fine particulate matter ($PM_{2.5}$) and (PM_{10}), ozone (O_3), nitrogen dioxide (NO_2). WHO guideline values for sulphur dioxide (SO_2) were exceeded at two monitoring stations.

10.2.2.2 Existing local Air Quality Conditions

Ambient Air Quality Assessment: Ballina (2025)

The closest monitoring site to the Proposed Development within the same air quality zone (Zone D, rural areas) is Ballina, Co. Mayo. Ballina indicative monitoring site is located approx. 16 km southeast of the Proposed Development. The Ballina site is located in the centre of Ballina Town with moderate traffic or other influences on air quality. Measurements are recorded at regular hourly intervals throughout the day for particulate matter $PM_{2.5}$ and PM_{10}. Results from the Ballina Monitoring station, Co. Mayo monitoring campaign during 2025[29] show:

<u>Particulate Matter ($PM_{2.5}$)</u>

The annual mean $PM_{2.5}$ level for Ballina in 2025 was 8.45 µg/m³.

- Annual Compliance:
  - EU Directive 2008/50/EC: Below the annual limit value of 20 µg/m³.
  - WHO Interim Target 3 (IT3): Below the 2026 target of 15 µg/m³.
  - WHO Air Quality Guidelines (AQG): Above the recommended level of 5 µg/m³.
- Short-term (24-hour) Exceedances:
  - WHO IT3 (37.5 µg/m³): Exceeded on two occasions (68.86 µg/m³ on 23/07/2025 and 42.95 µg/m³ on 24/07/2025).
  - WHO AQG (15 µg/m³): Exceeded on 34 occasions throughout the year.

<u>Particulate Matter (PM_{10})</u>

The annual mean (PM_{10}) level for Ballina in 2025 was 15.00 µg/m³.

- Annual Compliance:
  - EU Directive 2008/50/EC: Well below the annual limit value of 40 µg/m³.
  - WHO Interim Target 3 (IT3): Below the 2026 target of 30 µg/m³.
  - WHO Air Quality Guidelines (AQG): Directly aligns with the recommended level of 15 µg/m³.
- Short-term (24-hour) Exceedances:

[29] https://airquality.ie/readings?station=AQG-22583&dateFrom=01+Jan+2025&dateTo=09+Feb+2025 [Accessed: 13/04/2026]

  - EU Directive 2008/50/EC (50 µg/m³): Exceeded on 8 occasions. (Note: This remains within the permitted allowance of 35 exceedances per calendar year).
  - WHO IT3 (75 µg/m³): Exceeded on 2 occasions.
  - WHO AQG (45 µg/m³): Exceeded on 10 occasions.

Note: This annual mean is based on the available data dated 01/01/2025 to the 31/12/2025[31].

Ambient Air Quality Assessment: Castlebar (2025)

The nearest national monitoring site to the Proposed Development within the same air quality zone (Zone D, rural areas) is Castlebar, Co. Mayo. The Castlebar national monitoring site is located approx. 42 km south of the Proposed Development. The Castlebar site is located in the grounds of the EPA offices on the outskirts of Castlebar with moderate traffic or other influences on air quality. Measurements are recorded at regular hourly intervals throughout the day for particular matter (PM_{10}), ozone and nitrogen dioxide (NO_2). Results from the Castlebar Co. Mayo monitoring campaign during 2024 show:

Particulate Matter (PM_{10})

- Annual Compliance:
  - EU Directive 2008/50/EC: Well below the annual limit value of 40 µg/m³.
  - WHO Interim Target 3 (IT3): Below the 2026 target of 30 µg/m³.
  - WHO Air Quality Guidelines (AQG): Below the recommended level of 15 µg/m³.
- Short-term (24-hour) Exceedances:
  - EU Directive 2008/50/EC (50 µg/m³): Exceeded on one occasion (11/01/2025). This is well within the permitted allowance of 35 exceedances per calendar year.
  - WHO IT3 (75 µg/m³): Exceeded on one occasion (11/01/2025).
  - WHO AQG (45 µg/m³): Exceeded on one occasion (11/01/2025).

Nitrogen Dioxide NO_2

All NO_2 monitoring results for Castlebar in 2025 remained within both regulatory limits and health guidelines.

- Annual Compliance:
  - EU Directive 2008/50/EC: The annual mean was below the limit value of 40 µg/m³.
  - WHO Interim Target 3 (IT3): Below the 2026 target of 20 µg/m³.

[31] https://airquality.ie/station/TNO4468 [Accessed: 13/04/2026]

   - WHO Air Quality Guidelines (AQG): Below the recommended level of 10 µg/m³.
- Short-term (1-hour) Compliance:
   - EU Directive 2008/50/EC (200 µg/m³): No exceedances recorded. (Permitted allowance is 18 exceedances per calendar year).

*[a] is defined as the 99th percentile of the annual distribution of 24-hour average concentrations (equivalent to 3 - 4 exceedance days per year).

Note: This annual mean is based on the available data dated 01/01/2025 to the 31/12/2025[32]. It is important to note that several sensors at this weather station frequently experienced maintenance-related downtime or technical malfunctions. These data gaps can significantly impact the calculation of annual and monthly means, potentially skewing the results if the outages coincided with periods of high or low pollution. The $PM_{2.5}$ monitor recorded the most substantial disruption with 240 full days of missing data. For this reason, $PM_{2.5}$ was not included in the assessment. This was followed by the PM_{10} monitor, which lost 91 days of data. In contrast, the NO_2 sensor remained fully operational with no full-day gaps recorded.

10.2.3 Do Nothing Effect

If the Proposed Development did not proceed, the opportunity to reduce CO_2, NO_x, and SO_2 emissions 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 would result in an indirect, negative effect on air quality. If the Proposed Development did not proceed, the current forestry and farming/ agricultural practices would likely continue on the Wind Farm Site.

10.2.4 Potential Effects of the Proposed Development

10.2.4.1 Construction Phase

During the construction phase standard methodologies are being used given known ground conditions and soil stability. These standard methodologies are described and assessed.

10.2.4.1.1 Dust Emissions

The main potential effect on air quality during construction is dust generation. Dust may arise from excavations and various construction activities, including the development of Site Access Tracks, Turbine Hardstands, and trenches for the Wind Farm's internal cabling, as

[32] https://airquality.ie/readings?station=EPA-26&dateFrom=02+Dec+2024&dateTo=31+Dec+2024 [Accessed: 14/04/2026]

well as during the construction of the Grid Connection Route (GCR) to the Tawnaghmore 110 kV Substation. The GCR is assessed in this EIAR.

Additional dust-generating activities include excavation and concrete pouring for Turbine Foundations, as well as material hauling along the Turbine Delivery Route (TDR) and Construction Haul Route. Vehicular movement on unpaved surfaces may contribute to dust emissions, requiring mitigation measures such as water spraying and speed restrictions. The construction of the substation and works associated with the hardstands, and compound could also be significant sources of dust and should be factored into the mitigation strategy.

The potential for dust disturbance issues arising from the Proposed Development can worsen with weather conditions, (i.e., dry and windy conditions). Dust from cement can cause ecological damage if allowed to migrate to water courses, though it is proposed that ready-mix concrete will be used with no onsite batching taking place and therefore, this will not be a potential source of emissions.
Potentially dust generating activities are as follows:

- Earth moving and excavation plant and equipment for handling and storage of soils and subsoils.
- Transport and unloading of stone materials for Site Access Track construction.
- Rock that is suitable will be extracted from Turbine Foundations and Onsite Substation excavations when suitable and this will be used for subsequent use in construction of Site Access Tracks and Turbine Hardstands as needed.
- Where rock extracted is not suitable, rock will be imported from local quarries for Turbine Foundation areas, the Onsite Substation, BESS compound, Site Access Tracks, Turbine Hardstands and Met Mast Hardstands.
- Vehicle movements over dry surfaces such as Site Access Tracks and public roads.
- Mortar for blocking and plaster rendering for the Onsite Substation building.

The potential effect from dust becoming friable and a nuisance to workers and local road users, if unmitigated, is considered a slight, negative, short-term, direct effect during the construction phase based on the UK IAQM 2024 guidance which is considered best practice in Ireland.

Friable dust cannot remain airborne for a very long time. The distance it can travel depends on the particle sizes, disturbance activities and weather conditions. Larger dust particles tend to travel shorter distances than smaller particles. Particle sizes greater than 30 μm will generally deposit within approximately 100 m of its source, while particles between 10-30 μm travel up to approximately 250-500 m and particle sizes of less than 10 μm can travel up to approximately 1 km[33].

