8. AIR QUALITY AND CLIMATE

8.1 Air Quality

8.1.1 Introduction

This chapter identifies, describes and assesses the potential significant direct and indirect effects on Air Quality arising from the construction, operation and decommissioning of the Subject Development. The full description of the Subject Development is detailed in Chapter 3. Alternatives for the Subject Development and their potential for effects on Air Quality are considered in Chapter 2.

8.1.2 Background

The Site is located in Co. Donegal approximately 8km southwest of the twin towns of Ballybofey and Stranorlar and approximately 12km northeast of Donegal Town. The Site measures approximately 903 hectares and comprises of a mix of conifer forestry, blanket bog and the partially constructed Meenbog Windfarm.

Due to the non-industrial nature of the Subject Development and the general character of the surrounding environment, air quality sampling was deemed to be unnecessary for this rEIAR. It is expected that air quality in the existing environment is good, since there are no major sources of air pollution (e.g., heavy industry) in the vicinity of the Site.

Some minor indirect emissions associated with the construction of the Subject Development include vehicular and dust emissions. The construction phase of the Subject Development is now completed and limited further vehicular and dust emissions are expected in the operational phase of the Subject Development.

8.1.3 Statement of Authority

This section of the rEIAR has been prepared by Eoin O'Sullivan and Malena Thren and reviewed by Michael Watson.

Malena Thren is a Graduate Environmental Scientist with MKO. Malena holds a first-class Honours in BSc (Hons) Environmental Science from University of Galway (previously known as NUI Galway) in 2023. Prior to taking up her position with MKO in September 2023, she worked with the university and local authorities on a variety of award-winning environmental campaigns as Students' Union Officer and Sustainability Leadership Intern. Her key strengths and expertise are in report writing, research and communication and she is experienced in data analysis and QGIS mapping. Since joining MKO, Malena has been involved in the preparation of Environmental Impact Assessment Screening and Scoping Reports, License Monitoring, Project Management, Construction Management Plans, Environmental Impact Assessment Reports, Research projects and Environmental Reports.

Eoin O'Sullivan is Project Director Environment at MKO with over 15 years of experience in the assessment of a wide range of energy and infrastructure related projects and working in the fields of environmental and human health risk assessment, waste management, waste policy and permitting. Eoin has wide experience in the project management of large scale infrastructural projects and brownfield developments which includes all aspects of geo-environmental and geotechnical investigation. Eoin also has extensive experience in the preparation of air assessments and reports for EIAs. Eoin holds a BSc (Hons) in Environmental Science & Technology and a MSc in Environmental Engineering. Eoin is a Chartered Member of the Chartered Institute of Water and Environmental Management and Chartered Environmentalist with the Society of Environment.

8.1.4 Relevant Guidance and Legislation

The Air Quality and Climate section of this rEIAR is carried out in accordance with the 'EIA Directive' as amended by Directive 2014/52/EU and having regard, where relevant, to guidance listed below.

- Air Quality Assessment of Proposed National Roads – Standard PE-ENV-01107' (Transport Infrastructure Ireland, December 2022).
- Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes '(National Roads Authority (NRA), 2006).
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports – May 2022' (EPA, 2022).
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report' (EC, 2017).
- Environmental Protection Agency (2023) Air Quality in Ireland Report 2022.
- Environmental Protection Agency (2021) Best Practice Guidelines on the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects.
- Guidance on the Assessment of Dust from Demolition and Construction V2.2 (IAQM 2024).
- Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (TII 2011).
- Guidelines for Assessment of Ecological Impacts of National Roads Schemes (TII 2009).
  Rialtas na Éireann Clean Air Strategy for Ireland (April 2023).
- UK Department of Environment Food and Rural Affairs (DEFRA) Part IV of the Environment Act 1995: Local Air Quality Management, LAQM.TG (16) (DEFRA 2018).
- UK Highways Agency (UKHA) Design Manual for Roads and Bridges (DMRB) – LA
- 105 Air Quality (UKHA 2019).
- World Health Organization (WHO) Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide Global Update 2005 (WHO 2005).

8.1.5 Scoping and Consultation

The scope for this assessment has been informed by consultation with statutory consultees, bodies with environmental responsibility and other interested parties as summarised in Section 2.5 of Chapter 2 of the rEIAR. Details of these scoping responses pertaining to air quality are listed below and outlined in Section 2.5.2 of this rEIAR.

Health Service Executive (HSE)

The HSE asks for Air and Dust to be considered in this rEIAR. The HSE highlights that the generation of airborne dust has the potential to have significant impacts on sensitive receptors and requests for a CEMP to be included detailing dust control and mitigation measures to be included.

Transport Infrastructure Ireland

The developer, in preparing the rEIAR, should have regard to TII's Environmental Assessment and Construction Guidelines, including the '*Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes'* (National Roads Authority (NRA), 2006).

8.1.5.2 Air Quality Standards

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

- The first Daughter Directive (1999/30/EC) addresses sulphur dioxide, oxides of nitrogen, particulate matter and lead.
- The second Daughter Directive (2000/69/EC) addresses carbon monoxide and benzene. The first two Daughter Directives were transposed into Irish law by the Air Quality Standards Regulations 2002 (SI No. 271 of 2002).
- The third Daughter Directive, Council Directive (2002/3/EC) relating to ozone was published in 2002 and was transposed into Irish law by the Ozone in Ambient Air Regulations 2004 (SI No. 53 of 2004).
- The fourth Daughter Directive[1], published in 2004, relates to polyaromatic hydrocarbons (PAHs), arsenic, nickel, cadmium and mercury in ambient air and was transposed into Irish law by the Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations, 2009 (S.I. No. 58 of 2009).

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

- The merging of most of the existing legislation into a single Directive (except for the Fourth Daughter Directive) with no change to existing Air Quality objectives.
- New Air Quality objectives for particulate matter less than 2.5 micrometers (µm) referred to as $PM_{2.5}$ 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 less than 10µm (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.

Table 8-1 to Table 8-3 below sets out the limit values of the CAFE Directive, as derived from the Air Quality Framework Daughter Directives. Limit values are presented in micrograms per cubic metre (µg/m^3) and parts per billion (ppb). The notation PM_{10} is used to describe particulate matter or particles of 10µm or less (coarse particles) in aerodynamic diameter. $PM_{2.5}$ represents particles measuring less than 2.5µm (fine particles) in aerodynamic diameter.

The CAFE Directive was transposed into Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011). These Regulations supersede the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and the Ambient Air Quality Assessment and Management Regulations 1999 (S.I. No. 33 of 1999).

On the 26th of October 2022 the EU Commission announced a proposed review of Air Quality Standards. The proposed revision will set interim 2030 EU Air Quality standards, seeking to align more closely with WHO recommendations, while putting the EU on a trajectory to achieve zero pollution for air at the latest by 2050, in synergy with climate-neutrality efforts. To this end, regular reviews of the air quality standards are proposed to reassess them in line with latest scientific evidence as well as societal and technological developments. The first review is proposed to take place by the end of 2028, with the objective of ensuring full alignment with WHO recommendations[2].

[1] *IEEP Fourth Daughter Directive 2004. Available at: https://ieep.eu/publications/the-fourth-air-quality-daughter-directive-impacts-and-consequences-of-mandatory-limits/*

[2] [1] https://environment.ec.europa.eu/topics/air/air-quality/revision-ambient-air-quality-directives_en

Table 8-1 Limit values of the CAFE Directive 2008/50/EC (Source: https://airquality.ie/information/air-quality-standards)

Pollutant	Limit Value Objective	Averaging Period	Limit Value (µg/m3)	Limit Value (ppb)	Basis of Application of Limit Value	Attainment Date
Sulphur dioxide (SO_2)	Protection of Human Health	1 hour	350	132	Not to be exceeded more than 24 times in a calendar year	1st Jan 2005
Sulphur dioxide (SO_2)	Protection of human health	24 hours	125	47	Not to be exceeded more than 3 times in a calendar year	1st Jan 2005
Sulphur dioxide (SO_2)	Protection of vegetation	Calendar year	20	7.5	Annual mean	19th Jul 2001
Sulphur dioxide (SO_2)	Protection of vegetation	1st Oct to 31st Mar	20	7.5	Winter mean	19th Jul 2001
Nitrogen dioxide (NO_2)	Protection of human health	1 hour	200	105	Not to be exceeded more than 18 times in a calendar year	1st Jan 2010
Nitrogen dioxide (NO_2)	Protection of human health	Calendar year	40	21	Annual mean	1st Jan 2010
Nitrogen monoxide (NO) and nitrogen dioxide (NO_2)	Protection of ecosystems	Calendar year	30	16	Annual mean	19th Jul 2001
Particulate matter 10 (PM_{10})	Protection of human health	24 hours	50	-	Not to be exceeded more than 35 times in a calendar year	1st Jan 2005
Particulate matter 2.5 ($PM_{2.5}$)	Protection of human health	Calendar year	40	-	Annual mean	1st Jan 2005
Particulate matter 2.5 ($PM_{2.5}$) Stage 1	Protection of human health	Calendar year	25	-	Annual mean	1st Jan 2015
Particulate matter 2.5 ($PM_{2.5}$) Stage 2	Protection of human health	Calendar year	20	-	Annual mean	1st Jan 2020

Pollutant	Limit Value Objective	Averaging Period	Limit Value (µg/m3)	Limit Value (ppb)	Basis of Application of Limit Value	Attainment Date
Lead (Pb)	Protection of human health	Calendar year	0.5	-	Annual mean	1st Jan 2005
Carbon Monoxide (CO)	Protection of human health	8 hours	10,000	8,620	Not to be exceeded	1st Jan 2005
Benzene (C_6H_6)	Protection of human health	Calendar Year	5	1.5	Annual mean	1st Jan 2010

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

Table 8-2 Upper and Lower Assessment Thresholds from CAFE Directive 2008/50/EC

Pollutant	Limit Value Objective	Averaging Period	Limit Value (µg/m³)	Basis of Application of Limit Value
Sulphur dioxide (SO_2)	Upper assessment threshold for the protection of Human Health	24 hours	75	Not to be exceeded more than 3 times in a calendar year
Sulphur dioxide (SO_2)	Lower assessment threshold for the protection of human health	24 hours	50	Not to be exceeded more than 3 times in a calendar year
Nitrogen dioxide (NO_2)	Upper assessment threshold for the protection of human health	1 hour	140	Not to be exceeded more than 18 times in a calendar year
Nitrogen dioxide (NO_2)	Lower assessment threshold for the protection of human health	1 hour	100	Not to be exceeded more than 18 times in a calendar year
Particulate matter 10 (PM_{10})	Upper assessment threshold	24 hours	35	Not to be exceeded more than 35 times in a calendar year
Particulate matter 10 (PM_{10})	Lower assessment threshold	24 hours	25	Not to be exceeded more than 35 times in a calendar year
Lead (Pb)	Upper assessment threshold	Calendar Year	0.35	-
Lead (Pb)	Lower assessment threshold	Calendar Year	0.25	-

Pollutant	Limit Value Objective	Averaging Period	Limit Value ($\mu g/m^3$)	Basis of Application of Limit Value
Carbon Monoxide (CO)	Upper assessment threshold	8 hours	7000	-
Carbon Monoxide (CO)	Lower assessment threshold	8 hours	5000	-
Benzene (C_6H_6)	Upper assessment threshold	Calendar Year	3.5	-
Benzene (C_6H_6)	Lower assessment threshold	Calendar Year	2	-

Table 8-3 Alert Thresholds for Sulphur Dioxide and Nitrogen Dioxide Defined in Directive 2008/50/EC (source: https://airquality.ie/information/air-quality-standards)

Pollutant	Averaging Period	Threshold
Sulphur Dioxide	To be measured over three consecutive hours at locations representative of Air Quality over at least 100 km^2 or an entire zone or agglomeration, whichever is the smaller.	500 $\mu g/m^3$
Nitrogen Dioxide	To be measured over three consecutive hours at locations representative of Air Quality over at least 100 km^2 or an entire zone or agglomeration, whichever is the smaller.	400 $\mu g/m^3$

The Ozone Daughter Directive 2008/50/EC is different from the other Daughter Directives in that it sets target values and long-term objectives for ozone rather than limit values. Table 8-4 presents the limit and target values for ozone and Table 8.5 the relevant Ozone thresholds.

