10. CLIMATE

10.1 Introduction

10.1.1 Background & Objectives

This chapter of the rEIAR describes and assesses the residual direct and indirect climate impacts of peat extraction and ancillary activities, at the Application Site. The climate impact assessments have been prepared for the Peat Extraction Phase, the Current Phase and the Remedial Phase of the Project. The baseline environment has been prepared with reference to published climate data from the Environmental Protection Agency (EPA) and Met Éireann. For the purposes of this assessment, while the activities assessed have occurred over the past decades, beginning in 1988 and continuing to present day, impacts have been assessed against the most recently published climate guidance and policies which are likely more stringent than historical policies from previous years. Therefore, if it can be determined that, based on the most recent standards, no significant effects occurred as a result of the Project, then it is unlikely that significant impacts occurred based on historical standards.

10.1.2 Statement of Authority

This chapter of the rEIAR has been prepared by the following staff of AWN Consulting Ltd:

Ciara Nolan

Ciara Nolan (Principal Air Quality Consultant) holds a BSc (Eng) in Energy Systems Engineering from University College Dublin and has also completed an MSc in Applied Environmental Science at UCD. She is a Member of the Institute of Air Quality Management (MIAQM) and the Institution of Environmental Sciences (MIEnvSc). Ciara has over 8 years of experience in the field of air quality consultancy. She has prepared the air quality and climate EIAR chapters for a range of developments including wind energy, industrial, pharmaceutical, data centre, residential and commercial.

This chapter was reviewed by Dr. Edward Porter, Director of Air Quality & Climate at AWN Consulting Ltd. He holds a BSc(Hons) 1st Class from the University of Sussex and PhD (Air Quality) from University College Dublin. He is a Chartered Chemist and a member of Royal Society of Chemistry (C Chem MRSC). He has 25 years' experience in in the area of air quality, climate and sustainability.

10.1.3 Project Description

A full description of the Project is provided in Chapter 4 Description of the Development. A brief summary pertaining to Climate for the Project Phases, as detailed in Section 4.2.1 in Chapter 4, is provided in the following sections.

10.1.3.1 Peat Extraction Phase: July 1988-June 2020

Site preparation works including the implementation of drainage channels commenced at the Application Site in 1950. This was followed by industrial-scale peat extraction which continued across the Application Site over the following decades. The Application Site was drained by July 1988 and peat extraction was ongoing across much of the Application Site at that point. Peat extraction ceased completely in June of 2020. The loss of carbon sink potential of the land was the primary impact to climate as a result of the peat extraction and ancillary activities during the Peat Extraction Phase. The Peat Extraction Phase is described in detail in Sections 4.4 to Section 4.8 of Chapter 4: Description of the Development.

10.1.3.2 Current Phase: June 2020 to present day

Peat extraction ceased at the Application Site in June 2020. During the Current Phase, the activity on the Application Site is much reduced compared to when peat extraction was ongoing. Activities included the removal and transportation off site of any remaining peat stockpiles, which was completed in 2024. As peat extraction has ceased on the Application Site, there are no further carbon losses and associated climate impacts associated with this element. However, the Application Site will remain a carbon source until rewetted or converted to an alternative land use. The Current Phase is described in detail in Section 4.9 of Chapter 4 Description of the Development

10.1.3.3 Remedial Phase

It is a requirement of 'Condition 10 Cutaway Bog Rehabilitation' of the Integrated Pollution Licence (IPC) P0500-01 Licence that following decommissioning of use of all or part of their bogs, Bord na Móna Energy (i.e., the Applicant), prepares (to the satisfaction of the EPA) and implements a Cutaway Bog Decommissioning and Rehabilitation Plan – see Appendix 4-2 for details. The appropriate management of water levels on the bogs, where possible, will aid in restoring the carbon store function and promote the carbon sink potential of the land.

There will be minimal use of diggers to assist in drain blocking activities, however, due to the short-term duration of the drain blocking activities and the low volume of machinery involved (likely 1 no. digger and 1 no. tractor per bog) impacts from exhaust emissions will be imperceptible. Ecologists and site managers will visit the Application Site regularly for monitoring purposes. The Remedial Phase is described in detail in Section 4.10 of Chapter 4 Description of the Development.

10.2 Methodology

10.2.1 EPA Description of Effects

The significance of effects of peat extraction and ancillary activities will be described in accordance with the EPA guidance document *Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR), May 2022.* Details of the methodology for describing the significance of the effects are provided in Chapter 1 Introduction.

The effects associated with peat extraction and ancillary activities are described with respect to the EPA guidance in the relevant sections of this chapter.

10.2.2 Assessment Criteria

10.2.2.1 Relevant Climate Guidelines, Policies and Legislation

Climate related policy and legislation has developed considerably since 1988, the beginning of the assessment period for the Application Site. Climate targets and policies have become more stringent in recent years due to the increased awareness around climate change and the effects of climate change.