Generally, (depending on the conditions outlined), dust disturbance is most likely to occur at sensitive receptors within approximately 250 m (IAQM, 2024) of the source of the dust. It is considered that the principal sites of friable dust generation will be the Turbine Foundations and Turbine Hardstands, and also along new Site Access Tracks. All Wind Turbines are situated greater than 540 m away from inhabited dwelling houses not associated with the Proposed Development . Therefore, these principal source sites of dust generation are greater than 250m distant from these sensitive receptors

There are 79 sensitive receptors (dwellings) within 1 km of the proposed turbines. Of these 79 sensitive receptors, none are within 100 m of the proposed turbines. Five no. inhabitant dwellings are located within 100 m of proposed site infrastructure works. If unmitigated, there would be dust deposition temporarily arising from the construction of the Site Access Tracks. Effects from dust deposition would be short-term, temporary and slight negative effect on sensitive receptors (**Figure 2.3**) based on UK IAQM 2024 guidance which is considered best practice in Ireland. All other inhabited dwellings are situated greater than 100 m from all proposed Site infrastructure and therefore are unlikely to be affected by potential dust disturbance as dust typically only causes a disturbance within 100 m of the site of friable dust generation.

In addition, vegetation such as trees and hedgerows in the vicinity will help to mitigate any airborne dust migrating off the Wind Farm Site as outlined in IAQM 2024. Any effects of dust on vegetation will mostly be confined to the construction and will be short-term, slight, negative and not significant effect.

If unmitigated, there may also be dust deposition arising from mud on public roads, resulting from traffic leaving the construction Wind Farm Site. Effects from dust deposition at sensitive receptors would give rise to disturbance issues for residents of those properties. The effect would be short-term, temporary and slight negative and not sensitive on sensitive receptors.

33 http://www.dustscan.co.uk/Dust-Info/Definitions [Accessed 14/04/2026]

There is no likely significant effect on air quality from an increase of dust emissions during the construction phase.

10.2.4.1.2 Exhaust Emissions

Emissions from plant and machinery, including trucks, during the construction of the Project are a potential effect. The engines of these machines produce emissions such as carbon dioxide (CO_2), carbon monoxide (CO), nitrogen oxides (NO_x), and particulate matter (PM_{10} and $PM_{2.5}$).

Particulate matter ("PM") less than ten micrometres in size (PM_{10}) can penetrate deep into the respiratory system increasing the risk of respiratory and cardiovascular disorders. PM_{10} arises from direct emissions of primary particulate such as black smoke and formation of secondary particulate matter in the atmosphere by reactions of gases such as sulphur dioxide (SO_2) and ammonia (NH_3). The main sources of primary PM_{10} are incomplete burning of fossil fuels such as coal, oil and peat and emissions from road traffic, in particular diesel engines. Other sources of particulates include re-suspended dust from roads. Natural particulate matter includes sea-salt and organic materials such as pollens.

Nitrogen oxides (NO_x), include the two pollutants, nitric oxide (NO) and nitrogen dioxide (NO_2). Anthropogenic (human) activities such as power-generation plants and motor vehicles are the principal sources of nitrogen oxides through high temperature combustion. Nitrogen oxides are a significant air pollutant by themselves but can also react in the atmosphere to contribute to the formation of tropospheric ozone (ozone in the air we breathe) and acid rain. Short-term exposure to nitrogen dioxide is associated with reduced lung function and airway responsiveness, and increased reactivity to natural allergens. Long-term exposure is associated with increased risk of respiratory infection in children.

The construction phase is likely to result in an increase in exhaust emissions from construction vehicles and transport vehicles associated with the Project works. The impact on air quality from an increase in exhaust emissions will be a short-term, slight negative and not significant effect. There will be no likely significant effects on air quality from an increase in exhaust emissions during the construction phase.

The construction phase is likely to result in an increase in exhaust emissions from construction vehicles and transport vehicles associated with the Proposed Development works. The majority of Heavy Good Vehicle (HGV) movements to and from the Proposed Development site will occur during the first eleven months of the construction period and will be associated with construction of the Site Access Tracks, Turbine Hardstand, Turbine Foundation, Onsite Substation and BESS compound.

The impact on air quality from an increase in exhaust emissions will be a short-term, slight negative and not significant effect. There will be no likely significant effects on air quality from an increase in exhaust emissions during the construction phase.

10.2.4.2 Operational Phase

10.2.4.2.1 Dust Emissions and Exhaust Emissions

During the operational phase, only a small number of light vehicles will access the Wind Farm Site, resulting in minimal and sporadic dust generation, similar to the movement of agricultural vehicles. Site visits are expected to occur approximately once or twice a week. In the unlikely event that a Wind Turbine or its components need to be replaced during the Proposed Development's lifetime, the traffic generated will be significantly lower than during the initial construction phase. In this case, there would only be one Wind Turbine delivered, compared to 16 No. Wind Turbines during the construction phase. The Site Access Tracks and other infrastructure will already have been established at this stage. Therefore, the operational phase will have an imperceptible negative and not significant effect on air quality as a result of an increase in dust emissions during the operational phase.

Exhaust emissions associated with the operational phase of the Proposed Development will arise from machinery use and Light-Good Vehicles (LGV) that are intermittently required onsite for maintenance works.

This will give rise to an imperceptible negative and not significant effect on air quality as a result of an increase in exhaust emissions during the operational phase.

10.2.4.2.2 Wind Turbines

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 effect on air quality. Further details on the carbon dioxide savings associated with the Proposed Development are presented in **Section 10.3.4.3** below.

10.2.4.3 Decommissioning Phase

10.2.4.3.1 Dust Emissions and Exhaust Emissions

Effects during the decommissioning phase of the Proposed Development are anticipated to be less than those arising during the construction phase. The decommissioning phase will be as follows:

- Removal of 16 No. Wind Turbines;
- Removal of 1 No. Met Mast;
- Removal of all associated underground electrical and communications cabling connecting the Wind Turbines to the Onsite Substation. Ducting is to remain in-situ.

All other elements of the Proposed Development will remain in-situ. The Site Access Tracks, and associated drainage systems will also serve existing ongoing agricultural and commercial forestry activity in the area. All other hard surfaced areas will be allowed to revegetate naturally.

The decommissioning phase would be expected to last approximately 3-6 months, and any air quality effects from either dust or exhaust emissions would be predicted to be imperceptible.

10.2.5 Mitigation Measures and Residual Effects

10.2.5.1 Construction Phase Mitigation

The main potential effect during the construction phase of the Project will be from the potential for dust to cause disturbance at sensitive receptors close to the Wind Farm Site. The contractor will be contractually required to follow good practice construction procedures to prevent dirt and dust being transported onto the local road network and to minimise vehicle exhaust emissions. All mitigation measures detailed and assessed in this EIAR and outlined in the CEMP (**Appendix 2.1**) will be implemented onsite. Good practice site control measures will comprise the following:

- Site Access Tracks will be upgraded and built in the initial construction phases. These tracks will be finished with graded aggregate which compacts, preventing dust.
- Approach roads and construction areas will be cleaned on a regular basis to prevent build-up of mud and prevent it from migrating around the Site and onto the public road network.
- Wheel wash facilities will be provided at 6 no. locations throughout the Wind Farm Site to prevent mud/dirt being transferred from the Wind Farm Site to the public road network. Wheel wash 1 will be located at the Temporary Construction Compound (site entrance 2) to the south of the Wind Farm Site. Wheel wash 2 will be located at site entrance 1. Wheel wash 3 will be located at site entrance 3. Wheel wash 4 will be located at site entrance 5.

Wheel wash 5 will be located at the Temporary Construction Compound (site entrance 11) to the north of the Wind Farm Site. Wheel wash six will be located at site entrance 14 (spoil deposition area).

- The wheel wash facilities will be located outside the 50 m watercourse buffer zone (see **Appendix 2.1, CEMP Sections 3.2.9** and **3.5**).
- Public roads along the Construction Haul Route will be inspected and cleaned daily when required. In the unlikely event that dirt/mud is identified on public roads, the roads will be cleaned. The wheel wash facility will be investigated and the problem fixed to prevent this from happening again.
- During periods of dry and windy weather, there is potential for dust to become friable and cause disturbance to nearby residences and users of the local road network. This requires wetting material and ensuring water is supplied at the correct levels for the duration of the work activity. The weather will be monitored so that the need for damping down activities can be predicted. Water bowsers will be available to spray work areas (Turbine Hardstand areas and GCR) and Construction Haul Route roads to suppress dust migration from the Wind Farm Site.
- Vehicles delivering materials to the Wind Farm Site will be covered appropriately when transporting materials that could result in dust, e.g., crushed rock or sand.
- Exhaust emissions from vehicles operating within the Wind Farm Site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the Contractor by ensuring that emissions from vehicles are minimised through regular servicing of machinery.
- All machinery, when not in use, will be turned off.
- Ready-mix concrete will be delivered to the Wind Farm Site and no batching of concrete will take place onsite. Only washing out of chutes will take place onsite and this will be undertaken at a designated concrete washout facility at the contractor's Temporary Construction Compound. The concrete wash water will be disposed of at a license facility outlined in the Construction Environment Management Plan (CEMP) – **Management Plan 5 Waste and Resource Management Plan** (**Appendix 2.1**).
- Speed restrictions of 15 km/h on Site Access Tracks will be implemented to reduce the likelihood of dust becoming airborne. Consideration will be given to how onsite speed limits are policed by the Contractor and referred to in the toolbox talks.
- Stockpiling of materials will be carried out in such a way as to minimise their exposure to wind. Stockpiles will be covered with geotextiles layering and damping down will be carried out when weather conditions require it.
- Earthworks and exposed areas/soil stockpiles will be re-vegetated to stabilise surfaces as soon as practicable.