Table 8-4 Target values for Ozone Defined in Directive 2008/50/EC (source: https://airquality.ie/information/air-quality-standards)

Objective	Parameter	Target Value from 2010	Long term Objective from 2020
Protection of human health	Maximum daily 8 hour mean	120 $\mu g/m^3$ not to be exceeded more than 25 days per calendar year averaged over 3 years	120 $\mu g/m^3$
Protection of vegetation	AOT_{40} calculated from 1-hour values from May to July	18,000 $\mu g/m^3$-h averaged over 5 years	6,000 $\mu g/m^3$-h

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

Table 8-5 Alert Thresholds for Ozone as Defined in Directive 2008/50/EC (source: https://airquality.ie/information/air-quality-standards)

Pollutant	Averaging Period	Threshold
Ozone Information Threshold	1 hour average	180 µg/m^3
Ozone Alert Threshold	1 hour average	240 µg/m^3

8.1.5.3 Air Quality and Health

In September 2023, the Environmental Protection Agency (EPA) published 'Air Quality in Ireland 2022' (the "EPA 2022 Report") which reports that although air quality in Ireland is generally good, there are concerning localised issues. Fine particulate matter ($PM_{2.5}$) from solid fuel combustion and nitrogen dioxide (NO_2) from vehicle emissions are the main pollutants. People's health and the health of our environment is impacted by these pollutants. Ireland's ambition in the 'Clean Air Strategy for Ireland' (discussed below) is to move towards the WHO air quality guidelines, this will be challenging but will have a significantly positive impact on health.

The European Environmental Agency (EEA) Report, 'Air Quality in Europe – 2022 Report' highlights the negative effects of air pollution on human health across the EU. The report assessed that poor air quality accounted for premature deaths of approximately 238,000 people in the 27 EU Member States in 2021 and in 2020 in the European Union, 96% of the urban population was exposed to levels of fine particulate matter above the health-based guideline level set by the WHO. Furthermore, in 2020, damaging levels of nitrogen deposition to ecosystems were exceeded in 75% of the total ecosystem area in the 27 EU Member States. This represents a fall of 12% since 2005.

These emissions, along with others including sulphur oxides, carbon monoxide, benzene and lead are produced during fossil fuel-based electricity generation and traffic in various amounts, depending on the fuel and technology used. Whilst there is the potential of such emissions to be generated from the construction, operational and decommissioning phases of the Subject Development, several mitigation measures will be implemented at the Site to reduce the impact from dust and vehicle emissions, which are discussed in Section 8.2 below.

8.1.5.3.1 *Clean Air Strategy for Ireland 2023*

Irelands 'Clean Air Strategy 2023[3] sets out the detail of seven strategic frameworks that will be used to ensure that Air Quality continues to improve. The aims of these key strategic frameworks are:

- To set the appropriate targets and limits to ensure continuous improvements in Air Quality across the country, to deliver health benefits for all.
- To ensure the integration of clean air considerations into policy development across Government.
- To increase the evidence base that will help us to continue to evolve our understanding of the sources of pollution and their impacts on health, in order to address them more effectively.
- To enhance regulation required to deliver improvements across all pollutants.
- To improve the effectiveness of our enforcement systems.
- To promote and increase awareness of the importance of clean air, and the links between cleaner air and better health.

[3] *Rialtas na hÉireann Clean Air Strategy April 2023. Available at: https://www.gov.ie/en/publication/927e0-clean-air-strategy/#:~:text=The%20Clean%20Air%20Strategy%20provides,delivering%20on%20wider%20national%20objectives.*

- To develop the additional targeted/specific policy measures as required to deal with national or local Air Quality issues.

Figure 8-1 Seven Strategic Frameworks for Air Quality, with associated chapters in brackets. Reproduced as Figure 1 from Clean Air Strategy 2023

Chapter 11 of the Clean Air Strategy 2023 discusses Air Quality Policy Development. The chapter discusses energy policy and acknowledges how the State's accelerated transition to renewable electricity will be critical to successfully meeting the ambitious renewable energy and greenhouse gas emission reduction targets outlined in the European Green Deal and Ireland's Climate Action Plan 2023, as well as protecting against security of supply risks and removal of fossil fuels from power generation. Wind (offshore and onshore) and solar energy will be the leading cost-effective technologies to achieve our energy and emissions targets, as well as displacing emissions in other sectors, including household heating and vehicle transport.

8.1.6 Methodology

8.1.6.1 Air Quality Zones

The EPA has designated four Air Quality Zones for Ireland:

- Zone A: Dublin
- Zone B: Cork
- 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 Cafe Directive 2008/50/EC, and Daughter Directives.

The Air Quality Zone for the Site was selected followed by a review of EPA collated baseline air quality data namely Sulphur Dioxide (SO_2), Particulate Matter ($PM10$), Nitrogen Dioxide (NO_2), Carbon Monoxide (CO) and Ozone (O_3) for the selected Air Quality Zone to determine the representative levels of such emissions for the Subject Development.

The Site lies within Zone D which represents rural areas located away from large population centres.

8.1.6.2 Air Quality Data Review

The EPA publishes Air Monitoring Station Reports for monitoring locations in all four Air Quality Zones. The EPA 2022 Report provides SO_2, PM_{10}, NO_2 and O_3 concentrations for areas in Zone D. Values for each of these elements recorded within the Zone D monitoring stations listed in the EPA 2022 Report have been averaged to give representative values for Zone D. Similar measurement values for all air quality parameters would be expected for the Site as it lies in a rural location, within Zone D.

8.1.7 Baseline Air Quality

The Air Quality in the vicinity of the Site is typical of that of rural areas in the West of Ireland, i.e., Zone D. Prevailing south-westerly winds carry clean, unpolluted air from the Atlantic Ocean onto the Irish mainland. . The concentrations of SO2, PM, NO AND O for Zone D are detailed in the following tables.

8.1.7.1 Sulphur Dioxide (SO_2)

Sulphur dioxide data for Cork Harbour, Kilkitt, Askeaton, Edenderry and Letterkenny in 2022 is presented in Table 8-6.

Table 8-6 Average Sulphur Dioxide Data for Zone D Sites in 2022

Parameter	Measurement
Annual Mean	5.0 µg/m^3
Hourly values > 350	0
Hourly max (Average)	83.6 µg/m^3
Daily values > 125	0
Daily max (Average)	22.8 µg/m^3

During the monitoring period annually in 2022 there were no exceedances of the daily limit values for the protection of human health. As can be observed from Table 8-6, the average maximum hourly value recorded during the monitoring period was 83.6 µg/m^3. In addition, there were no exceedances of the annual mean limit for the protection of ecosystems. It would be expected that existing SO_2 values at the Site would be similar or lower than those recorded for the Zone D sites above As outlined above, the Site lies within Zone D which represents rural areas located away from large population centres. The measurement points for air quality in Zone D are located within population centres, albeit small. Therefore It would be expected that existing SO_2 values at the Site would be similar or lower than those recorded for the Zone D sites above as the Site is located at the closest 8km from the nearest population centre.

8.1.7.2 Particulate Matter (PM_{10})

Sources of particulate matter include vehicle exhaust emissions, soil and road surfaces, construction works and industrial emissions. The EPA 2022 Report provides annual mean PM_{10} concentration for sixteen Zone D towns, Tipperary Town, Carrick-on-Shannon/ Askeaton, Enniscorthy, Birr, Macroom, Castlebar, Cobh Carrignafoy, Claremorris, Kilkitt, Cavan, Roscommon Town, Edenderry, Mallow, Longford, Killarney and Cobh Cork Harbour. Particulate matter (PM_{10}) data for 2022 is presented in Table 8-7.

Table 8-7 Average Particulate Matter (PM_{10}) Data for Zone D Sites in 2022

Parameter	Measurement
Annual Mean	12.7 µg/m^3
% Data Capture (Average)	93.2%
Values > 50 ug/m^3	Max. 10
Daily Max (Average)	56.5 µg/m^3

Notes: [1] PM_{10} daily limit for the protection of human health: No more than 35 days >50 µg/m^3

The daily limit of 50 µg/m^3 for the protection of human health was not exceeded more than 35 days during the monitoring period of 2022. It would be expected that PM_{10} values at the Site would be similar or lower than those recorded for the Zone D sites above. In the EPA 2022 Report, it notes that there were breaches in the levels of particulate matter (PM), which in Ireland, mainly comes from the burning of solid fuel, such as coal, peat, and wood to heat our homes.

8.1.7.3 Nitrogen Dioxide (NO_2)

Zone D level are measured in the following locations for the EPA 2022 Report. Nitrogen dioxide data for Emo Court, Birr, Castlebar, Carrick-on-Shannon, Edenderry and Kilkitt in 2022 is presented in Table 8-8.

Table 8-8 Average Nitrogen Dioxide Data for Zone D Sites in 2022

Parameter	Measurement
Annual Mean (Average)	7.4 µg/m^3
NO_2 Values >200	0
Values > 140 (UAT)	1
Values >100 (LAT)	4
Hourly Max. (Average)	87.3 µg/m^3

The annual NO_2 value was below the annual mean limit value for the protection of human health of 40 µg/m^3. Furthermore, the lower assessment threshold of 100 µg/m^3 was exceeded 4 no. times during the monitoring period in Emo Court, Co. Laois and the upper assessment threshold of 140 µg/m^3 was exceeded once during the monitoring period, also in Emo Court, Co. Laois. Both did not exceed the 18 day limit during the monitoring period. In 2022, no other monitoring locations in Zone D had exceedances of the lower and upper assessment thresholds of 100 and 140 µg/m^3 respectively. The average hourly max. NO_2 value of 87.3 µg/m^3 measured during the monitoring period was below the hourly max threshold of 200 µg/m^3. It would be expected that NO_2 values at the Site would be similar or lower than those recorded for the Zone D sites above.

8.1.7.4 Carbon Monoxide (CO)

The EPA Report provides rolling 8-hour carbon monoxide concentrations for Birr, a Zone D site. Carbon Monoxide data for 2022 is presented in Table 8-9 below.

Table 8-9 Carbon Monoxide Data for Birr - Zone D Site in 2022

Parameter	Measurement
Annual Mean	0.8 mg/m^3
Median	0.7 mg/m^3
% Data Capture	95.9%
Values > 10	0
Max	3.4mg/m^3

The average annual mean concentration of carbon monoxide was 0.8 mg/m^3. The carbon monoxide limit value for the protection of human health is 10,000 µg/m^3 (or 10mg/m^3). On no occasions were values in excess of the 10 mg/m^3 limit value set out in Directive2008/50/EC. It would be expected that CO values at the Subject Development site would be similar or lower than those recorded for the Zone D sites above.

8.1.7.5 Ozone (O_3)

The EPA 2022 Report provides rolling 8-hour ozone concentrations for seven Zone D sites, Emo Court, Kilkitt, Carnsore Point, Mace Head, Castlebar, Valentia and Malin Head. Ozone (O_3) data for 2022 is presented in Table 8-10. As can be observed from Table 8-10, in 2022 there were 17 no. exceedances of the maximum daily eight-hour mean limit of 120 µg/m^3. The legislation stipulates that this limit should not be exceeded on more than 25 no. days. It would be expected that O_3 values at the Subject Development would be similar or lower than those recorded for the Zone D sites below.

Table 8-10 Average Ozone Data for Zone D Sites in 2022

Parameter	Measurement
Annual Mean	61.7 µg/m^3
Median	62.2µg/m^3
% Data Capture	89.5%
No. of days > 120 µg/m^3	17 days

8.1.7.6 Dust

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

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

The potential dust-related effects on local air quality and the relevant associated mitigation measures are presented in Sections 8.2.2 below.