Legislation

In 2015, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) (Government of Ireland, 2015) was enacted (the Act). The purpose of the Act was to enable Ireland '*to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050'* (3.(1) of No. 46 of 2015). This is referred to in the Act as the 'National Transition Objective'. The Act made provision for, *inter alia*, a national adaptation framework. In addition, the Act provided for the establishment of the Climate Change Advisory Council. The Climate

Change Advisory Council advise and make recommendations on the preparation of the national mitigation and adaptation plans and compliance with existing climate obligations.

The key duty imposed on planning authorities by Section 15 of the Climate Action and Low Carbon Development Act 2015 (as amended) is:

> *"1) A relevant body [a planning authority] shall, in so far as practicable, perform its functions in a manner consistent with—*
>
> *(a) the most recent approved climate action plan,*
>
> *(b) the most recent approved national long term climate action strategy,*
>
> *(c) the most recent approved national adaptation framework and approved sectoral adaptation plans,*
>
> *(d) the furtherance of the national climate objective, and*
>
> *(e) the objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State."*

Following on from Ireland declaring a climate and biodiversity emergency in May 2019 and the European Parliament approving a resolution declaring a climate and environment emergency in Europe in November 2019, the Government approved the publication of the General Scheme for the Climate Action (Amendment) Bill 2019 in December 2019 (Government of Ireland 2019b). This was followed by the publication of the Climate Action and Low Carbon Development (Amendment) Act 2021 (No. 32 of 2021) (hereafter referred to as the 2021 Climate Act) in July 2021 (Government of Ireland, 2021b). The 2021 Climate Act was prepared for the purposes of giving statutory effect to the core objectives stated within the Climate Action Plan (CAP).

The purpose of the 2021 Climate Act is to provide for the approval of plans '*for the purpose of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by no later than the end of the year 2050*'. The 2021 Climate Act will also '*provide for carbon budgets and a decarbonisation target range for certain sectors of the economy*'. The 2021 Climate Act defines the carbon budget as '*the total amount of greenhouse gas emissions that are permitted during the budget period*'. The 2021 Climate Act removes any reference to a national mitigation plan and instead refers to both the Climate Action Plan, as published in 2019, and a series of National Long Term Climate Action Strategies. In addition, the Minister for the Environment, Climate and Communications will request each local authority to make a 'local authority climate action plan' lasting five years and to specify the mitigation measures and the adaptation measures to be adopted by the local authority.

In relation to carbon budgets, the Climate Action and Low Carbon Development (Amendment) Act states '*a carbon budget, consistent with furthering the achievement of the national climate objective, shall be proposed by the Climate Change Advisory Council, finalised by the Minister and approved by the Government for the period of 5 years commencing on the 1 January 2021 and ending on 31 December 2025 and for each subsequent period of 5 years (in this Act referred to as a 'budget period')*'. The carbon budget is to be produced for 3 sequential budget periods, as shown in Table 10-1. The carbon budget can be revised where new obligations are imposed under the law of the European Union or international agreements or where there are significant developments in scientific knowledge in relation to climate change. In relation to the sectoral emissions ceiling, the Minister for the Environment, Climate and Communications will prepare and submit to government the maximum amount of Greenhouse Gas (GHG) emissions that are permitted in different sectors of the economy during a budget period and different ceilings may apply to different sectors. The sectorial emission ceilings for 2030 were published July in 2022 and are shown in Table 10-2.

The Application Site would fall under the heading of LULUCF (Land Use, Land Use Change, and Forestry), this does not yet have an allocated emissions ceiling. It should be noted that as sectoral emissions ceilings were published in 2022 they were not in place for the duration of the Peat Extraction Phase (1988 – 2020). Therefore, the peat extraction and ancillary activities during the Peat Extraction Phase did not require compliance with any sectoral emissions ceilings or carbon budgets.

Table 10- 1 5-Year Carbon Budgets

Budget Period	Carbon Budget	Reduction Required
2021-2025	295 Mt CO_2e	Reduction in emissions of 4.8% per annum for the first budget period.
2026-2030	200 Mt CO_2e	Reduction in emissions of 8.3% per annum for the second budget period.
2031-2035	151 Mt CO_2e	Reduction in emissions of 3.5% per annum for the third provisional budget.

Table 10- 2 Sectoral Emission Ceilings 2030

Sector	Baseline (Mt CO_2e)	Carbon Budgets (Mt CO_2e)		2030 Emissions (Mt CO_2e)	Indicative Emissions % Reduction in Final Year of 2025- 2030 Period (Compared to 2018)
	2018	2021-2025	2026-2030		
Electricity	10	40	20	3	75
Transport	12	54	37	6	50
Built Environment - Residential	7	29	23	4	40
Built Environment - Commercial	2	7	5	1	45
Industry	7	30	24	4	35
Agriculture	23	106	96	17.25	25
Other (F-gases, waste, petroleum refining)	2	9	8	1	50
Land Use, Land-use Change and Forestry (LULUCF)	5	Reflecting the continued volatility for LULUCF baseline emissions to 2030 and beyond, CAP24 puts in place ambitious activity targets for the sector reflecting an EU-type approach.			
Total	**68**				
Unallocated Savings	-	-	26	-5.25	-
Legally Binding Carbon Budgets and 2030 Emission Reduction Targets	**-**	**295**	**200**	**-**	**51**