- An independent, qualified Geotechnical Engineer will be contracted for the detailed design stage of the Proposed Development and geotechnical services and will be retained throughout the construction phase, including monitoring and supervision of construction activities on a regular basis. The methodology statement will be signed off by a suitably qualified Geotechnical Engineer.
- A complaints procedure will be implemented on the Wind Farm Site where complaints will be reported, logged and appropriate action taken.

10.2.5.2 Operational Phase Mitigation

As the operation of the Proposed Development will have positive effects on air quality, mitigation measures are considered unnecessary. Where Wind Turbine components are being replaced, or other scheduled or unscheduled maintenance activities occur on the Wind Farm Site, the same mitigation measures as per the construction phase will apply.

10.2.5.3 Decommissioning Phase Mitigation

Mitigation measures during the decommissioning phase will be similar to those employed during the construction phase as outlined above, where applicable. The Decommissioning Plan (**Management Plan 6** to the **CEMP, Appendix 2.1**) is a live document and outlines the mitigation measures assessed in this EIAR that are required during decommissioning.

10.2.6 Residual Effects of the Proposed Development

Although there are no likely significant effects arising in terms of dust generation and exhaust emissions in the absence of mitigation measures the use of plant and machinery will affect air quality in the area. In this section the effect of the Proposed Development on air quality is re-assessed given the mitigations measures prescribed in **Section 10.2.6**.

10.2.6.1 Construction Phase

With mitigation measures in place, any effects of dust on vegetation during the construction phase will be reduced to no likely significant effects.

With mitigations in place, any effects of dust emissions during the Turbine Foundations and Turbine Hardstands construction will have no likely significant effects.
With mitigation measures in place, any effects of disturbance during the construction of new/ upgraded Site Access Tracks will reduce to no likely significant effects.

With mitigation measures in place, the effects of exhaust emissions during the construction phase, will reduce to no likely significant effects.

10.2.6.2 Operational Phase

During the operational phase of the Proposed Development exhaust emissions will arise from the occasional use and Light-Good Vehicles (LGV) that will be required for occasional onsite maintenance works. The effect on dust emissions during the operational phase will remain imperceptible, negative and long-term. The effect on exhaust emissions during the operational phase will not have likely significant effects.

The wind energy created by the Proposed Development will avoid electricity production from coal, oil or gas-fired power stations resulting in emission savings of CO_2, NO_x, and SO_2, as outlined in **Section 10.3.4**. This will lead to a long-term significant positive effect on air quality.

10.2.6.3 Decommissioning Phase

With mitigations in place, any effects of dust emissions during the decommissioning phase will be reduced to Imperceptible, negative and temporary. Mitigated, any effects of exhaust emissions during the decommissioning phase will remain no likely significant effects.

10.2.7 Cumulative Effects

All large wind farm developments (operational and in the planning process) within 20 km of the Wind Farm Site (**Appendix 1.2**) and all other major developments or proposed developments (bigger than a one-off house) (**Appendix 1.5**) within 10 km of the Wind Farm Site in conjunction with the Proposed Development, are assessed to determine to potential cumulative effects on Air Quality and Climate.

Air quality concerns related to wind farms primarily arise during construction and decommissioning, with potential effects influenced by proximity to sensitive receptors. In terms of cumulative effects, negative cumulative effects in relation to air quality could occur if a large development with the potential to effect air quality was located to the vicinity of the Wind Farm Site.

There are seven number operational wind farms within 20 km of the Wind Farm Site:

- Oweninny Phase 1 (Planning Reference 16.PA0029) (approx. 13.9 km from the Tirawley Wind Farm Site).
- Oweninny Phase 2 (Planning Reference PA0029) (approx. 19.6 km from the Tirawley Wind Farm Site).
- Sheskin (Planning Reference 15/825 & 19/457) (approx. 18 km from the Tirawley Wind Farm Site).

- Killala Community Wind Farm Phase 1 (Planning Reference 17169) (approx. 6.0 km from the Tirawley Wind Farm Site).
- Killala Community Wind Farm Phase 2 (Planning Reference 19260) (approx. 5.2 km from the Tirawley Wind Farm Site).
- Lackan Wind Farm (Planning Reference 22401) (approx. 13.6 km from the Wind Farm Site).
- Bellacorick Wind Farm (Planning Reference 901077) (approx. 16.8 km from the Wind Farm Site). Decommissioning of Bellacorick Windfarm will take place alongside the construction of the proposed Oweninny Phase 3.

There are three consented (not yet built) wind farms within 20 km of the Wind Farm Site:

- Dooleeg (Planning Reference 20467) (approx. 19 km from the Tirawley Wind Farm Site).
- Sheskin South (Planning Reference ABP-310529-21) (approx. 19.9 km from the Wind Farm Site).
- Oweninny Phase 3 (Consented by An Bord Pleanála, Planning Reference ABP-309375-21) (approx. 14.3 km from the Wind Farm Site).

In addition, there are two proposed wind farms awaiting a decision and two at pre-planning stage within c. 20 km of the Wind Farm Site, namely:

- Glenora (Proposed under An Bord Pleanála under case reference ABP-310528-21) (approx. 6.9 km from the Wind Farm Site).
- Keerglen (Consented, Mayo County Council Planning Reference 2460537) (approx. 6.5 km from the Wind Farm Site).
- Gortnahurra (Pre-planning stage) (approx. 11.7 km from the Wind Farm Site).
- Keenagh, Owenboy & Trista Windfarm (Pre-planning) (approx. 22.3 km from the Wind Farm Site).

These wind energy developments range from 5.2 km to 22.3 km distance from the Proposed Development. Given their distances from the Wind Farm Site, these wind farms are not in the direct vicinity of the Proposed Development. Even if construction of these developments coincided with the proposed Tirawley Wind Farm, their separation from the Wind Farm Site ensures no cumulative air quality effects.

There is 1 domestic turbine located 1.1 km north of the Wind Farm Site and 1 domestic wind turbine located 4.1 km southeast of the Wind Farm Site. Given the size of these domestic turbines and as they are already operational, there would not be any cumulative air quality effects.

During the operational phase emissions of CO_2, NO_x, and SO_2 or dust emissions from the Proposed Development and other projects listed in **Appendix 1.2**, will result from the operation and maintenance vehicles onsite. However, these emissions will be minimal. Therefore, there will be a long-term imperceptible negative cumulative effect on air quality and climate.

Cumulative effects during the decommissioning phase will be similar to the construction phase although slightly less as a result of the reduced works required during the decommissioning phase as some infrastructure will be left in-situ e.g., Turbine Foundations and the Site Access Tracks.

The nature of the Proposed Development ensures compatibility with permitted, operational and planned wind farm projects in the area and will have an overall net positive contribution over the lifespan of the Proposed Development.

The nature of the Proposed Development and other wind energy developments within 20 km are such that, once operational, they will have a cumulative long-term, significant, positive effect on air quality.
The Mayo County Council Planning Portal was accessed to check planning permissions granted within a 10 km of radius of the wind farm and other major development or proposed developments (larger than a one-off house are summarised in **Appendix 1.5**).

Much of the non-wind planning permissions relate to (see **Table 2.2**):
- Agricultural Buildings;
- Underground Slurry Tanks;
- Cattle Underpass;
- Dwelling Developments;
- Telecommunication Mast;
- Forest Harvesting Roads;
- All Weather Astroturf;
- Anaerobic Digestion Biomass Facility;
- Quarry Restoration;
- Quarry Extension;

- Asphalt Mixing Plant and Associated Electrical Substation;
- Inert Waste Recovery Facility (Awaiting Decision);
- Batter Storage Facility (BESS);
- Mayo Renewables Ltd. Biomass Electricity Generating Station;
- Killala Energy Hub (100 MW Hydrogen Plant & 106 MW Energy Centre);
- 2 no. Data Centres; and
- Demolition of existing Commercial Extension, the Construction of New extension, the Retention of Existing Sheds and the Renovation of Existing Building to include 11 no. Guest Bedrooms, a Communal Bar and Dining Room; and
- Change of use Farm Building to Residential Units

In terms of their scale, it is considered that the construction and use of agricultural buildings, agriculture facilities, forestry roads and telecommunication mast would have a negligible to minor localised effects on air quality should their construction and operational use be concurrent with the Proposed Development.

In terms of their scale, it is considered that the construction and use of housing developments (greater than one off houses) and guest houses would have a negligible to minor localised effects on air quality should their construction and operational use be concurrent with the Proposed Development as none are considered close to the Tirawley Wind Farm Development (all are 3.05 – 4.96 km distant).

Larger developments including all Quarry related developments, sporting facilities, data centres, the Killala Energy Hub, the Mayo Renewables Ltd. Biomass Electricity Generating Station plant, BESS facilities, an inert waste recovery facility and an anaerobic digestion biomass facilities are considered to have a negligible to minor localised effect on air quality should their construction and operational use be concurrent with the Proposed Development as none are located close to the Tirawley Wind Farm Development. All are located between approximately 6.15 to 7.92 km from the Tirawley Wind Farm Site.