Existing Receptor Locations

According to the Institute of Air Quality Management in the UK (IAQM) guidance document '*Guidance on the Assessment of Dust from Demolition and Construction*' (2024), dust deposition impacts can occur for a distance of 250m from works areas, but the majority of deposition occurs within the first 50m (IAQM, 2024). According to the IAQM guidance, residences are considered as *high sensitivity receptors* as these are places where people are likely to spend most of their time. For the purpose of this rEIAR, residences are referred to as 'Receptor Locations'. Commercial properties and places of work are regarded as medium sensitivity while low sensitivity receptors are places where people are present for short periods or do not expect a high level of amenity. An 'Ecological Receptor' refers to any sensitive habitat affected by dust soiling. For locations with a statutory designation, consideration should be given as to whether the particular site is sensitive to dust, and this will depend on its Qualifying Interests.

Detail on receptor locations considered in this rEIAR regarding persons or property is available in Chapter 4 Population and Human Health and for Ecological Receptors available in Chapter 5 Biodiversity. The nearest receptor location is 500m from the Subject Development at its closest extent.

8.1.8 Likely Significant Effects and Associated Mitigation Measures

8.1.8.1 'Do-Nothing' Scenario

Under the Do-Nothing scenario, the 25 deviations that comprise the Subject Development would be removed and restored to the greatest extent practicable. The Meenbog Wind Farm would then be completed in accordance with the current planning permission (ABP Ref: PA05E.300460). This approach may lead to environmental effects due to the potentially extensive groundworks required to remove and restore the existing peat cells, portions of access roads, laybys, and hardstands, and peat containment berm. New access road sections and hardstands would then be constructed in the slightly different, and less optimal, locations shown on the permitted Meenbog Wind Farm plans. Unauthorised borrow pits would be backfilled to the greatest extent possible with spoil and peat and revegetated. Unauthorised peat cells would be dismantled, and the stored peat material would be removed from the site for disposal elsewhere.

The 'Do-Nothing; Scenario would likely have a greater, albeit imperceptible effect on air quality than the selected option of regularising the Subject Development. The removal of the existing Subject Development would result in additional dust emissions from construction works and exhaust emissions from machinery and plant.

8.1.8.2 Construction Phase

8.1.8.2.1 *Exhaust Emissions*

The construction of the Subject Development required the operation of construction vehicles and plant on and off-site and the transport of workers to and from the Site. Exhaust emissions associated with vehicles and plant such as NO_2, Benzene and PM_{10} arose as a result of construction activities. This is considered to have had a Short Term, Slight Negative Effect on Air Quality.

Mitigation measures to reduce this effect are presented below.

Mitigation

- All construction machinery was maintained in good operational order while on-site, minimising any emissions that were likely to arise.
- Machinery that was used intermittently was shut down or throttled back to a minimum when not in use.
- Construction traffic was restricted to defined routes and a speed limit was implemented.

- The expected waste volumes generated onsite were not large enough to warrant source segregation at the Site. Therefore, all waste streams generated onsite were deposited into a single waste skip which was covered. This waste material was transferred to a licensed /permitted Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste was sorted into individual waste streams for recycling, recovery or disposal. The MRF facility was local to the Site to reduce the emissions associated with vehicle movements. There are two waste facilities within 25km of the site, the first in Ballynacarrick to the Southwest of the site and the second Northeast of the site between Castlefinn and Strabane.
- A Construction and Environmental Management Plan (CEMP) was in place throughout the construction phase (see Appendix 3-2).

Residual Effect

With the implementation of the above measures during the construction phase, residual impacts on air quality from exhaust emissions associated with construction activities and machinery were considered to have a Short Term Imperceptible, Negative Effect on Air Quality.

Significance of Effects

Based on the evaluation above there was no significant direct or indirect effects on air quality due to the construction of the Subject Development.

8.1.8.2.2 *Dust Emissions*

The construction of access roads, peat storage cells, borrow pits, berms and stilling ponds gave rise to dust emissions. The majority of the construction materials for the Subject Development was won from the onsite borrow pits. The removal of topsoil followed by its transportation and deposition to the peat storage cells during the construction phase also gave rise to dust emissions.

This is considered to have a Short-term Slight Negative Effect pre mitigation. Mitigation measures to reduce the significance of this effect are presented below.

Mitigation

- Water misting or bowsers operated on-site as required to mitigate dust in dry weather conditions.
- The transport of soils or other material, which had significant potential to cause dust, was undertaken in tarpaulin-covered vehicles where necessary.
- In periods of extended dry weather, dust suppression was necessary along haul roads and around the borrow pit area to ensure dust did not cause a nuisance. Water was taken from stilling ponds in the site's drainage system and was pumped into a bowser or water spreader to dampen down haul roads and site compounds to prevent the generation of dust. Silty or oily water was not used for dust suppression, because this would transfer the pollutants to the haul roads and generate polluted runoff or more dust. Water bowser movements were carefully monitored, as the application of too much water could have led to increased runoff.
- A Construction and Environmental Management Plan (CEMP) was in place throughout the construction phase (see Appendix 3-2). The CEMP included dust suppression measures.

Residual Effect

Following implementation of the mitigation measures above, residual effects of dust emissions on air quality for the construction phase of the Subject Development had a Short-term Imperceptible, Negative Effect.

Significance of Effects

Based on the evaluation above there was no significant direct or indirect effects on air quality from dust emissions.

8.1.8.3 Operational Phase

8.1.8.3.1 *Exhaust Emissions*

There will be limited additional traffic generated due to the operational phase of the Subject Development. The Subject Development is an integrated part of the Meenbog Windfarm. Any traffic that will be generated by the Meenbog Windfarm will be limited to the transport of a small number of security and maintenance staff to and from the Site and has been assessed as part of the Permitted Development. Over the 30-year lifespan of the Meenbog Windfarm, it is anticipated that the Subject Development will give rise to a long-term imperceptible negative effect on air quality.

8.1.8.3.2 *Dust Emissions*

There will be no additional dust generated due to the operational phase of the Subject Development. The Subject Development is an integrated part of the Meenbog Windfarm. Any dust emissions that may arise are the same as operational emissions that were assessed and considered acceptable under the Permitted Development.

8.1.8.4 Decommissioning Phase

8.1.8.4.1 *Exhaust Emissions*

There may be limited additional exhaust emissions generated from construction machinery and plant from activities due to the decommissioning phase of the Subject Development. The Subject Development is an integrated part of the Meenbog Windfarm. It is assumed that the majority of components will be left in situ. A decommissioning plan will be prepared to address details. There may be a short term negative imperceptible effects on air quality during the decommissioning phase of the Subject Development due to exhaust emissions from machinery and limited works required as per the decommissioning plan.

8.1.8.4.2 *Dust Emissions*

In the case of decommissioning of the Subject Development, the majority of components of the Subject Development will be left in situ. A decommissioning plan will be prepared to address details. There may be a short term negative imperceptible effects on air quality during the decommissioning phase of the Subject Development due to dust emissions from machinery and limited works required as per the decommissioning plan.

8.1.9 Cumulative and In-Combination Assessment

Potential cumulative effects on air quality between the Subject Development, the Permitted Development, the November 2020 Peatslide and associated remediation works, and other plans or projects as set out in the cumulative project List (Appendix 2-1) were also considered as part of this assessment.

There were no significant effects on air quality resulting from the construction phase of the Subject Development. The Permitted Development and Subject Development were constructed simultaneously, as were emergency works and remediation works associated with the November 2020 Peatslide. Taking a precautionary approach it can be considered that there was a Short-term, Imperceptible, Negative, local cumulative effect on air quality due to vehicular and dust emissions during the construction phase when the Subject Development is considered cumulatively with the Permitted Development and the November 2020 Peat Slide.

Due to the remote location of the site, there were no other projects identified within 500m of the Subject Development. Therefore, there was no potential for cumulative effect associated with dust emissions in combination with other projects. There were no relevant projects within 1km of the Subject Development and therefore there was no potential for cumulative air quality effects. There were no significant cumulative air quality effects when the Subject Development is considered in combination with the other projects listed in Appendix 2-1.

No significant cumulative air quality effects are anticipated during the completion of the construction phase of Meenbog Windfarm or in the post-construction phases of the Subject Development.

8.2 Climate

8.2.1 Introduction

This section identifies, describes and assesses the potential significant direct and indirect effects on climate arising from the construction, operation and decommissioning of the Subject Development. The full description of the Subject Development is detailed in Chapter 3 of this rEIAR. Alternatives for the Subject Development and their potential for effects on climate are considered in Chapter 2 of this rEIAR.

The climate section of this EIAR is carried out in accordance with the 'EIA Directive' as amended by Directive 2014/52/EU and has been prepared in accordance with guidance listed in Section 1.6.2 of Chapter 1: Introduction.

All relevant legislation and policy in relation to climate is outlined in detail in Chapter 2 of this rEIAR. A summary of the same is provided in the following sections.

8.2.1.1 Statement of Authority

This section of the EIAR has been prepared by Catherine Johnson and Ellen Costello, and reviewed by Michael Watson, all of MKO. Catherine is an Environmental Scientist and Climate Practitioner at MKO with over one year of consultancy experience in climate and sustainability. Prior to joining MKO in 2022, Catherine worked as an Environmental Social Governance (ESG) analyst for Acasta in Edinburgh. Catherine has expertise in international climate law and policy, earth science, and sustainability/ESG processes. Catherine has a BSc in Earth and Ocean Science and an LLM in Global Environment and Climate Change Law. Ellen is a Project Environmental Scientist and Climate Practitioner with over four years of consultancy experience with MKO and has been involved in a range of projects including climate and sustainability context reports for masterplans and commercial developments, renewable energy infrastructure projects, and the compilation of numerous chapters including the preparation of climate assessments for Environmental Impact Assessment Reports. Ellen holds a BSc. in Earth Science and a MSc. in Climate Change: Integrated Environmental and Social Science Aspects where she focused her studies on climate adaptation and mitigation, and its implications on environment and society.

Michael Watson is a Director of Environment in MKO. Michael has over 20 years' experience in the environmental sector. Following the completion of his master's degree in environmental resource management, Geography, from National University of Ireland, Maynooth he worked for the Geological Survey of Ireland and then a prominent private environmental & hydrogeological consultancy prior to joining MKO in 2014. Michael's professional experience includes managing Environmental Impact Assessments, EPA License applications, hydrogeological assessments, environmental due diligence and general environmental assessment on behalf of clients in the wind farm, waste management, public sector, commercial and industrial sectors nationally. Michaels key strengths include project strategy advice for a wide range and scale of projects, project management and liaising with the relevant local authorities, Environmental Protection Agency (EPA) and statutory consultees as well as coordinating the project teams and sub-contractors. Michael is a key member of the MKO senior management team and as head of the Environment Team has responsibilities to mentor various grades of team members, foster a positive and promote continuous professional development for employees. Michael also has a Bachelor of Arts Degree in Geography and Economics from NUI Maynooth, is a Member of IEMA, a Chartered Environmentalist (CEnv) and Professional Geologist (PGeo).

8.2.1.2 Scoping and Consultation

The scope for this assessment has been informed by consultation with statutory consultees, bodies with environmental responsibility and other interested parties as summarised in Section 2.5 of Chapter 2 of the rEIAR. Details of these scoping responses pertaining to climate are listed below and outlined in Section 2.5.2 of this rEIAR.

Table 8-11 Summary of Climate Related Scoping Response

Consultee	Description	Addressed in Section
Health Service Executive (HSE)	The Health Service Executive (HSE) recommends that the following matters are included and assessed as part of the EIAR: › Climate Change and Opportunity for Health Gain	Section 8.2.5 and 8.3

8.2.2 Climate Change and Greenhouse Gases

Although variation in climate is thought to be a natural process, the rate at which the climate is changing has been accelerated rapidly by human activities. Climate change is one of the most challenging global issues facing the world today and is primarily the result of increased levels of greenhouse gases in the atmosphere. Greenhouse gases, when emitted, create a 'greenhouse effect' in the atmosphere, effectively trapping heat near the earth surface, resulting in higher temperatures and a warming planet. Greenhouse gases come primarily from the combustion of fossil fuels in energy use.

The Intergovernmental Panel on Climate Change (IPCC), in their AR6 Synthesis Report: Climate Change 2023[4], state that widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred. This has led to widespread adverse impacts and related losses and damages to people and nature due to the pressures of climate change and the inability to adapt to a rapidly changing environment. Moving away from our reliance on coal, oil and other fossil fuel-driven power plants is essential to reduce emissions of greenhouse gases and combat climate change.