In a worst-case scenario cumulative air effect may arise if the construction, operational and maintenance period and decommissioning of any of the projects listed in **Appendix 1.5** occur simultaneously with the construction of the Proposed Development, Grid Connection and TDR works.

Cumulative effects during the decommissioning phase will be similar to the construction phase although slightly less as a result of the reduced works required during the decommissioning phase as some infrastructure will be left in-situ e.g., Turbine Foundations and the Site Access Tracks.

The nature of the Proposed Development and other major developments (bigger than one-off houses) within 10 km are such that, once operational, they will have a cumulative long-term, significant, positive effect on air quality.

10.2.8 Summary of Significant Effects

This assessment has identified no likely significant effects, given the mitigation measures embedded in the design which will be implemented in the Proposed Development.

10.2.9 Statement of Significance

The significance of potential effects of the Proposed Development on air quality has been assessed as having the potential to result in slight, negative and temporary/short-term effects on air Quality during construction and decommissioning. There will be no significant effect on air quality during construction and decommissioning.

The avoidance of the production of electricity from coal, oil, peat or gas-fired power stations, will lead to a slight, positive and long-term effect on air quality during the operation phase.

The Proposed Development has been assessed as having no significant direct or indirect effects on air quality during the construction, operation or decommissioning phases of the Proposed Development.

Potential cumulative effects were assessed as having a cumulative long-term, significant, positive effect on air quality.

10.3 CLIMATE AND GREENHOUSE GASES (GHGS)

GHGs constitute a group of gases contributing to global warming and climate change. GHGs with the most global warming potential are carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). Other greenhouse gases are 'F-Gases' (hydrofluorocarbons and perfluorocarbons), sulphur hexafluoride (SF_6) and man-made gases used in refrigeration and air conditioning appliances.

Continued greenhouse gas emissions will lead to increasing global warming, with the best estimate of reaching 1.5 °C in the near term in considered scenarios and modelled pathways. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred. Human-caused climate change is already affecting many weather and climate extremes in every region across the globe. This has led to widespread adverse impacts and related losses and damages to nature and people (IPCC, 2023[34]).

Human activities that produce GHGs include:

- Carbon dioxide emissions through burning fossil fuels such as coal, oil and gas and peat
- Methane and nitrous oxide emissions from agriculture.
- Emissions through land use changes such as deforestation, reforestation, urbanization and desertification.

Current projections indicate that continued emissions of GHGs, including the burning of fossil fuel to produce electricity, will cause further warming and changes to our climate. Climate is predicted to have indirect and direct effects on Ireland including:

- Rising sea-levels threatening habitable land and particularly coastal infrastructure
- Extreme weather, including more intense storms and rainfall affecting our land, coastline and seas
- Further pressure on our water resources and food production systems with associated impacts on fluvial and coastal ecosystems
- Increased chance and scale of river and coastal flooding; Giving rise to:
  - Greater political and security instability
  - Displacement of population and climate refugees
  - Heightened risk of the arrival of new pests and diseases
  - Poorer water quality; and
  - Changes in the distribution and time of lifecycle events of plant and animal species on land and in the oceans[35].

Climate change means a significant change in the measures of climate, such as temperature, rainfall, or wind, lasting for an extended period – decades or longer. Earth's climate has changed naturally many times during the planet's existence. However, currently human activities are significantly contributing to climate change through GHG emissions. The global average temperatures have now increased by more than 1 °C since pre-industrial times and there is an 80% chance that the annual global average temperature will temporarily exceed 1.5 °C above pre-industrial levels for at least one of the next five years[36]

[34] Climate Change 2023 – Synthesis Report (IPCC, 2023)
[35] The Department of the Environment, Climate and Communications – 'Climate Action Plan 2023 – Changing Ireland for the Better '. Available at: https://www.gov.ie/en/publication/7bd8c-climate-action-plan-2023/ [Accessed: 14/04/2026]
[36] World Meteorological Organisation (WMO) Press Release, 05 June 2024, Available at: https://wmo.int/news/media-centre/global-temperature-likely-exceed-15degc-above-pre-industrial-level-temporarily-next-5-years [Accessed: 14/04/2026]

At the Paris climate conference (COP21) in 2015, 195 countries adopted the first-ever universal, legally binding global climate deal. The landmark agreement established a global action plan to avoid dangerous climate change by limiting global warming to below 2 °C above pre-industrial levels, while striving to limit the increase to 1.5 °C. Governments agreed that global emissions should peak as soon as possible, acknowledging that this would take longer for developing countries and committed to undertake rapid reductions thereafter in accordance with the best available science.

The Glasgow Climate Pact (COP26) of 2021 built upon the Paris Agreement, aiming to limit the global temperature rise to 1.5 °C and finalising unresolved elements of the earlier accord. This pact operates across three United Nations climate treaties: the United Nations Framework Convention on Climate Change (the COP), the Kyoto Protocol (the CMP), and the Paris Agreement (the CMA).

The Dubai UN Climate Change Conference (COP28) of 2023 marked a critical juncture, concluding the first 'global stocktake' under the Paris Agreement. The stocktake revealed insufficient progress across all areas of climate action, including reducing GHG emissions, strengthening climate resilience, and providing financial and technological support to vulnerable nations. In response, countries committed to accelerating actions by 2030, including speeding up the transition from fossil fuels to renewable energy sources such as wind and solar power in their future climate commitments.

At COP29 in Baku (December 2024), countries reaffirmed their commitment to the Paris Agreement. Several significant agreements were reached, including a new climate finance goal to mobilise $300 billion annually by 2035 and efforts to secure $1.3 trillion per year from public and private sources. A global carbon market agreement was established, providing pathways for sustainable business practices, while a new loss and damage fund was operationalised, with $800 million pledged to support adaptation efforts. Enhanced measures for transparent climate reporting were also adopted to ensure accountability and track progress. These initiatives aim to accelerate global climate action and provide critical support to vulnerable nations adapting to climate effects.

COP30 was held from November 10 to 22, 2025, in Belém, Brazil. Adaptation to climate change was a top priority this year in Belém. Countries built on the new global climate finance goal agreed at COP29 in Baku (the New Collective Quantified Goal or NCQG), which aims to scale up support for developing countries. Its aim is to mobilise at least USD 300 billion per year by 2035 in finance from public sources, as part of a total of USD 1.3

trillion per year from all sources, public and private. At COP30, the EU renewed its commitment to the COP28 pledges to transition away from fossil fuels, triple renewable energy capacity and double energy efficiency by 2030, as agreed in Dubai.

In Ireland, the Climate Action Plan 2023 (CAP23), developed by the Department of the Environment, Climate and Communications, outlined a detailed strategy to achieve a 75% reduction in overall GHG emissions by 2030 and to reach net-zero emissions by no later than 2050. This ambitious plan reflects commitments made in the Program for Government and enshrined in the Climate Action and Low Carbon Development Act 2015 and Climate Action and Low Carbon Development (Amendment) Act 2021, as amended (the "Climate Act"). The subsequent Climate Action Plans 2024 and 2025 (CAP2024 and CAP2025) builds on CAP2023, detailing a sectoral roadmap to deliver a 51% reduction in GHG emissions by 2030. CAP25 emphasizes the need for transformative change across six high-impact sectors, including a critical focus on renewable electricity generation to supply 80% of demand by 2030.

Among its key measures, CAP2025 targets the deployment of 9 GW of onshore wind, 8 GW of solar and at least 5 GW of offshore wind energy by 2030. Chapter 12 of CAP2025 highlights the immense challenge facing the electricity sector, noting its pivotal role in the decarbonization of other sectors such as transport, heating and industry through electrification. The plan identifies the need for unprecedented deployment rates of renewable energy and grid infrastructure, requiring policies to shift from an 'end of decade' trajectory to a 'remaining carbon budget' approach.

Section 12.1.3 of CAP2025 underscores the urgency of action, particularly as the energy system faces severe pressures to ensure security of supply amid projections of rapid electricity demand growth. The electricity sector has been assigned one of the steepest carbon budget trajectories, with a 75% reduction target across all sectors. CAP2025 also addresses barriers to renewable energy development, including onshore wind, emphasising the dual benefits of emissions reduction and enhanced energy security through reduced reliance on imported energy.

In summary CAP2025, approved by the Irish Government in April 2025, reinforces Ireland's commitment to meeting legally binding emissions targets. It emphasizes the unparalleled scale of renewable energy development required, which must proceed at a rate approximately eight times faster than the historical average between 2025 and 2030, placing climate solutions at the core of Ireland's economic and social development.

The provision of the Proposed Development will have a long-term positive effect by providing a sustainable energy source. Should the Proposed Development not proceed, fossil fuel power stations will be the primary alternative to provide the required quantities of electricity. This will further contribute to GHGs and other emissions. It will also hinder Ireland in its commitment to meet its target to increase electricity production from renewable sources and to reduce GHGs as agreed at the Paris climate conference (COP21) in 2015, the Glasgow Climate Pact (COP26) in November 2021, the Dubai UN Climate Change Conference (COP28) in December 2023, the 2024 United Nations Climate Change Conference in Baku (COP29) and the Belém Political Package (COP30).