8.2.2.1 International Greenhouse Gas Emission and Climate Targets

Globally, governance relating to climate change has changed significantly since 1994 when the United Nations Framework Convention on Climate Change (UNFCCC) entered into force. Greenhouse Gas emissions have been a primary focus of climate related international agreements for almost two decades.

International greenhouse gas emission and climate targets play an important role in stimulating and enabling action for developed and developing nations. The following sections provide an overview of the international agreements that have played key roles in establishing climate governance.

8.2.2.1.1 *Kyoto Protocol*

The Kyoto Protocol was adopted on 11 December 1997; this Protocol operationalised the UNFCCC and was the first international agreement that committed countries to reduce their greenhouse gas emissions. It set limitations and reduction targets for greenhouse gases for developed countries (Annex I countries) and set a special obligation for certain countries to provide financial resources and facilitate technology transfer to developing countries (Annex II countries). The EU, and therefore Ireland, was both an Annex I and Annex II country.

The Kyoto Protocol came into effect in 2005, as a result of which, emission reduction targets agreed by developed countries, including Ireland, became binding for the first time.

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

[4] *IPCC (2023) AR6 Synthesis Report: Climate Change 2023 <https://www.ipcc.ch/report/sixth-assessment-report-cycle/>*

Doha Amendment to the Kyoto Protocol

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

- New commitments for Annex I Parties to the Kyoto Protocol who agreed to take on commitments in a second commitment period from starting in 2013 and lasting until 2020.
    - The amendment entered into force on 31 December 2020
- A revised list of greenhouse gases to be reported on by Parties in the second commitment period; and
- Amendments to several articles of the Kyoto Protocol which specifically referenced issues pertaining to the first commitment period and which needed to be updated for the second commitment period.

During the first commitment period, 37 industrialised countries and the European Union committed to reduce greenhouse gas emissions to an average of 5% below 1990 levels. During the second commitment period, Parties committed to reduce greenhouse gas emissions by at least 18% below 1990 levels in the eight-year period from 2013 to 2020. The composition of Parties in the second commitment period is different from the first; however, Ireland and the EU signed up to both the first and second commitment periods. Under the protocol, countries must meet their targets primarily through national measures, although market-based mechanisms (such as international emissions trading) can also be utilised.

Although the 1997 Kyoto Protocol and 2012 Doha Amendment were in force in 2020, the 2015 Paris Agreement superseded the Kyoto Protocol as the principle regulatory instrument governing the global response to climate change.

8.2.2.1.2 COP21 Paris Agreement

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

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

8.2.2.1.3 COP25 Climate Change Conference- Madrid

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

8.2.2.1.4 COP28 Climate Change Conference – Dubai

The 28th Conference of the Parties for the United Nations Framework Convention on Climate Change (COP28) took place in Dubai from the 30th of November 2023 to the 13th of December 2023.

COP28 resulted in a landmark deal to 'transition away' from fossil fuels, the United Arab Emirates (UAE) Consensus. The agreement calls for 'transitioning away from fossil fuels in energy systems, in a just, orderly, and equitable manner.' This is the first time in 28 years that fossil fuels have been mentioned in a COP outcome. However, it is noted that the text of 'phase out as soon as possible inefficient fossil fuel subsidies' does not address energy poverty or the just transition. The UAE Consensus also calls for more explicit near-term goals in the lead up to 2050, calling for the world to cut greenhouse gas emissions by 43% by 2030 as compared to 2019 levels. However, many island states have criticised that despite the text being an improvement over previous agreements, there is a litany of loopholes that will enable destructive environmental practices to continue and do not assuage their concerns over rising sea levels and other climate change impacts.

COP28 concluded the first ever Global Stocktake under the Paris Agreement. The Global Stocktake recognises that the world is not on track to meet 1.5°C and will require Parties to align their national targets and measures with the Paris Agreement. Parties have two years to submit their Nationally Determined Contributions for 2035, these need to be aligned with the best available science and the outcomes of the Global Stocktake.

An unusual aspect that came out of COP28 in the final hours of discussion was the quantity of decisions and documents which remain unfinished and not signed off. Notably, discussions on carbon markets collapsed in the final days of COP28 as no consensus could be reached on the country-to-country trading regimes or rules for the market in relation to Article 6 of the Paris Agreement. Negotiations will be continued at COP29 in Azerbaijan.

8.2.2.1.5 *United Nations Sustainable Development Goals Report 2023*

Transforming our World: the 2030 Agenda for Sustainable Development which includes 17 Sustainable Development Goals (SDGs), and 169 targets was adopted by all UN Member States at a UN summit held in New York in 2015. The agenda is universally applicable with all countries having a shared responsibility to achieve the goals and targets which came into effect on January 1st, 2016. The goals and targets are to be actions over the 15-year period, are integrated and indivisible i.e., all must be implemented together by each Member State. On 10th July 2023, the United Nations published '*The Sustainable Development Goals Report 2023*[5]*,* highlighting that the lasting impacts of the COVID-19 pandemic, the war in Ukraine and subsequent refugee crisis, and the increasing consequences of the climate crisis have hindered the achievement of the SDGs. The report stipulates that due to these unprecedented events, the world is falling short of meeting most of the SDGs by 2030, especially in terms of climate action. An assessment of the around 140 targets for which trend data is available shows that about half of these targets are moderately or severely off track; and over 30% have either seen no movement or regressed below the 2015 baseline.

In October 2022 the Department of Communications, Climate Action & Environment in partnerships with all Government Departments, key stakeholders, and based on input from two public consultation processes published the Sustainable Development Goals National Implementation Plan 2022-2024 ('the SDG Plan').[6] The SDG Plan identifies that, overall, the world is not on track to achieve the global Goals by 2030. The SDG Plan sets out how Ireland will work to achieve the goals and targets of the Agenda for Sustainable Development both domestically and internationally. Irelands first National Implementation Plan provided a framework for Ireland to work towards the implementation of the SDGs; the new Implementation Plan aims to build on the structures and mechanisms from the first Plan and to develop and integrate additional approaches in areas identified as requiring further action.

In September 2023, the UN Summit on the SDGs took place in New York and was co-facilitated by Ireland and Qatar. Representing the halfway mark to achieving the SDGs by 2030, it marked the beginning of a new phase of accelerated progress towards the SDGs with high-level political guidance on transformative and accelerated actions. The Global Sustainable Development Report 2023[7] was published

[5] https://unstats.un.org/sdgs/report/2023/The-Sustainable-Development-Goals-Report-2023.pdf
[6] *National Implementation Plan for the Sustainable Development Goals 2022-2024. Available at:* <https://www.gov.ie/en/publication/e950f-national-implementation-plan-for-the-sustainable-development-goals-2022-2024/>
[7] *Global Sustainable Development Report 2023* <https://sdgs.un.org/sites/default/files/2023-09/FINAL%20GSDR%202023-Digital%20-110923_1.pdf>

in September 2023. The previous Global Sustainable Development Report (2019[8]) found that for some targets the global community was on track, but for many others the world would need to quicken the pace. In 2023, the situation is much more worrisome owing to slow implementation and a confluence of crises. The 2023 Report goes on to highlight the current standing of each SDG and its relevant indicators. A 2023 UN Special Report[9] found that over 30% of the SDGs have seen either no improvement or reverse trends in progress. The push for transformation to achieve the SDGs will come through shifts in six key entry points:

1. *Human Well Being and Capabilities*
2. *Sustainable and Just Economies*
3. *Food Systems and Healthy Nutrition*
4. *Energy Decarbonisation with Universal Access*
5. *Urban and Peri-Urban Development*
6. *Global Environmental Commons*

As detailed in Section 1.5 in Chapter 1 of this rEIAR, the 25 deviations that comprise the Subject Development are in response to actual conditions encountered on the ground, during the construction of the Meenbog Windfarm. The Meenbog Windfarm will contribute to Entry Point 4 due to the clean and renewable energy it will provide over its operational life. The phase out of fossil fuels in a manner that is globally and domestically just, while strengthening the transition to renewables by increasing energy efficiency and encouraging behavioural change will be key to achieving the relevant SDGs.

SDGs relevant to the Meenbog Windfarm and how they are implemented into Irish National plans and policies can be found in Table 8-12.

[8] *Global Sustainable Development Report 2019* <https://sdgs.un.org/sites/default/files/2020-07/24797GSDR_report_2019.pdf>
[9] *The Sustainable Development Goals Report 2023: Special Edition* <https://unstats.un.org/sdgs/report/2023/The-Sustainable-Development-Goals-Report-2023.pdf>

Table 8-12 SDGs relevant to the Meenbog Windfarm, and Implementation into Irish National Plans

SDG	Targets	International Progress/Downfalls to Date (2023)[10]	National Relevant Policy
SDG 7 Affordable and Clean Energy: ***Ensure access to affordable, reliable, sustainable and modern energy for all***	› By 2030, ensure universal access to affordable, reliable and modern energy services. › By 2030, increase substantially the share of renewable energy in the global energy mix. › By 2030, double the global rate of improvement in energy efficiency. › By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology. › By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support.	The war in Ukraine and global economic uncertainty continue to cause significant volatility in energy prices, leading some countries to raise investments in renewables and others to increase reliance on coal, putting the green transition at risk. The share of renewable sources in total final energy consumption amounted to 19.1% globally in 2020, or 2.4 percentage points higher than in 2015. Part of this progression is due to lower final energy demand in 2020, as the pandemic disrupted social and economic activities worldwide. The electricity sector shows the largest share of renewables in total final energy consumption (28.2% in 2020) and has driven most of the growth in renewable energy use, while the heat and transport sectors have seen limited progress over the past decade. The rate of improvement in primary energy intensity, which had already slowed in recent years, dropped to 0.6% in 2020. This makes it the worst year for energy intensity improvement since the global financial crisis. This slowdown was influenced by a shift in the economic structure during Covid towards more energy-intensive industrial production, combined with only modest rates of technical efficiency improvements, in the context of low energy prices.	*Ireland's Transition to a Low Carbon Energy Future 2015-2030;* *Energy Poverty Action Plan;* *Ireland's Transition to a Low Carbon Energy Future 2015-2030;* *National Mitigation Plan;* *National Energy Efficiency Action Plan;* *One World, One Future;* *The Global Island Economic Recovery Plan* *Project Ireland 2040: National Planning Framework;* *Project 2040;* *National Development Plan 2021-2030;* *Climate Action Plan 2024*
SDG 9: Industry, Innovation, and Infrastructure ***Build resilient infrastructure, promote inclusive and sustainable industrialisation***	› Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all. › Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross	The manufacturing industry's recovery from COVID-19 remains incomplete and uneven: some high-income regions achieved record-high manufacturing value added per capita in 2022 but levels in least developed countries were not much higher than the 2015 baseline. Global carbon dioxide (CO2) emissions from energy combustion and industrial processes grew by 0.9% in 2022 to a new all-time high of 36.8 billion tonnes. Emissions shrank by more than 5% in 2020, but rebounded past pre – pandemic levels in 2021, growing more than 6%	*National Development Plan 2021-2030;* *National Economic Recovery Plan;* *Climate Action Plan 2024;* *National Implementation Plan on Persistent Organic Pollutants;*

[10] *United Nations, the 17 Goals – Sustainable Development <https://sdgs.un.org/goals>*