10.3.1 Relevant Legislation and Guidance

Greenhouse gasses (GHGs) are the subject of international agreements, such as the United Nations Framework Convention on Climate Change, Kyoto Protocol and the Paris Agreement. The Glasgow Climate Pact is manifested across these three United Nations climate treaties. At a national level, the Climate Action and Low Carbon Development (Amendment) Act 2021 (the Climate Act) commits Ireland to reach a legally binding target of net zero emissions no later than 2050, and a cut of 51% by 2030 (compared to 2018 levels). It establishes a framework with clear, legally binding targets and commitments and ensures the necessary structures and processes are embedded on a statutory basis to achieve Ireland's national, EU and international climate goals and obligations in the near and long term. The Climate Act is supported by the annual Climate Action Plans (e.g., CAP2021, CAP2024, CAP2025), which detail the specific actions needed to achieve the targets.

The Mayo County Council Climate Action Plan 2024-2029 sets out how Mayo County Council will be responsible for enhancing climate resilience, increasing energy efficiency, and reducing greenhouse gas emissions. To help achieve carbon emission and energy efficiency targets, the Mayo County Development Plan 2022-2028 includes Chapter 11 on Climate Action and Renewable Energy. This chapter builds upon the Mayo Renewable Energy Strategy 2011-2020, which outlines a plan-led approach to renewable energy development in County Mayo. The existing Mayo Renewable Energy Strategy 2011-2020, which set a minimum target of 600 MW for wind energy, is being updated to align with the Mayo County Development Plan 2022-2028 and future renewable energy strategies for the Northern and Western Regional Assembly.

These agreements along with International and National Policy and Legislation are discussed in **Chapter 4: Planning Policy**. This assessment has been prepared in accordance with the relevant legislation and all plans within Section 15, 'Duties of certain bodies' of the Climate Act have been considered. The Project has been assessed against and is consistent with those plans.

10.3.2 Assessment Methodology

The methodology accords with guidance and best practice.

As outlined in **Section 10.1.5** of this chapter:

- A climate assessment has been conducted through a desk study of the local and national climate in relation to the Proposed Development area (Baseline description)
- The climate effects of the Proposed Development will be assessed using the Carbon Calculator Tool (version 2.14.1 release date 27/01/2023). This carbon calculator, specifically designed for assessing the climate impact of wind farms was developed under the guidance of the Scottish Government, Scottish Environmental Protection Agency (SEPA), Scottish Natural Heritage (SNH) and Forestry Research (impact assessment). Commonly used guidance produced by SNH in 2003 (in a technical guidance note), has been used to determine carbon payback in the absence of any more detailed methods to determine the impacts on soil carbon stocks. The use of the Scottish carbon calculator in assessing the climate impact and determining carbon payback for this Proposed Development is acceptable, as the peat habitat of Scotland is similar to Ireland and at similar latitudes, the simulated land-atmosphere interactions are applicable.

The methodology approach taken to evaluate the 'do nothing scenario', significance of effects', mitigation measures' and 'assessment of cumulative effect' is outlined in **Section 10.1.5**.

10.3.3 Existing Climate

The Köppen climate classification divides regions of the globe based on seasonal precipitation and temperature patterns. The five main groups are tropical, dry, temperate, continental, and polar. The Irish climate is defined as a temperate oceanic climate on the Köppen climate classification system[37]. Ireland's climate is mild, moist and changeable with abundant rainfall and a lack of temperature extremes. The country generally experiences cool summers and mild winters and it is considerably warmer than other areas on the same

[37] https://www.britannica.com/science/Koppen-climate-classification/World-distribution-of-major-climatic-types, [Accessed: 14/04/2026]

latitude. Ireland's land mass is warmed by the North Atlantic Current all year and as a result does not experience a great annual range of air temperatures.

The best available data from Met Eireann was used to assess the existing climate and climate trends. The annual mean air temperature for Ireland over the climate period 1991-2020 is 9.8 °C and range from 8.5 and 10.8 °C. Due to the moderating influence of the sea, areas closest to the coast are generally warmest. Comparing the 1991-2020 annual mean air temperature for Ireland with that of the 1961-1990 period, there has been an average annual mean temperature increase of approximately 0.7 °C[38].

Nationally, annual average rainfall over the period 1991-2020 is approximately 1,288 mm. There is large variation in rainfall. Annual average rainfall ranges from 878 mm in regions along the east coast to 2,044 mm in the southwest mountainous regions. December is the wettest month with average rainfall of approximately 142 mm over the same period. The driest months are April and May with average rainfall of 82 mm and 79 mm, respectively. The highest number of rain days and wet days is observed in elevated western and northwest regions. The average annual number of very wet days[39] observed over the period 1991-2020 again shows that these events are more frequent in the west of the country than in eastern and midland regions. Annual rainfall totals on the west coast generally average between 1,000 mm and 1,400 mm with the wettest months being December and January and April being the driest month. The annual average rainfall for Ireland has increased by approximately 7% between the period 1961-1990 and 1991-2020 climate periods[40].

The prevailing wind direction is between south and west. Average wind speed ranges from 3 m/s in south Leinster to 8 m/s in the extreme north of the country. On average there are less than 2 days with gales each year at some inland places like Carlow, but more than 50 a year at northern coastal locations such as Malin Head[41].

For the purpose of the assessment of changes to the Climate, meteorological data from Belmullet monitoring station, over a period of 1992-2023 is shown in **Table 10.3**. **Graph 10.1** shows the mean air temperature and precipitation amount (mm) recorded at Belmullet from 1992 to 2023. Belmullet is located 44 km west of the Proposed Development and is

[38] Met Éireann 2023, Ireland's Climate Averages 1991-2020, Available at: https://www.met.ie/cms/assets/uploads/2023/09/Irelands-Climate-Averages_1991-2020.pdf [Accessed: 14/04/2026]
[39] a very wet day is defined as being greater than the 95th percentile of "wet days" (R ≥ 1mm) during the 1961-1990 reference period
[40] Met Éireann 2024 Climatological Note 22 https://www.met.ie/education/publications/climatological-notes [Accessed: 14/04/2026]
[41] Met Éireann, Wind, Available at: https://www.met.ie/climate/what-we-measure/wind [Accessed: 14/04/2026]

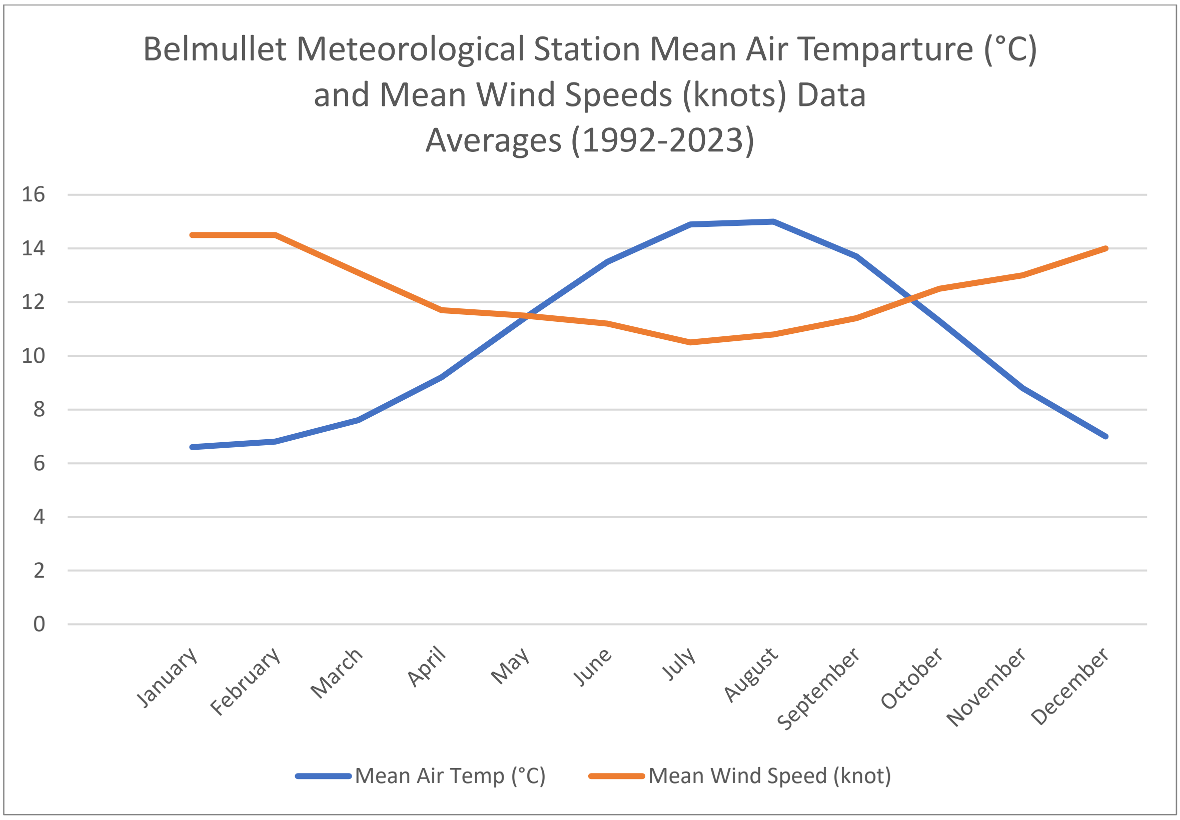
the closest Met Éireann climate station to the Proposed Development after Newport (Furnace) which is located approx. 39 km southwest.

The mean annual air temperature as shown in **Table 10.3** is between 1992 and 2023 was 10.5 °C. Mean monthly temperatures ranged from 6.6 °C in January to 15 °C in August. Mean annual rainfall over this period was 1267.6 mm, with a maximum monthly mean rainfall of 149.8 mm in December and a minimum monthly mean rainfall of 70.2 mm in April[42].

[42] Belmullet Monthly Data - Datasets - https://www.met.ie/climate/available-data/historical-data [Accessed: 14/04/2026]

Table 10.3: Belmullet Meteorological Station Data Averages (1992 - 2023)

Month	Mean Air Temp. (°C)	Maximum Air Temp. (°C)	Minimum Air Temp. (°C)	Mean Maximum Temp. (°C)	Mean Minimum Temp. (°C)	Precipitation Amount (mm)	Grass Minimum Temp. (°C)	Mean Wind Speed (knot)	Highest Gust (knot)	Sunshine Duration (hours)
January	6.6	12.2	-1.4	9.1	4.2	135.4	-5.7	14.5	66.6	45.6
February	6.8	12.2	-0.8	9.5	4.2	110.8	-4.5	14.5	62.5	68.8
March	7.6	14.6	-0.3	10.6	4.7	91.8	-4.0	13.1	57.3	108.6
April	9.2	17.2	1.2	12.6	5.9	70.2	-2.5	11.7	51.9	157.8
May	11.4	21.5	3.2	14.8	8.0	72.5	-0.2	11.5	50.3	200.6
June	13.5	21.7	6.1	16.5	10.5	72.0	3.1	11.2	44.4	166.7
July	14.9	22.8	8.3	17.7	12.1	86.2	5.4	10.5	42.5	137.4
August	15.0	21.8	8.0	17.9	12.2	101.8	4.9	10.8	45.2	146.0
September	13.7	21.2	6.0	16.8	10.8	102.2	2.4	11.4	49.8	120.3
October	11.3	17.8	3.6	14.0	8.6	136.9	-0.1	12.5	54.8	92.8
November	8.8	14.3	1.1	11.2	6.4	138.0	-2.8	13.0	58.0	49.1
December	7.0	12.7	-0.9	9.4	4.6	149.8	-5.1	14.0	63.1	40.1
Annual Mean	10.5	17.5	2.8	13.3	7.7	1267.6	-0.8	12.4	53.9	111.9



Graph 10.1: Belmullet Meteorological Station Mean Air Temperature (°C) and Mean Wind Speeds (knots) Data Averages (1992-2023)

10.3.4 Carbon Impact, Embodied Energy and Vulnerability Assessment

10.3.4.1 Carbon Calculator

To assess the effect of the Proposed Development on the climate, the carbon emitted or saved as a result of the Proposed Development was determined using a carbon calculator as discussed in **Section 10.3.2**. The online carbon calculator which aims to assess, in a comprehensive and consistent way, the carbon emission effect of wind farm developments. This is done by comparing the carbon costs of wind farm developments with the carbon savings attributable to the Wind Farm. The carbon calculation takes into account the carbon released from a number of sources during the construction, operational and decommissioning stages. These include the effects of losses associated with changes in land use, embodied carbon from wind turbine manufacturing, transportation and construction.

Assessments are also carried out to estimate the carbon savings over the lifetime of the Wind Farm, compared to electricity generated using fossil fuel. The assessment of carbon savings relates to the capacity of the Wind Farm over the number of years for which it is operational, site improvement works, (i.e., peatland improvement, habitat creation, etc.), forestry felling, and site restoration works, (i.e., removal of infrastructure and restoration of previous site conditions), when the Wind Farm will be decommissioned.

The completed worksheet, including the assumptions used in the model, is provided in **Appendix 10.1** of this EIAR. The model calculates the total carbon emissions associated with the Proposed Development including manufacturing of the turbine technology, transport, construction of the Proposed Development and tree felling. The model, which is assessed for the 16 number turbines (16 no. Vestas V117 (4.3 MW) IEC IIA), accounts for improvement works and the years taken for the Site to return to its original characteristics but does not factor in the potential re-use of turbine components. All metal components can be recycled, while there is limited potential for the recycling/reuse of the fibreglass blades. The model also calculates the carbon savings associated with the Proposed Development against three comparators:

i. Coal fired Electricity Generation

ii. Grid mix of Electricity Generation

iii. Fossil fuel mix of Electricity Generation (oil, gas and coal)[43].

This is to compare this renewable source of electricity generation to traditional methods of electricity generation to assess the carbon savings and losses.

10.3.4.2 Carbon Losses

The potential carbon losses were assessed for the Proposed Development.

The main CO_2 losses due to the Proposed Development are summarised in **Table 10.4**. A copy of the input and output data is provided in the completed worksheet in **Appendix 10.1**.

43 Ireland's energy imports comprise oil (56%), gas (31%) and coal (10%). http://ireland2050.ie/present/oil-and-gas/?q=where-does-ireland-get-its-electricity#:~:text=Ireland%20has%20only%20small%20proven,%25)%20and%20coal%20(10%25, [Accessed: 14/04/2026]

Table 10.4: Carbon Losses

Origin of Losses	Total CO_2 Losses (tonnes CO_2 equivalent)		
	Turbines Used (4.3 MW Turbine)		
	Expected Value	Minimum	Maximum
Loss due to Turbine Life (i.e., Turbine manufacture, construction and decommissioning)	56,802 tonnes CO_2 equivalent	56,802 tonnes CO_2 equivalent	56,802 tonnes CO_2 equivalent
Losses due to Backup	44,719 tonnes CO_2 equivalent	44,719 tonnes CO_2 equivalent	44,719 tonnes CO_2 equivalent
Losses due to reduced carbon fixing potential	1,386 tonnes CO_2 equivalent	347 tonnes CO_2 equivalent	2,672 tonnes CO_2 equivalent
Losses from soil organic matter	30,919 tonnes CO_2 equivalent	14,416 tonnes CO_2 equivalent	64,126 tonnes CO_2 equivalent
Losses due to DOC and POC leaching	6,802 tonnes CO_2 equivalent	966 tonnes CO_2 equivalent	16,879 tonnes CO_2 equivalent
Felling of Forestry	14,721 tonnes CO_2 equivalent	14,312 tonnes CO_2 equivalent	15,130 tonnes CO_2 equivalent
Total Expected Losses	155,350 tonnes CO_2 equivalent	131,563 tonnes CO_2 equivalent	200,327 tonnes CO_2 equivalent

The worksheet model calculated that the Proposed Development is expected to give rise to 155,350 tonnes of CO_2 equivalent losses for the 16 no. Vestas V117 (4.3 MW) IEC IIA model over its 35-year life. Of this total figure, the proposed wind turbines directly account for 56,802 (36.56%) tonnes of CO_2 equivalent losses. Losses due to backup account for 44,719 tonnes (28.79%) of CO_2 equivalent losses.

Losses from soil organic matter, reduced carbon fixing potential, DOC and POC leaching and the felling of forestry accounting for the remaining 34.65% (53,828 tonnes) of CO_2 equivalent. The figure tonnes of CO_2 arising from ground activities associated with the Proposed Development is calculated based on the entire Proposed Development footprint being "Acid Bog", as this is one of only two choices, the other being Fen. The habitat that will be impacted by the Proposed Development footprint comprises predominantly agricultural land and commercial forestry rather than the acid bog assumed by the model and therefore the actual CO_2 losses are expected to be lower than this value.

The figures discussed above are based on the assumption that the hydrology of the site and habitats within the site are not restored on decommissioning after its expected 35-year useful life. However, at the end of the 35-year lifespan of the Proposed Development, the turbines may be replaced with newer models subject to a consent for the same being obtained. This would mean the carbon losses associated with not restoring the habitats hydrology at the site would be offset by the carbon-neutral energy that the new turbines would generate.

Based on the calculations as presented above, the worst-case scenario is that 155,350 tonnes of CO_2 equivalent are expected to be lost to the atmosphere due to the construction, operation and decommissioning of the Proposed Development.

10.3.4.3 Carbon Savings

The carbon 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 and similar data was not available in the model for the Irish electricity generation plant. Therefore, these CO_2 emissions savings from the Proposed Development were calculated separately from the worksheet.

According to the model described above, the Proposed Development will give rise to total losses of 155,350 tonnes of of CO_2 equivalent.

A simple formula is used to calculate CO_2 emission 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 maximum capacity of the wind energy development in MW **(68.8 MW)**

B = The capacity or load factor, which takes into account the availability of wind turbines and array losses etc. **(35%)**

C = The number of hours in a year **(8,760)**

D = Carbon load in grams per kWh (kilowatt hour) of electricity generated and distributed via the national grid. **(253.7gCO_2/kWh)**

For the purposes of this calculation, the rated capacity of the Proposed Development is assumed to approximately 68.8 MW. A load factor of 0.35 (or 35%) has been used for the Proposed Development.