SDG	Targets	International Progress/Downfalls to Date (2023)[10]	National Relevant Policy
and foster innovation	domestic product, in line with national circumstances, and double its share in least developed countries. › Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities.	in tandem with economic stimulus and a surge in coal demand even as renewables capacity additions scaled record heights. CO2 growth in 2022 was well below GDP growth of 3.2%.	*Waste Action Plan for a Circular Economy;* *National Waste Prevention Programme;* *A Better World*
SDG 11: Sustainable Cities and Communities *Make cities and human settlements inclusive, safe, resilient and sustainable*	› By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums. › By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons. › Strengthen efforts to protect and safeguard the world's cultural and natural heritage. › By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management	Climate change, the pandemic, and conflicts tend to have a disproportionate impact on cities. These factors mean that the world is far from achieving the goal of sustainable cities. In many developing countries, slum populations have been growing, putting at risk the target of adequate housing for all by 2030. Since 2015, the number of countries with national disaster risk reduction strategies has more than doubled. According to 2022 data from 1,507 cities in 126 countries, only 51.6% of the world's urban population has convenient access to public transport, with considerable variations across regions. Data for 2020 from 1,072 cities in 120 countries indicate that more than three-quarters of these cities have less than 20% of their area dedicated to open public spaces and streets, about half of the proportion recommended. By the end of 2022, 102 countries reported having local governments with disaster risk reduction strategies, an increase from 51 countries in 2015.	*Rebuilding Ireland Action Plan for Housing and Homelessness;* *Housing for All;* *EU Regulation 1370/2007 on Public Passenger Transport Services by Rail and by Road;* *Project Ireland 2040 National Planning Framework;* *National Clean Air Strategy;* *Rural Development Programme 2014-2022;* *National Implementation Plan on Persistent Organic Pollutants;* *Waste Action Plan for a Circular Economy;* *National Waste Prevention Programme;* *A Better World*
SDG 12 Responsible Consumption	› By 2030, achieve the sustainable management and efficient use of natural resources.	Unsustainable patterns of consumption and production are the root cause of the triple planetary crisis:	*National Implementation Plan on Persistent Organic Pollutants;*

SDG	Targets	International Progress/Downfalls to Date (2023)[10]	National Relevant Policy
and production: *Ensure sustainable consumption and production patterns.*	› By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment. › Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle. › Promote public procurement practices that are sustainable, in accordance with national policies and priorities. › Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products	1. *Climate Change* 2. *Biodiversity Loss* 3. *Pollution* The world is seriously off track in its effort to halve per-capita food waste and losses by 2030.The COVID-19 pandemic has had significant impacts on consumption and production patterns, with disruptions to global supply chains and changes in consumer behaviour. Responsible consumption and production must be an integral part of the recovery from the pandemic. But the global economy also needs to speed up the decoupling of economic growth from resource use by maximizing the socio-economic benefits of resources while minimizing their negative impacts. Reporting on corporate sustainability has tripled since the beginning of the SDG period, but the private sector will need to significantly improve reporting on activities that contribute to the SDGs. Global data showed a rise in fossil fuel subsidies in 2021, after a brief fall in 2020 which was largely caused by a drop in energy prices. In 2021, Governments spent an estimated $732 billion on subsidies to coal, oil, and gas, against $375 billion in 2020. This brings the subsidies back to pre-2015 levels. High oil and gas prices in 2022 will likely bring a new increase, as subsidies are often linked to the price of energy.	*Waste Action Plan for a Circular Economy;* *National Waste Prevention Programme;* *Climate Action Plan 2024* *Tourism Action Plan;* *National Clean Air Strategy;* *Towards Responsible Business: Ireland's Second National Plan on Corporate Social Responsibility (CSR) 2017-2020;* *Sustainable, Inclusive and Empowered Communities 2019-2024;*
SDG 13 Climate Action: *Take urgent action to combat climate change and its impacts ** **Acknowledging that the United*	› Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries. › Integrate climate change measures into national policies, strategies and planning. › Improve education, awareness-raising and human and institutional capacity on climate	The world is on the brink of a climate catastrophe and current actions and plans to address the crisis are insufficient. Without transformative action starting now and within this decade to reduce greenhouse gas emissions deeply and rapidly in all sectors, the 1.5°C target will be at risk and with it the lives of more than 3 billion people. Failure to act leads to intensifying heatwaves, droughts, flooding, wildfires, sea-level rise, and famines. Emissions should already be decreasing now and	*National Adaptation Framework;* *Building on Recovery: Infrastructure and Capital Investment 2016-2021;* *National Mitigation Plan;* *National Biodiversity Action Plan 2017-2021;*

SDG	Targets	International Progress/Downfalls to Date (2023)[10]	National Relevant Policy
Nations Framework Convention on Climate Change is the primary international, intergovernmental forum for negotiating the global response to climate change.	change mitigation, adaptation, impact reduction and early warning.	will need to be cut almost by half by 2030 - a mere seven years from now. Global temperatures have already hit 1.1°C, rising due to increasing global greenhouse gas emissions, which reached record highs in 2021. Real-time data from 2022 show emissions continuing an upward trajectory. Instead of decreasing emissions as required by the target to limit warming, carbon dioxide levels increased from 2020 to 2021 at a rate higher than the average annual growth rate of the last decade and is already 149% higher than pre-industrial levels. Projected cumulative future CO2 emissions over the lifetime of existing and currently planned fossil fuel infrastructure exceed the total cumulative net CO2 emissions in pathways that limit warming to 1.5°C (>50%) with no or limited overshoot.	*National Policy Position on Climate Action and Low Carbon Development; Project 2040: National Development Plan 2021-2030; Climate Action Plan 2024; National Dialogue on Climate Action; Agriculture, Forest, and Seafood Climate Change sectoral Adaptation Plan; The National Strategy on Education for Sustainable Development in Ireland*
SDG15 Life on Land: *Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.*	› Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species › By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts. › By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world › Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of	The trend in forest loss, land degradation and the extinction of species is becoming worse, posing a severe threat to the health of the planet and people. The world's forest area continues to decline, from 31.9% in 2000 to 31.2% in 2020, representing a net loss of 100 million hectares. Agricultural expansion is the direct driver for almost 90% of global deforestation. However, globally, there has been progress in sustainable forest management with both certified forest area and the proportion of forests under management plans and within protected areas increasing. Between 2015 and 2019, the world lost at least 100 million hectares of healthy and productive land every year, affecting food and water security globally. Human activities, intensified by climate change, are the main drivers of land degradation, directly affecting 1.3 billion people. If land degradation continues at a similar rate, this would result in an additional 1.5 billion hectares of degraded land by 2030.	*Climate Action Plan 2024 Enhanced Decommissioning, Rehabilitation and Restoration Scheme (2020) National Biodiversity Action Plan*

SDG	Targets	International Progress/Downfalls to Date (2023)[10]	National Relevant Policy
	biodiversity and, by 2020, protect and prevent the extinction of threatened species		

8.2.2.1.6 *Climate Change Performance Index 2024*

Established in 2005, the Climate Change Performance Index (CCPI)[11] is an independent monitoring tool which tracks countries climate protection performance. It assesses individual countries based on climate policies, energy usage per capita, renewable energy implementation and greenhouse gas emissions and ranks their performance in each category and overall. The 2024 CCPI was published in December 2023. While the CCPI 2024 indicates signs of potential reductions in global emissions, no country achieved its Paris Climate targets and therefore the first three places of the ranking system remain unoccupied.

Ireland, ranked 37th in 2023, has fallen 6 places to 43rd for 2024, and remains as a "low" performer in international performance. The CCPI states that Ireland's policies are missing a long-term strategy for phasing out fossil fuel infrastructure and shifting investments from natural gas towards an emissions-neutral energy supply. Rebound effects from economic growth in emissions-intensive sectors (such as agriculture and land use) cause absolute emissions to remain high. The chance to integrate clear sanctions into the framework has so far been missed.

However, the CCPI experts welcome Ireland's medium-term offshore wind and solar plans. The country's offshore wind offers considerable opportunities for capitalising on renewable energy and (over the long term) potential for electricity export.

Ireland has moved to the 'low' category in 2024 from the 'very low' category in 2023 on the Greenhouse Gas Emissions ratings despite falling to 54th in 2024 in the world from 47th in 2023. Ireland remains in the 'Medium' category in the Renewable Energy rating table; however, Ireland has fallen from 23rd in 2023 to 31st in 2024.

8.2.2.2 National Greenhouse Gas Emission and Climate Targets

8.2.2.2.1 *Programme for Government*

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

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

8.2.2.2.2 *Climate Action and Low Carbon Development (Amendment) Act 2021*

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

This act will manage the implementation of a suite of policies to assist in achieving these annual targets.

The act includes the following key elements, among others:

- Places on a statutory basis a 'national climate objective', which commits to pursue and achieve no later than 2050, the transition to a climate resilient, biodiversity-rich, environmentally sustainable and climate-neutral economy.

[11] *Climate Change Performance Index 2024* <https://ccpi.org/>

- Embeds the process of carbon budgeting into law, the Government are required to adopt a series of economy-wide five-year carbon budgets, including sectoral targets for each relevant sector, on a rolling 15-year basis, starting in 2021.
- Actions for each sector will be detailed in the Climate Action Plan, updated annually.
- A National Long Term Climate Action Strategy will be prepared every five years.
- Government Ministers will be responsible for achieving the legally binding targets for their own sectoral area with each Minister accounting for their performance towards sectoral targets and actions before an Oireachtas Committee each year.
- Strengthens the role of the Climate Change Advisory Council, tasking it with proposing carbon budgets to the Minister.

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

8.2.2.2.3 Climate Change Advisory Council 2023

The CCAC was established on 18th January 2016 under the Climate Action and Low Carbon Development Act 2015. The CCAC aims to provide independent evidence-based advice and recommendations on policy to support Ireland's just transition to a biodiversity-rich, environmentally sustainable, climate-neutral, and resilient society.

In July 2023, the CCAC published the 2023 Annual Review[12], this is the seventh annual review carried out by CCAC and details the CCAC concerns that the necessary national actions are not taking place or being enabled at the required speed, going on to state that 'at the current rate of policy implementation, Ireland will not meet the targets set in the first and second carbon budget periods unless urgent action is taken immediately, and emissions begin to fall much more rapidly.'

8.2.2.2.4 Carbon Budgets

The first national carbon budget programme proposed by the CCAC, approved by Government and adopted by both Houses of the Oireachtas in April 2022 comprises three successive 5-year carbon budgets. The total emissions allowed under each budget are shown in Table 8-13.

Table 8-13 Proposed Carbon Budgets of the Climate Change Advisory Council

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

8.2.2.2.5 Sectoral Emissions Ceilings

The Sectoral Emissions Ceilings were launched in September 2022. The objective of the initiative is to inform on the total amount of permitted greenhouse gas emissions that each sector of the Irish economy can produce during a specific time period. The Sectoral Emissions Ceilings alongside the annually

[12] *Climate Change Advisory Council 2023 Review* <https://www.climatecouncil.ie/councilpublications/annualreviewandreport/CCAC-AR-2023-FINAL%20Compressed%20web.pdf>

published Climate Action Plan provide a detailed plan for taking decisive action to achieve a 51% reduction in overall greenhouse gas emissions by 2030.

Section C of the Climate Action and Low Carbon Development (Amendment) Act 2021 provides the minister with a method of preparing the Sectoral Emissions Ceiling within the bounds of the carbon budget. The Sectoral Emission Ceilings for each 5-year carbon budget period was approved by the government on the 28th of July 2022 and are shown in Table 8-14 below.

Table 8-14 Sectoral Emission Ceilings 2022

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

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

The electricity sector is the third largest emitting sector in Ireland and the successful decarbonisation of this sector could lead to decarbonisation in other sectors, such as the electrification of transport and heating. The CCAC 2023 Annual Review states that the electricity sector has been set one of the smallest sectoral emission ceilings and the steepest decline in emissions of all sectors with emission ceilings of 40MtCO$_2$eq for the first carbon budget period (2021–2025) and 20MtCO$_2$eq for the second carbon budget period (2026–2030). This equates to a headline target of a 75% reduction in emissions in the sector from 2018 levels by 2030, which will be achieved by increasing the share of renewable electricity to 80%, encompassing 9GW of onshore wind capacity, at least 5GW of offshore wind capacity, with 2 GW earmarked for green hydrogen production, and 8GW of solar photovoltaic capacity, supported by a range of actions set out in the Climate Action Plan 2024 (CAP 2024).

8.2.2.2.6 Climate Action Plan 2024

CAP 2024[13] was launched in December 2023. Following on from Climate Action Plans 2019, 2021, and 2023, CAP 2024 sets out the roadmap to deliver on Ireland's climate ambition. It aligns with the legally binding economy-wide carbon budgets and sectoral ceilings that were agreed by Government in July 2022 following the Climate Action and Low Carbon Development (Amendment) Act 2021, which commits Ireland to a *legally binding target of net-zero greenhouse gas emissions no later than 2050, and a reduction of 51% by 2030*. CAP 2024 seeks to build on the progress made under Climate Action Plan 2023 by delivering policies, measurements and actions that will support the achievement of Irelands carbon budgets, SECs, and 2030 and 2050 climate targets.