There has been a strong reduction in the CO_2 intensity of electricity generation, especially after 2016, with intensity falling below 300 gCO_2/kWh for the first time in 2020. It is now less than a third of its 1990 value[44]. 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 2023 and was published in Sustainable Energy Authority Ireland's (SEAI) December 2024 report, 'Energy in Ireland 2024 Report'[45]. The emissions factor for electricity in Ireland in 2023 was 253.7 gCO_2/kWh. This is most recent set of data for a full annual year. The below calculation for carbon savings is based on the latest emission factor (253.7 gCO_2/kWh) for electricity in Ireland in 2023.

The calculation for carbon savings are as follows:

$$CO_2 \text{ (in tonnes)} = \frac{(68.8 \text{ MW} \times 0.35 \times 8{,}760 \text{ hours} \times 253.7 \text{ gCO2/kWh})}{1000}$$

= 49,719 tonnes per annum

Based on this calculation, approximately 49,719 tonnes of CO_2 will be displaced per annum from the largely carbon-based traditional energy mix by the Proposed Development. In total, it is estimated that 1,740,156 tonnes of carbon dioxide will be displaced over the proposed 35-year lifetime of the Wind Farm.

The Scottish Government carbon calculator as presented above calculated 155,350 tonnes of CO_2 will be lost to the atmosphere due to the construction and operation of the Proposed Development. This represents 8.93% of the total amount of carbon dioxide emissions that will be offset by the Proposed Development. Given the calculated carbon savings over the expected 35-year period of the wind farm, the carbon losses due to the construction and

[44] SEAI (2021) Energy-Related CO_2 Emissions in Ireland 2020 Companion Note to 2020 National Energy Balance October 2021, Sustainable Energy Authority of Ireland. Available at https://www.seai.ie/publications/Energy-CO2-emissions-2020-Short-Note-FINAL.pdf [Accessed 15/04/2026]
[45] SEAI. 2024. *Energy in Ireland 2024 Report*. Dublin: Sustainable Energy Authority of Ireland. [Accessed 15/04/2026]

operation of the Proposed Development will be offset by the Proposed Development in approximately 37.5 months of operation.

10.3.4.4 Vulnerability Assessment

This section describes the likely significant effects on the environment deriving from the vulnerability of the Proposed Development to risks of major accidents and/or natural disasters. In accordance with the EIA Directive, the assessment considers the Proposed Developments potential to cause accidents and its inherent vulnerability to natural hazards. The overall vulnerability of the Proposed Development is considered low based on design specifications and the low-risk profile of the site location.

10.3.4.4.1 Hydrological and Meteorological Vulnerability (Flooding)

The Proposed Development has been assessed against extreme weather events and potential flooding scenarios, detailed further in **Chapter 9: Hydrology and Hydrogeology:**

- **Fluvial Flood Risk:** The Wind Farm Site is entirely mapped within Fluvial Flood Zone C, indicating a low risk of flooding.
- **Historical Records:** National records from the OPW and GSI show no recurring or historical flood instances within the Wind Farm Site boundary.
- **Climate Change Resilience:** Future climate models project a potential increase of 24% in winter rainfall. To mitigate this vulnerability, all drainage infrastructure and settlement ponds are designed for a 1-in-200-year return flow.
- **Pluvial Flooding:** The risk of surface water ponding is low due to the elevated, sloping nature of the land and a high density of natural drainage features.
- **Grid Connection Integrity:** The Grid Connection Route utilizes horizontal directional drilling (HDD) at major watercourse crossings, such as Palmerstown Bridge, to ensure infrastructure remains safe from surface flooding and does not increase downstream flood risk.

10.3.4.4.2 Geological Vulnerability (Peat Stability)

Ground stability is a critical factor for infrastructure on peatland, as assessed in **Chapter 8: Soils and Geology:**

- **Peat Depth:** Site investigations confirmed that 86.4% of the Redline Boundary area has negligible peat depth between 0.00 m and 0.50 m.
- **Stability Risk:** A Peat Stability Hazard and Landslide Risk Assessment (PLHRA) concluded that with the implementation of mitigation measures, there is a NEGLIGIBLE

hazard of instability for all 16 turbines, Site Access Tracks, BESS, Met Mast and the Onsite Substation.

- **Disaster Mitigation:** A Geotechnical Clerk of Works will monitor construction activities, and physical barriers such as catch fences or concrete blocks will be available to divert potential landslides away from protected areas.

10.3.4.4.3 Technological Industrial Vulnerability

As detailed in **Chapter 16: Major Accidents and Natural Disasters**, technological risks are minimised through standard safety protocols:

- **Fire and Explosion Risk:** The Battery Energy Storage System (BESS) and 110 kV Substation are identified as potential fire/explosion hazards. These are mitigated by imbedded design within the technology, dedicated Fire Safety Assessment and a requirement for a Fire Service review prior to construction.
- **Contamination:** Accidental hydrocarbon or chemical spills are classified as "low-risk" scenarios due to the use of bunded storage areas, secondary containment systems, and specialised treatment units such as siltbusters.
- **Grid Reliability:** Technical faults at the Wind Farm will not affect the national energy supply, as EirGrid manages the grid from National Control Centres to match electricity production to customer demand.
- **Substation Emissions:** The Proposed Development includes a 110 kV Gas Insulated Switchgear (GIS) onsite substation. In accordance with EU Regulation 2024/573 on fluorinated greenhouse gases, EirGrid stipulates that the insulating medium for 110 kV switchgear shall be SF_6 unless a specific derogation is approved. Where SF_6 or alternative F-gases are utilized, the equipment is designed to be hermetically sealed with a maximum annual leakage rate not exceeding 0.1% per annum per compartment. All equipment must be clearly labelled with the specific gas quantity (kg), its Global Warming Potential (GWP), and CO_2 equivalent. Due to these strict containment, monitoring, and recovery protocols required by EirGrid and EU law, operational emissions are considered imperceptible and are not a significant contributor to the Project's total carbon losses.

10.3.4.4.4 Emergency Preparedness

Residual risks are managed through a robust Construction Environmental Management Plan (CEMP) and an Emergency Response Procedure (ERP) provided in **Appendix 2.1**. The ERP provides procedures to be adopted in the event of an emergency involving site health and safety, contamination, or environmental protection. All staff will be required to adhere to the site Health and Safety Plan and proper use of Personal Protective Equipment.

10.3.4.4.5 Statement of Significant Effects

This vulnerability assessment identifies no likely significant effects, given the mitigation measures embedded in the design and the protocols defined in the CEMP. The Proposed Development is resilient to extreme meteorological, hydrological, and geological hazards, ensuring its vulnerability is minimized. Cumulative risks related to vulnerability are classified as low and are not expected to lead to significant adverse environmental impacts.

10.3.5 Do Nothing Effect

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 as detailed in **Chapter: 4 Planning and Policy**. The binding EU targets have been transposed into Irish National Policy in the CAP2025 which commits to a target 9 GW of onshore wind by 2030. This demonstrates the significance of wind energy in the Irish energy context and highlights the need for the proposed Project in reaching both EU and national renewable energy targets.

Ireland is obliged under the Renewable Energy Directive EU/2023/2413 (as amended) to ensure that 42.5% of the total energy consumed in heating, electricity and transport is generated from renewable resources by 2030. This is in order to help reduce the nation's CO_2 emissions and to promote the use of indigenous renewable sources of energy. These targets have been incorporated into national policy in the CAP2025 which aims to:

- Reduce CO_2 eq. emissions from the electricity sector by 62-81%.
- Deliver an early and complete phase-out of coal and peat fired electricity generation. (Note although peat-fired electricity generation has ceased in Ireland, coal and oil-fired plants are still operational. Tarbert Power Station (620 MW) was scheduled to close by 2023, and Moneypoint Power Station (915 MW) was scheduled to close by 2025. These closures have been delayed arising from concerns about the security of electricity supply. This delay means that more carbon emissions will arise. It highlights the urgency of constructing this and other wind farms.
- Increase electricity generated from renewable sources to 80%, including:
  - 9 GW of onshore wind energy

Furthermore, the Climate Act will act to reduce 51% emissions over a ten-year period to 2030, in line with the programme for Government which commits to a 7% average yearly reduction in overall greenhouse gas emissions over the next decade, and to achieving net zero emissions by 2050.

Under a 'Do Nothing' alternative, the Proposed Development will not be constructed. The land upon which Proposed Development will occur would remain unchanged. The main land use of the Wind Farm Site would remain as agriculture and or commercial forestry. Consequently, the environmental effects, identified in the EIAR, positive and negative, would not occur.

However, in the "Do-Nothing" scenario, the prospect of creating sustainable energy through County Mayo's wind energy resource would be lost at this Wind Farm Site. The Proposed Development's contribution to EU and National renewable energy and greenhouse gas reduction targets would be lost. This may result in the nation incurring significant financial penalties from the EU if targets are not achieved.