Six Vital High Impact Sectors were identified within Climate Action Plan 2023[14] relating to the Sectoral Emission Ceiling (Section 8.2.2.2.5 above). CAP 2024 provides a more detailed breakdown of these Six Vital High Impact Sectors as many sectors have since developed their own independent, but complimentary, analytical approaches to emissions reductions. These sectors and their associated targets are detailed below.

Powering Renewables – 75% Reduction in emissions by 2030

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

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

Achievement of the 75% reduction in emissions by 2030 and the decarbonisation of the grid in Ireland would assist in the achievement of the Electricity sectoral emission ceiling.

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

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

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

Achievement of the 45% (Commercial/Public) and 40% (Residential) reduction in emissions by 2030 would assist in the achievement of the Built Environment (Commercial/Residential) sectoral emission ceiling.

Turning Transport Around – 50% Reduction in Emissions by 2030

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

[13] *Department of the Environment, Climate and Communications (2023) Climate Action Plan 2024. Available at: https://www.gov.ie/en/publication/79659-climate-action-plan-2024/#new-approach-to-the-2024-annex-of-actions*
[14] *Department of the Environment, Climate and Communications (2022) Climate Action Plan 2023 – Summary Document*

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

Achievement of the 50% reduction in emissions relating to transport by 2030 would assist in the achievement of the Transport sectoral emission ceiling.

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

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

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

Achievement of a 25% reduction in emissions by 2030 in agriculture and farming practices would assist in the achievement of the Agriculture sectoral emission ceiling.

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

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

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

Achievement of a 35% reduction in emissions by 2030 in relation to Irish production and consumption would enable a more circular economy and assist in the achievement of the Industry and Other sectoral emission ceilings.

Changing our land use

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

- Increase our annual afforestation rates to 8,000 hectares per annum from 2023 onwards.
- Rethink our Forestry Programme and Vision.
- Promote forest management initiatives in both public and private forests to increase carbon sinks and stores.

- Improve carbon sequestration of 450,000 ha of grasslands on mineral soils and reduce the management intensity of grasslands on 80,000 ha of drained organic soils.
- Rehabilitate 77,600 hectares of peatlands.

By improving the manner in which Ireland utilises its land use, Ireland can achieve emission reductions and mitigate the ongoing climate and biodiversity crisis's. The LULUCF sectoral emission ceiling will be set after completion of the Land-use Strategy. Exact reduction target for this sector is yet to be determined.

Adaptation

CAP 2024 highlights the need for adaptation to climate change. Adaptation is the process of adjustment to actual or expected climate change and its effects. Observations show that Irelands climate is changing in terms of coastline, sea level rise, seasonal temperatures, and changes in typical weather patterns. Climate change is expected to have diverse and wide-ranging impacts on Ireland's environment, society, and economic development, including managed and natural ecosystems, water resources, agriculture and food security, the built environment, human health, and coastal zones.

Climate Sectoral Adaptation Planning[15] includes for 12 sectoral adaptation plans that describe and assess the extent of the risks presented by climate change to a sector, and present contingency plans to address these risks and ensure climate resilience. They include actions to mainstream adaptation into policy and administration at sectoral level to improve the resilience of existing and planned critical infrastructure, systems, and procedures, to the effects and variability of climate change, as well as to improve cooperation and coherence within and across sectors, as well as on a local and national level.

8.2.2.2.7 *Irelands Climate Change Assessment*

In 2024 the EPA published Irelands Climate Change Assessment (ICCA).[16] This assessment provides a comprehensive overview and breakdown of the state of knowledge around key aspects of climate change with a focus on Ireland. The ICCA is presented in four volumes.

- Volume 1: Climate Science – Ireland in a Changing World
- Volume 2: Achieving Climate Neutrality in 2050
- Volume 3: Being Prepared for Irelands Future
- Volume 3: Realising the Benefits of Transition and Transformation

The ICCA Synthesis Report[17] states that having peaked in 2001, Irelands greenhouse gas emissions have reduced in all sectors except agriculture. However, Ireland currently emits more greenhouse gases per person than the EU average. The ICCA Synthesis Report goes on to state that there has been an identified gap in policy that indicates that Ireland will not meet its statutory greenhouse gas emission targets. Already Ireland has seen significant and ongoing deterioration in environmental quality, including declines in water quality, biodiversity and ecosystem quality. Developing a climate-resilient Ireland will require sufficient public and private investment and financial support in ways that adequately recognise the value of ecosystem services and the importance of societal wellbeing

There are well-established 'no-regret options' that need to happen now, which can get Ireland most of the way to net zero carbon dioxide emissions. Beyond that, there are 'future energy choices' relating to the scale and magnitude of technologies that will assist in achieving Ireland statutory climate targets. Ireland's no-regret options are demand reduction (e.g. through energy efficiency and reduced consumption), electrification (e.g. electric vehicles and heat pumps), deployment of market-ready renewables (e.g. wind energy and solar photovoltaics) and low-carbon heating options (e.g. district heating). Irelands future choices include hydrogen, carbon capture and storage, nuclear energy and electro-fuels.

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[15] *Department of the Environment, Climate and Communications (2020) Sectoral Adaptation Planning.* https://www.gov.ie/en/collection/51df3-sectoral-adaptation-planning/
[16] *Environmental Protection Agency (2023) Irelands Climate Change Assessment.* https://www.epa.ie/our-services/monitoring--assessment/climate-change/irelands-climate-change-assessment-icca/
[17] *Environmental Protection Agency (2023) Ireland Climate Change Assessment Synthesis Report* <https://www.epa.ie/publications/monitoring--assessment/climate-change/irelands-climate-change-assessment-synthesis-report.php>

Achieving net zero carbon dioxide emissions by 2050 requires significant and unprecedented changes to Ireland's energy system. Policies tailored to suit different stages of technology development are critical for achieving a net zero energy system. Established technologies, such as wind energy, solar photovoltaics and bioenergy, will be key in meeting short-term emission reduction targets (i.e. 2030), whereas offshore wind infrastructure is expected to be the backbone of future energy systems (i.e., 2050).

8.2.2.2.8 Greenhouse Gas Emissions Projections

In its approach to decarbonisation, the EU has split greenhouse gas emissions into two categories, the Emissions Trading System (ETS) and the non-ETS. Emissions from electricity generation and large industry in the ETS are subject to EU-wide targets which require that emissions from these sectors be reduced by 43% by 2030, relative to 2005 levels. Within the ETS, participants are required to purchase allowances for every tonne of emissions, with the amount of these allowances declining over time to ensure the required reduction of 43% in greenhouse gas emissions is achieved at EU-level[18].

Emissions from all other sectors, including agriculture, transport, buildings, and light industry are covered by the EU Effort Sharing Regulation (ESR[19]). This established binding annual greenhouse gas emission targets for Member States for the period 2021–2030. Ireland is required to reduce its emissions from these sectors by 30% by 2030, relative to 2005 levels. Under the EU Green Deal, the targets for the ETS and non-ETS sectors will be revised upwards in order to achieve the commitment, at EU level, to reach an economy-wide 2030 reduction in emissions of at least 55%, compared to 1990 levels.

The EPA publish Ireland's Greenhouse Gas Emission Projections and at the time of writing, the most recent report, *'Ireland's Greenhouse Gas Emissions Projections 2022–2040'* was published in June 2023. The report includes an assessment of Ireland's progress towards achieving its emission reduction targets out to 2030 set under the ESR.

The EPA has produced two scenarios in preparing these greenhouse gas emissions projections: a "With Existing Measures" (WEM) scenario and a "With Additional Measures" (WAM) scenario. These scenarios forecast Irelands greenhouse gas emissions in different ways. The WEM scenario assumes that no additional policies and measures, beyond those already in place by the end of 2020. This is the cut off point for which the latest national greenhouse gas emission inventory data is available, known as the 'base year' for projections. The WAM scenario has a higher level of ambition and includes government policies and measures to reduce emissions such as those in Ireland's Climate Action Plan 2024.

The EPA Emission Projections Update notes the following key trends:

- Ireland is not on track to meet the 51% emissions reduction target by 2030 (as compared to 2018 levels) – expected to achieve a total reduction of 29% under a WAM scenario
    - Will only achieve an 11% reduction under a WEM scenario
- Almost all sectors are projected to breach their sectoral emission ceiling (SEC) for 2025 and 2023 in both WAM and WEM scenarios
    - Only the residential sector will achieve their SEC
- Projected that Ireland could meet the original EU Effort Sharing Regulation target of 30% emissions reductions by 2030 (compared to 2005) – this goal has since been updated to a 42% reduction which will require full and rapid implementation of CAP 2024 measures and further measures to be implemented
- Energy sector emissions are projected to decrease by 50-60% between 2021-2030
    - Achievement of the 80% renewable energy target is expected
- Transport emissions are expected to decrease between 1-35% between 2021-2030
- Emissions from LULUCF are projected to increase over the period 2021-2030 as forestry reaches harvesting age

[18] *Department of the Environment, Climate and Communications (2023) - Climate Action Plan 2024* https://www.gov.ie/en/publication/79659-climate-action-plan-2024/
[19] *Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013 (Text with EEA relevance)*

- Planned policies for the sector are expected to reduce the extent of emissions increase

8.2.2.3 Local Greenhouse Gas Emission and Climate Targets

8.2.2.3.1 *Donegal Local Authority Climate Action Plan 2024-2029*

The Donegal County Council Local Authority Climate Action Plan 2024-2029 (Donegal LACAP) was adopted on 27th February 2024, with only the draft version available with the adopted plan not yet available for viewing purposes.

The Donegal LACAP will highlight the current state of climate action in Ireland, and how Donegal County Council intends to deliver and enable climate action for a just transition to a low carbon and climate resilient future within County Donegal. The Donegal LACAP will help address the mitigation of greenhouse gases, the implementation of climate change adaption measures, and will strengthen the alignment between national climate policy and the delivery of effective local climate action.

Overall, the greenhouse gas emissions generated from County Donegal equated to 1,970,000 tCO2eq in the baseline year, 2019. The top emitting sectors within the county in terms of total greenhouse gas emissions in the baseline year were: Agriculture, Residential, and Land Use Land Use Change and Forestry (LULUCF); producing 39%, 21%, and 15% respectively. In 2019, Irelands national emissions totalled 65,152,000tCO2eq, with County Donegal being responsible for approximately 3% of this.

The Donegal LACAP will assess climate risk relevant to Ireland and to County Donegal, which, along with the evidence baseline, inform the climate objectives and actions that will be undertaken by Donegal County Council to assist in the achievement of national and international climate targets. Projections indicate an overall increase in average temperature between 1.1°C and 1.5°C for County Donegal relative to the 1981-2000 period.

Due to its geographical location, County Donegal will see an increase in sea level rise which will place its coastal communities in vulnerable positions to ongoing climate change impacts.

The Draft Donegal County Development Plan 2024-2030[20] sets out the overall strategy for the proper planning and sustainable development of the County over a 6-year period. The Draft Donegal County Development Plan 2024-2030 includes numerous objectives on sustainability and climate.

8.2.3 Climate and Weather in the Existing Environment

Ireland has a temperate, oceanic climate, resulting in mild winters and cool summers. The Met Éireann weather station at Malin Head Co. Donegal, which is located approximately 105 kilometres to the north of the Site, is the nearest weather and climate monitoring station to the Site that has meteorological data recorded for the 30-year period from 1990-2020. The Met Éireann weather station in Clones is located closer to the Site, however this weather station only has data for the 30-year average period from 1978-2007, which has been deemed an inappropriate timescale to determine weather in the existing environment. Meteorological data recorded at Malin Head over the 30-year period from 1990-2020 is shown in Table 8-15 below. The wettest months are August and October, with March and April being the driest. July is the warmest month with an average temperature of 15.3° Celsius and January is the coldest with an average temperature of 4.4°C.

More recent monthly meteorological data recorded at Finner Camp, Co. Donegal, located approximately 45.5km to the southwest of the site, from January 2021 to January 2024 is available at: https://www.met.ie/climate/available-data/monthly-data. February 2022 was the wettest month in this time period, with 180.2mm of rainfall recorded, while April 2021 was the driest month with 33.8mm of

[20] *Draft Donegal County Development Plan 2024-2030* <*https://www.donegalcoco.ie/DraftCountyDonegalDevelopmentPlan2024_2030/Draft%20County%20Donegal%20Development%20Plan%202024-2030.pdf*>

rainfall. June 2023 was the warmest month in this time period, with a mean monthly temperature of 16.8° Celsius. January 2021 was the coldest month with a mean monthly temperature of 4.2° Celsius.

Table 8-15 Data from Met Éireann Weather Station at Malin Head, Co. Donegal, 1990-2020

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
TEMPERATURE (degrees Celsius)													
Mean daily max	8.2	8.4	9.4	11.1	13.3	15.3	17	17.1	15.8	13.1	10.5	8.8	12.3
Mean daily min	3.7	3.7	4.6	6	8	10.4	12.1	12.4	11.1	8.8	6.2	4.3	7.6
Mean temperature	6	6	7	8.6	10.7	12.8	14.5	14.8	13.4	11	8.4	6.6	10
Absolute max.	14.5	14.6	19.9	21.4	25.1	25.2	25.9	25.9	23.4	20.4	17.4	16	25.9
Absolute Min.	-3.9	-3.6	-2.7	-1.5	0.7	2.7	7.1	6.9	3.6	0.4	-1.2	-5.2	-5.2
Mean No. of Days with Air Frost	2	1.7	1.1	0.2	0	0	0	0	0	0	0.3	1.7	7
Mean No. of Days with Ground Frost	6.9	5.8	5.4	2.5	0.6	0.1	0	0	0	0.4	2.3	5.1	29
RELATIVE HUMIDITY (%)													
Mean at 0900UTC	83.4	82.8	81.5	79.1	79.3	81.6	83.2	83	82.5	82.6	83	82.8	82.1
Mean at 1500UTC	80.7	77.7	76.1	74.7	75.5	78.6	79.9	79	77.5	77.4	79.9	81	78.2
SUNSHINE (Hours)													
Mean daily duration	1.3	2.4	3.4	5.3	6.5	5.5	4.7	4.7	3.8	2.6	1.6	1.1	3.6
Greatest daily duration	7.6	9.1	11.6	14.2	16	16.8	16.4	14.6	12.2	10.4	8	6.7	16.8
Mean no. of days with no sun	9.9	5	4.9	2.9	2.3	2	2	3	3.1	5.6	8	10.4	59.1
RAINFALL (mm)													
Mean monthly total	118.9	95.2	80.7	63.4	65	73.8	86	97.8	94.8	110.3	121.6	130.5	1138.1
Greatest daily total	28.4	34.3	31.4	26.3	35	42.2	27.7	73	34.9	38.7	39.4	66	73
Mean num. of days with >= 0.2mm	23.2	20.1	20.9	17.2	17.4	17.7	20.1	20.8	19.9	21.5	23.7	23	245.5
Mean num. of days with >= 1.0mm	18.8	15.8	15.2	12.6	12.2	12.4	15.7	15.7	14.9	17.5	19.8	19.5	190.1
Mean num. of days with >= 5.0mm	9.1	7.2	5.9	4.3	4.2	5.2	6	6.6	6.9	7.5	9	9.2	81.1
WIND (knots)													
Mean monthly speed	9.4	9.2	8.5	7.5	6.9	6.4	6.1	6.5	7.3	8.3	8.8	9	7.8
Max. gust	91	80	73	71	73	62	57	58	71	78	92	96	96
Max. mean 10-minute speed	68	56	52	52	55	47	42	43	49	56	61	67	68
Mean num. of days with gales	10.5	8.7	7.4	3.4	1.8	0.8	0.6	0.7	2.3	5.1	7.2	8.6	57.2

8.2.4 Carbon Losses from the Subject Development

8.2.4.1 Background

In addition to the combustion of fossil fuels, greenhouse gases are also released through natural processes such as the decomposition of organic material (which is composed of carbon). Bogs and peatlands are known to store large amounts of carbon. Due to the waterlogged nature of these habitats, stored carbon is not broken down and released into the atmosphere. The construction of wind farms on bog and peat habitats may affect the natural hydrological regime, thus exposing and drying out the peat and allowing the decomposition of carbon. It is therefore necessary to demonstrate that any wind farm constructed on such sites saves more carbon through the decarbonisation of electricity production than is released through the removal of carbon-sequestering bog and peat habitats. The Site is situated on commercial forestry and peatland, covered by coniferous forestry and smaller areas of transitional woodland scrub.

CO_2 emissions occur naturally in addition to being released with the burning of fossil fuels. All organic material is composed of carbon, which is released as CO_2 when the material decomposes. Organic material acts as a store of carbon. Peatland habitats have a significant capacity to store organic carbon. The vegetation on a peat bog slowly absorbs CO_2 from the atmosphere when it is alive and converts it to organic carbon. When the vegetation dies, in the acidic waterlogged conditions of bogs and peatlands, the organic material does not decompose fully, and the organic carbon is retained in the ground.

The carbon balance of wind farm developments in peatland habitats has attracted significant attention in recent years. When developments such as wind farms are proposed for peatland areas, there will be direct impacts and loss of peat in the area of the development footprint. There may also be indirect impacts where it is necessary to install drainage in certain areas to facilitate construction, or from the reinstatement of extracted peat. The works can either directly or indirectly allow the peat to dry out, locally, which permits the full decomposition of the stored organic material with the associated release of the stored carbon as CO_2. It is essential therefore that any wind farm development in a peatland area saves more CO_2 than is released. As the 25 deviations that comprise the Subject Development are contiguous with the footprint of the Permitted Development, a wind farm, the carbon losses associated with the Subject Development are identified using the methodology employed for wind farm developments.

8.2.4.2 Methodology for Calculating Losses

A methodology was published in June 2008 by scientists at the University of Aberdeen and the Macauley Institute with support from the Rural and Environment Research and Analysis Directorate of the Scottish Government, Science Policy, and Co-ordination Division. The document, '*Calculating Carbon Savings from Wind Farms on Scottish Peat Lands*', was developed to calculate the impact of wind farm developments on the soil carbon stocks held in peat. This methodology was refined and updated in 2011 based on feedback from users of the initial methodology and further research in the area. The web-based version of the carbon calculator, which supersedes the excel based versions of the tool, was released in 2016 and is currently available as Version 1.8.1 which was last updated in 2023. The carbon calculator provides a transparent and easy to follow method for estimating the impacts of wind farms on the carbon dynamics of peatlands. Previously guidance produced by Scottish Natural Heritage in 2003 had been widely employed to determine carbon payback in the absence of any more detailed methods.

Although the loss of carbon fixing potential from plants on peat land is not substantial, it is nonetheless calculated for areas from which peat is removed and the areas affected by drainage. This calculation can take account of the annual gains due to the carbon fixing potential of the peat land and the time required for any habitat restoration. The carbon sequestered in the peat itself represents a much more substantial potential source of carbon loss. During the construction of a wind farm, carbon is lost as a result of peat excavation and peat drainage. The amount of carbon lost is estimated using default values from the IPCC (IPCC, 1997) as well as by more site-specific equations derived from the scientific literature and updated emission factors. Carbon gains due to habitat improvement and site restoration are calculated in a similar fashion.

Peatlands are essentially unbalanced systems. When flooded, peat soils emit less carbon dioxide but more methane than when drained. In waterlogged soils, carbon dioxide emissions are usually exceeded by plant fixation, so the net exchange of carbon with the atmosphere is negative and soil carbon stocks increase. When soils are aerated, carbon emissions usually exceed plant fixation, so the net exchange of carbon with the atmosphere is positive. In order to calculate the carbon emissions resulting from the removal or drainage of the peat, the Macauley Institute method accounts for emissions occurring if the peat had been left in-situ and subtracts these from the emissions occurring after removal and drainage.

The Macauley Institute methodology states that the total volume of peat impacted by the construction of a wind farm is strongly correlated to the extent of the peatland affected by drainage at the site.

The drainage of peat soils leads to continual loss of soil carbon until a new steady state is reached, when inputs are approximately equal to losses. For peat, this steady state approximates 0% carbon, so 100% carbon loss from drained peats is assumed if the site is not restored after decommissioning of the wind farm. The amount of carbon lost is calculated on the basis of the annual emissions of methane and carbon dioxide, the area of drained peat, and the time until the site is restored. In the case of the Subject Development, the model has been prepared on the basis that restoration will not occur upon decommissioning of the Permitted Development (i.e., site roads and hardstands will be left in situ). Given the nature of the Subject Development it will have no bearing on the decommissioning phase of the Meenbog Windfarm. Please refer to Chapter 3 Section 3.11 for details in relation to decommissioning.

The effects of drainage may also reduce dissolved and particulate organic carbon retention within the peat. Losses of carbon dioxide due to leaching of dissolved and particulate organic carbon are calculated as a proportion of the gaseous losses of carbon from the peat. The Macauley Institute method assumes that published good practice is employed in relation to avoiding the risk of peat instability. As detailed in Section 7.3.8 in Chapter 7 of this rEIAR: Land, Soils and Geology, the Meenbog Windfarm has been the subject of a peat stability risk assessments and site inspections.

A limited amount of tree felling was necessary for the construction of the Subject Development. Carbon losses as a result of felling are calculated from the area felled, the average carbon sequestered annually, and the lifetime of the wind farm. Alterations in soil carbon levels following felling are calculated using the equations for drainage and site restoration already described.

The outputs of the Macauley Institute web-based carbon calculator are included in Appendix 8-1 of this rEIAR, '*Carbon Calculations'.*

8.2.4.2.1 Carbon Losses

The Scottish Government online carbon calculator was used to assess the impacts of the Subject Development in terms of potential carbon losses and savings taking into account peat removal and reinstatement, drainage, habitat improvement, and tree felling associated with the Subject Development. Applying the Precautionary Principal, the assessment is based on the carbon emissions associated with the entire Subject Development and does not assume any savings related to the infrastructure not constructed as part of the Permitted Development.

A copy of the outputs is provided as Appendix 8-1 of this rEIAR, *'Carbon Calculations'.* Where available and relevant, site-specific information was inserted into the online carbon calculators. Otherwise, default values were used.

The main CO_2 losses resulting from the Subject Development are summarised in Table 8-16.

Table 8-16 CO2 Losses from the Subject Development

Origin of Losses	CO_2 Losses (tonnes CO_2 equivalent)	
	Expected	Maximum
Losses from reduced carbon fixing potential	32	48
Losses from soil organic matter and due to leaching of dissolved and particulate organic carbon (CO2 loss from removed and drained peat)	14,966	20,196
Losses associated to forestry felling	58	61
Total	15,056	20,305

The worksheet models and online tools calculate that the Subject Development gave rise to 15,056 tonnes of CO_2 equivalent losses. Of this total figure, losses from reduced carbon fixing potential accounts for 0.2% or 32 tonnes. Losses from soil organic matter, i.e., CO_2 loss from removed and drained peat, will equate to 14,966 tonnes, or 99.4%. Losses due to forestry felling account for 58 tonnes or 0.4%. The calculations of carbon loss set out above were made following the precautionary principle and represent a worst-case estimate of the carbon loss from the Subject Development taken in isolation from the Permitted Development. In reality, the carbon losses set out above are, when considered cumulatively with the Permitted Development be largely offset by the corresponding reduction in footprint of the Permitted Development.

The figure of 32 tonnes of CO_2 arising from ground activities associated with the Subject Development is calculated based on the entire Subject Development footprint being "Acid Bog", as this is one of only two choices the model allows (the other being Fen). The habitat that was impacted by the Subject Development footprint comprises predominantly drained bog (cutover), rather than the acid bog assumed by the model that gives rise to the 32 tonnes and therefore the actual CO_2 losses are expected to be lower than this value.