According to EirGrid Group's All-island Generation Capacity Statement 2021 – 2030 (EirGrid, 2021), the growth in energy demand for the next ten years on the Island of Ireland will be between 18% and 43%. In the 'Do-nothing' scenario, importation of fossil fuels to maintain growing energy supply will continue and Ireland's energy security will remain vulnerable. A "Do-nothing" scenario would contribute to strain on existing energy production and may effect on economic growth if energy demand cannot be met. The delays in closing Tarbert and Moneypoint means we continue to rely on imported fossil fuels with unpredictable pricing, a vulnerable supply chain and higher carbon emissions.

10.3.6 Potential Effects of the Proposed Development

10.3.6.1 Construction Phase

It is estimated that during the Wind Farm construction, an approximate total of 11,022 loads of material and building supplies will be delivered and removed from the Wind Farm Site. The majority of HGV movements to and from the Wind Farm Site will occur during the first eleven months of the construction period and will be associated with the construction of Site Access Tracks, Turbine Hardstands, Turbine Foundations, Onsite Substation and BESS compound.

The main GHG produced by vehicles is CO_2. Smaller quantities of N_2O and CH_4 are also produced (and emitted) by the fuel consumption process. The potency of these GHGs are very high, with 1 kg of N_2O releasing the equivalent of 298 kg of CO_2 into the atmosphere and 1 kg of CH_4 releasing the equivalent of 25 kg CO_2.

In the absence of mitigation measures the effect of vehicle movements associated with the construction phase will have, a short-term, moderate potential effects on GHG emissions. There will be no likely significant effects on climate from vehicle movements.

Carbon losses from excavation works is included in the carbon calculator and accounts for approximately 34.65% (53,828 tonnes) of the total carbon losses associated with the Proposed Development. This is considered to be a permanent, moderate, negative effect. There are no likely significant effects on carbon losses due to the construction of the Proposed Development.

10.3.6.2 Operation Phase

The operational phase of the Proposed Development does not contain any element which will produce GHG emissions or odorous emissions.

The Proposed Development will displace carbon dioxide from fossil fuel-based electricity generation, over the proposed 35-year lifespan of the Proposed Development. The Proposed Development will assist in displacing CO_2 emissions (49,719 tonnes per annum) from fossil fuel-based electricity generation, over the proposed 35-year lifespan of the Proposed Development. This is a long-term, moderate, positive effect on the climate.

Table 10.5 shows the number of homes that can be powered each year from the electrical energy produced by the Proposed Development. This was calculated at the maximum anticipated expected capacity of 66.8 MW, using a figure of 4.459 MWh of electrical energy per home (In 2022, the average home used 17.15 MWh of energy 26% of which is from electrical sources[46], equivalent to 4.459 MWh of energy). The CO_2 offset from the electricity generated (tonnes per annum) is also shown in **Table 10.5**, using the most recent SEAI emissions factor available for a full calendar year (2024) (0.224 kg of CO_2 per kWh)[47].

[46] Sustainable Energy Authority of Ireland (2022) Available at: https://www.seai.ie/data-and-insights/seai-statistics/residential/ [Accessed 15/04/2026]
[47] SEAI (2025) Energy in Ireland 2025 Report. Available at:://www.seai.ie/sites/default/files/publications/Energy-in-Ireland-2025.pdf .pdf [Accessed 15/04/2026]

The approximate emissions savings that can be achieved each year at a running capacity of 35%, instead of the equivalent output from the current mix of generating fuel in Ireland. This assessment assumes a scenario of 68.8 MW output for the Proposed Development.

Table 10.5: Statistics relating to Emissions Avoidance of the EIA Development

Factor	Contribution (68.8 MW)
Energy Produced (MWh per annum) 68.8 MW x 0.35 x 365 x 24 (35% capacity factor)	210,940 MWh per annum
Number of Homes Powered (per annum) (at 4.459 MWh/ house of electrically sourced energy)	47,306 homes per annum
CO_2 offset of electricity generated (tonnes per annum) (0.224 Kg of CO_2 per kWh)	47,251 tonnes per annum

These calculations show that the annual electricity needs for 47,306 homes can be met by electricity produced by the Proposed Development. In terms of CO_2 offset of electricity generated, 47,251 tonnes of CO_2 will be offset annually. The reduction of CO_2 emissions from electricity production using fossil-fuel by replacing it with wind energy will have a moderate positive and long-term effect in helping Ireland reduce its GHG emissions and meet its international obligations.

10.3.6.3 Decommissioning Phase

Any effects that occur during the decommissioning phase are similar to that which occur during the construction phase, albeit to a substantially lesser extent. The turbines will be dismantled and removed from the Wind Farm Site and the reinforced concrete bases and hardstands will be left in situ and allowed to revegetate naturally. The Site Access Tracks will also be left in-situ and remain in use by the landowners. Keeping the Turbine Foundations, buildings and Site Access Tracks in situ will greatly reduce the effect of GHGs; there will be no delivery loads associated with turbine and Onsite Substation foundations and Site Access Tracks during decommissioning.

The effect from this phase is expected to be slight, negative and temporary effect. There will be no likely significant effects on GHG emissions during the decommissioning phase.

10.3.7 Mitigation Measures

All mitigation measures detailed and assessed in this EIAR and outlined in the CEMP (**Appendix 2.1**) will be implemented onsite. Good practice site control measures will comprise the following:

10.3.7.1 Construction Phase Mitigation

Mitigation measures for reduction of GHGs are:

- All machinery when not in use will be turned off.
- Exhaust emissions from vehicles operating within the site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the Contractor by ensuring that emissions from vehicles are minimised through regular servicing of machinery.
- Use of local quarries, materials suppliers and waste facilities will be used, as outlined in **Chapter 17: Traffic and Transport**, minimising travel distances.
- A robust Traffic Management Plan (**Appendix 2.1, CEMP, Management Plan No. 7**) has been developed, utilising the most direct routes where possible. This plan will be updated to reflect project needs.

10.3.7.2 Operation Phase Mitigation

The operation phase of the Proposed Development will have a positive effect on the climate due to the displacement of fossil fuels and therefore no mitigation is necessary for this phase. Where turbine components are being replaced the same mitigation measures as per the construction phase will apply.

10.3.7.3 Decommissioning Phase Mitigation

Mitigation measures during the decommissioning phase will be similar to those employed during the construction phase as outlined above. The Decommissioning Plan (**Appendix 2.1, CEMP, Management Plan No. 6**) is a live documented and outlines the mitigation measures required for decommissioning.

10.3.8 Residual Effects of the Proposed Development

10.3.8.1 Construction Phase

There will be no likely significant effect to air and climate as a result of GHG emissions. There will be no significant likely effects regarding the proposed Developments vulnerability during this phase.

10.3.8.2 Operational Phase

There will be no likely significant effect to air and climate as a result of reduced GHG emissions. There will be no significant likely effects regarding the proposed Developments vulnerability during this phase

10.3.8.3 Decommissioning Phase

There will be no likely significant effect to air and climate as a result of GHG emissions. There will be no significant likely effects regarding the proposed Developments vulnerability during this phase

10.3.9 Cumulative Effects

Potential cumulative effects on the climate between the Proposed Development and nearby developments were also considered as part of this assessment. The other developments considered as part of the cumulative effects assessment are described in **Appendix 1.2** and **Appendix 1.5**.

During the construction phase of the Proposed Development and other consented developments within 20 km that are yet to be constructed, minor exhaust and dust will occur. In a worst-case scenario, if any of these developments were built concurrently with the Proposed Development, there would be a short-term, slight negative cumulative effect on the climate due to exhaust and dust emissions.

Once operational, the Proposed Development will have a long-term, significant positive effect on the climate. The cumulative effect is expected to be positive in terms of carbon reduction and climate benefits.

During the operational phase emissions of CO_2, NO_x, SO_2 or dust emissions from the Proposed Development and other projects listed in **Appendix 1.2** and **Appendix 1.5**, will result from the operation and maintenance vehicles onsite. However, these emissions will be minimal. Therefore, there will be a long-term imperceptible negative cumulative effect on the climate.

Cumulative effects during the decommissioning phase will be similar to those during the construction phase, although slightly less due to the reduced scope of work, as some infrastructure, such as Turbine Foundations, Site Access Tracks and the Onsite Substation will remain in-situ.

Once operational, the Proposed Development will have a cumulative, long-term, and significant positive effects on the climate.

10.3.10 Summary of Significant Effects

This assessment has identified no likely significant effects, given the mitigation measures embedded in the design and recommended for the implementation of the Proposed Development.

The nature of the Proposed Development is such that once operational, it will have a significant, positive and long term, effect on the air and climate. It is considered that the cumulative effects will be positive in terms of carbon reduction and the climate also.

10.3.11 Statement of Significance

The Proposed Development has been assessed as having the potential to result in a short-term imperceptible, negative effect on Climate and vulnerability during construction. There will be long-term significant, positive effect on climate as a result of reduced GHG emission during the operational phase.

Potential cumulative effects of the Proposed Development and other developments within 20 km on air and climate was assessed as having a long-term, significant, positive effect on the Climate