The values discussed above are based on the assumption that the hydrology of the Meenbog Windfarm and habitats within the Site are not restored on decommissioning of the Meenbog Windfarm after its expected 30-year proposed operational life. The Subject Development is part of the Meenbog Windfarm. Therefore, the decommissioning of the Subject Development must be discussed in the context of the overall wind farm. The wind turbines that will be installed as part of the Permitted Development, are expected to have a lifespan of approximately 30 years. Following the end of their useful life, the wind turbines may be replaced with a new set of turbines, subject to planning permission being obtained, or the wind farm may be decommissioned fully. The onsite substation will remain in place as it will be under the ownership of the ESB/EirGrid. On-site borrow pits will have been restored by the completion of the construction phase and therefore no decommissioning will be required. Similarly, on-site peat storage cells will be completely revegetated and will remain in-situ. If the wind farm is decommissioned, a Decommissioning Plan will be agreed with the local authority in advance of commencing decommissioning work. Please refer to Chapter 3, Section 3.11 for further details on decommissioning.

8.2.5 Likely, Significant Impacts on Climate and Associated Mitigation Measures

8.2.5.1 'Do-Nothing' Scenario

Under the Do-Nothing scenario, the 25 deviations that comprise the Subject Development would be removed and restored to the greatest extent practicable. The Meenbog Wind Farm would then be completed in accordance with the current planning permission (ABP Ref: PA05E.300460). This approach may lead to environmental effects due to the potentially extensive groundworks required to remove and

restore the existing peat cells, portions of access roads, laybys, and hardstands, and peat containment berm. New access road sections and hardstands would then be constructed in the slightly different, and less optimal, locations shown on the permitted Meenbog Wind Farm plans. Unauthorised borrow pits would be backfilled to the greatest extent possible with spoil and peat and revegetated. Unauthorised peat cells would be dismantled, and the stored peat material would be removed from the site for disposal elsewhere.

The additional works that would create additional and greater, albeit imperceptible, greenhouse gas emissions from construction works by removing revegetating peat, further peat removal works for the construction of the permitted infrastructure and exhaust emissions from machinery and plant.

The 'Do-Nothing' Scenario would likely have a greater, albeit imperceptible effect on climate than retaining and regularising the Subject Development The construction phase of the Subject Development has been successfully completed and will not cause any additional climate effects by leaving it in place.

8.2.5.2 Construction Phase

8.2.5.2.1 *Greenhouse Gas Emissions: Construction of Subject Development Infrastructure*

Identification of Impacts

The construction of access roads and hardstand areas, peat storage cells and borrow pits, berms and stilling ponds required the removal and reinstatement of peat habitat, tree felling, construction materials and the operation of vehicles and plant at the Site. Greenhouse gas emissions, e.g., carbon dioxide (CO_2), carbon monoxide and nitrogen oxides, associated with tree felling, land disruption, and the operation of vehicles and plant arose as a result of the Subject Development construction activities. This effect is considered to be short-term and slight only, given the quantity of greenhouse gases emitted to the atmosphere, and were restricted to the duration of the construction phase. Mitigation measures to reduce this effect are presented below.

Some potential long-term slight negative effects occurred due to the removal of carbon fixing vegetation and habitat, however, that has been avoided where possible by the design and layout of the Subject Development. The Subject Development occurred in response to actual conditions encountered on the ground, during the construction of the Permitted Development and resulted in a more sensible footprint for the Meenbog Windfarm. This effect is considered to be long-term and slight only, given the quantity of greenhouse gases have been emitted to the atmosphere.

Mitigation & Monitoring Measures for the Subject Development

- All construction machinery was maintained in good operational order while on-site, minimising any emissions that were likely to arise.
- Areas of excavation were kept to a minimum, and stockpiling was minimised by coordinating excavation, spreading and compaction.
- Machinery that was used intermittently was shut down or throttled back to a minimum when not in use.
- Aggregate materials for the construction of the Subject Development were predominantly sourced onsite.
- A Construction and Environmental Management Plan (CEMP) was in place throughout the construction phase (see Appendix 3-2).
- Where applicable, low carbon intensive construction materials were, and will continue to be, sourced and utilised onsite.

Residual Effects

With the implementation of the above measures during the construction phase, residual effects on Climate from greenhouse gas emissions associated with construction phase of the Subject Development

were considered to have a short-term, imperceptible, negative effect on Climate. However, once emitted to the atmosphere, the greenhouse gas emissions that arose from construction phase activities had a permanent imperceptible negative effect on Climate.

When considering these greenhouse gas emissions within the context of the national Electricity Sector Emissions Ceilings detailed in Section 8.2.2.2.5, Carbon Budget 1 (2021-2025) has an Electricity Sector budget of 40 MtCO2eq. and Carbon Budget 2 (2026-2030) has an Electricity Sector budget of 20 MtCO2eq for large-scale deployment of renewables. Within the context of the 5-year Carbon Budget periods, the Subject Development gave rise to 15,056 tCO_2eq or 0.0151 $MtCO_2eq$. The figure of 15,056 tonnes, or 0.0151 MtCO2eq accounts for 0.037% of available budget in the first carbon budgeting period and 0.075% of the available budget in the second carbon budgeting period.

Significance of Effects

Based on the assessment above no significant direct or indirect effects on Climate occurred as a result of the Subject Development.

8.2.5.2.2 *Greenhouse Gas Emissions: Transport to Site*

Identification of Impacts

As detailed in Chapter 12 of this rEIAR: Material Assets, the Subject Development did not require any additional staff or travel volumes than those for the construction of the Permitted Development. Therefore, the Subject Development did not have an effect on greenhouse gas emissions arising from transport to and from the Site.

Significance of Effects

Based on the assessment above no significant direct or indirect effects on Climate occurred as a result of the Subject Development.

8.2.5.2.3 *Greenhouse Gas Emissions: Waste Disposal*

The Subject Development gave rise to waste, mainly from excavation and unavoidable construction waste including material surpluses, damaged materials, construction worker welfare facilities, and packaging waste. This impact was short-term and slight only, given the quantity of greenhouse gases associated with the generation and management of these waste streams that was emitted to the atmosphere, and was restricted to the duration of the construction phase. Waste management was carried out in accordance with *Best Practice Guidelines on the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects* (2021) produced by the EPA.

Mitigation & Monitoring Measures for the Subject Development

- Waste material was transferred to a licensed /permitted Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste was sorted into individual waste streams for recycling, recovery or disposal. The MRF facility was local to the Site to reduce the amount of emissions associated with vehicle movements.
- A Construction and Environmental Management Plan (CEMP) was in place throughout the construction phase (see Appendix 3-2).

Residual Effects

With the implementation of the above measures during the construction phase, residual effects on Climate from greenhouse gas emissions associated with construction phase of the Subject Development were considered to have a short-term, imperceptible, negative effect on Climate. However, once emitted

to the atmosphere, the greenhouse gas emissions from construction phase activities will have had a permanent imperceptible negative effect on Climate.

Significance of Effects

Based on the assessment above no significant direct or indirect effects on Climate occurred as a result of the Subject Development.

8.2.5.3 Operational Phase

8.2.5.3.1 *Greenhouse Gas Emissions*

The Subject Development will, if granted substitute consent, become a passive part of the Meenbog Windfarm and no separate routine maintenance is anticipated for the Subject Development during the operational period.

Some potential long-term slight negative impacts that may occur during the operational phase of the Subject Development are the release of carbon dioxide to the atmosphere due to vehicle emissions associated with routine maintenance and monitoring activities and the ongoing effect of removal of carbon fixing vegetation and habitat.

Mitigation and Monitoring Measures for the Subject Development

- Ensure that all maintenance and monitoring vehicles will be maintained in good operational order while onsite, and, when stationary, be required to turn off engines thereby minimising any emissions that arise.

Residual Impact

The loss of carbon fixing vegetation and in particular peat habitat over the lifetime of the Subject Development will be partially offset by the natural revegetation of peat storage cells and restored borrow pit sections, and using the precautionary principle, will have a potential long-term imperceptible negative effect on Climate. When considering these greenhouse gas emissions within the context of the national Electricity Sector Emissions Ceilings detailed in Section 8.2.2.2.5, Carbon Budget 1 (2021-2025) has an Electricity Sector budget of 40 MtCO2eq. and Carbon Budget 2 (2026-2030) has an Electricity Sector budget of 20 MtCO2eq for large-scale deployment of renewables.

Significance of Effects

Based on the assessment above no significant direct or indirect effects on Climate will occur as a result of the Subject Development.

8.2.5.4 Decommissioning Phase

Given the nature of the Subject Development, it will have no bearing on the decommissioning phase of the Meenbog Windfarm. As detailed in Section 3.11 in Chapter 3 of this rEIAR, a copy of the Meenbog Windfarm CEMP in included as Appendix 3-2. The Subject Development will not alter the decommissioning plan for the Meenbog Windfarm. Any impact and consequential effect that occurs during the decommissioning phase are similar to that which occur during the construction phase, be it of less impact. The mitigation measures prescribed for the construction phase of the Subject Development will be implemented during the decommissioning phase thereby minimising any potential impacts.

8.3 Cumulative and In-Combination Assessment

The potential for impact between the Subject Development, and other relevant developments has been carried out with the purpose of identifying what influence the Subject Development will have on the surrounding environment when considered cumulatively and in combination with relevant existing, permitted, or proposed developments and landuses in the cumulative assessment study area, as set out in Chapter 2 of this rEIAR. Please see Section 2.7 of Chapter 2 for cumulative assessment methodology.

Construction Phase Cumulative Impacts

Potential cumulative effects on Climate between the Subject Development, the Permitted Development, the November 2020 Peatslide and associated remediation works, and other plans or projects as set out in the cumulative project List (Appendix 2-1) were also considered as part of this assessment.

There were no significant effects on Climate resulting from the construction phase of the Subject Development. The Permitted Development and Subject Development were constructed simultaneously, as were emergency works and remediation works associated with the November 2020 Peatslide. The construction phase of the Permitted Development has and will result in exhaust emissions as a result of construction vehicles and machinery. Emissions also resulted from land disturbance of local peat habitat in the Site. As detailed in Section 8.2.4.1, bogs and peatlands are known to store large amounts of carbon and the construction of wind farms on bog and peat habitats may affect the natural hydrological regime, thus exposing and drying out the peat and allowing the decomposition of carbon. Similarly, construction of emergency work and environmental remediation measures associated with the November 2020 Peatslide resulted in greenhouse gas emissions from vehicle and machinery exhaust. Cumulatively, emissions arising from the construction phase of the Subject Development, the Permitted Development, the November 2020 Peatslide, and the construction of the other projects described in Section 2.7 of the rEIAR have resulted in a short term, slight negative effect on climate. Therefore, there were no significant construction phase cumulative negative effects on climate.

Cumulative greenhouse gas emissions associated with the construction of the Subject Development and the construction of other developments during the time of construction of the Subject Development were restricted to the duration of the construction phase, however, once emitted to the atmosphere, the greenhouse gas emissions that arose from construction phase activities had a permanent slight negative effect on Climate.

When considering these greenhouse gas emissions within the context of the Electricity Sectoral Emissions Ceilings detailed in Section 8.2.2.2.5, Carbon Budget 1 (2021-2025) has an Electricity Sector budget of 40 MtCO2eq. and Carbon Budget 2 (2026-2030) has an Electricity Sector budget of 20 MtCO2eq for large-scale deployment of renewables. The total emissions arising from the Subject Development account for 0.037% of the first carbon budgeting period and 0.075% of the second carbon budgeting period.

Operational Phase Cumulative Impacts

It is considered there will be no measurable negative cumulative effects on climate should other proposed or consented plans and within the surrounding landscape be operational in parallel with the Subject Development, which during the operational phase would become a passive part of the Meenbog Windfarm. The Meenbog Windfarm has been assessed as having a long term, positive effect on climate. Therefore, when the Subject Development is considered cumulatively with the Permitted Development there will be no negative cumulative effect on climate.

Decommissioning Phase Cumulative Impacts

Given the nature of the Subject Development, it will have no bearing on the decommissioning phase of the Meenbog Windfarm.

There will be no cumulative negative effect on climate during the decommissioning phase from the Subject Development when considered in combination with the projects outlined in Appendix 2-1. For further details on decommissioning please refer to Chapter 3, Section 3.11 of this rEIAR.