National Policy

The first Climate Action Plan (CAP) was published by the Irish Government in June 2019 (Government of Ireland, 2019). The CAP 2019 outlined the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture. It also outlined the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. CAP 2019 detailed the required governance arrangements for implementation including carbon-proofing of policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas. The Government published the second CAP (CAP21) in November

2021 (Government of Ireland, 2021a) with further updates in 2022 (CAP22) and 2023 (CAP24). The current CAP is CAP25 published in April 2025 (DECC, 2025).

CAP25 is the fourth plan to be prepared under the Climate Action and Low Carbon Development (Amendment) Act 2021, and following the introduction, in 2022, of economy-wide carbon budgets and sectoral emissions ceilings. The plan follows on from CAP23 and CAP24 with the implementation of the carbon budgets and sectoral emissions ceilings and sets out a roadmap for taking decisive action to reach net zero no later than 2050, as committed to in the Programme for Government. CAP25 sets out how Ireland can accelerate the actions that are required to respond to the climate crisis, putting climate solutions at the centre of Ireland's social and economic development.

CAP25 discusses in Section 7.3.2 reducing emissions from the Land Use Land-Use Change and Forestry (LULUCF) sector through wetlands restoration schemes. CAP25 has the following action in relation to this:

- Action JM/25/4 Support the restoration and rehabilitation of degraded peatlands.

The EU's Recovery and Resilience Facility, through the National Recovery and Resilience Programme, is investing up to €108 million in the Enhanced Decommissioning, Rehabilitation and Restoration Scheme (EDRRS) to rehabilitate 33,000 ha of peatlands over 82 no. Bord na Móna bogs, previously used for peat extraction .

CAP24 had the following key metrics to 2030 to deliver abatement in wetlands, these measures are not explicitly restated in CAP25 but are still relevant as each CAP builds upon the last:

1. *35,900 ha of peatlands to be rehabilitated as part of Bord na Móna EDRRS and LIFE People and Peatlands, and*
2. *30,000 ha of additional exploited peatlands rehabilitated.*

Regional Policy

The County Development Plans for Offaly have been reviewed for specific policies in relation to climate.

There were no specific climate-related policies in the sections of the 1967 Offaly County Development Plan available as part of this assessment.

There were no specific climate-related policies in the sections of the 1987 Offaly County Development Plan available as part of this assessment.

There were no specific climate-related policies in the sections of the 1995 Offaly County Development Plan available as part of this assessment.

The Offaly County Development Plan 2003-2009 discusses renewable energy in Section 13.3 which is of relevance to climate as increased use of renewable energy will reduce greenhouse gas emissions. It is the objective of the council to encourage wind energy developments in so far as they do not have an adverse effect on other aspects of the environment. No other specific climate-related policies were identified in the sections of the 2003-2009 County Development Plan available as part of this assessment.

The Offaly County Development Plan 2009-2015 in Section 8.1 discusses the opportunities for renewable energy development and how this would mean reductions in CO_2 emissions. The Council commit to continuing to take a positive approach to the acceptance and development of renewable energy facilities. Section 10.2 discusses the potential for peatlands to be utilized to accommodate large scale energy production such as wind farms.

The Offaly County Development Plan 2014-2020 under Section 3.7 Energy Policies has a number of policies in relation to renewable energy development, particularly wind energy. The main policy being:

EP-01: It is Council policy to support national and international initiatives for limiting emissions of greenhouse gases and to encourage the development of renewable energy sources.

Section 4.20 of the 2014-2020 development plan contains a specific policy in relation to climate change,

EnvP-01: It is Council policy to reduce emissions to the air of greenhouse gases in order to contribute to a reduction and avoidance of human induced climate change. The Council supports and is committed to the National Climate Change Strategy and, in general to facilitating measures which seek to reduce emissions of greenhouse gases. In this regard, the Council will support any initiatives taken to provide for more sustainable forms of energy use.

The Offaly County Development Plan 2021-2027 outlines in Chapter 3: Climate Action and Energy the strategic aim of the development plan is:

"To achieve a transition to an economically competitive, low carbon climate resilient and environmentally sustainable county, through reducing the need to travel, promoting sustainable settlement patterns and modes of transport, and by reducing the use of non-renewable resources, whilst recognising the role of natural capital and ecosystem services in achieving this."

Section 3.4.1 of the County Development Plan 2021-2027 is specific to peatlands and states:

"*The Council recognises the great potential that the circa 80,000 hectares of industrial peatlands in the midlands offer in relation to after uses ranging from amenity, tourism, biodiversity services, 'wild areas', flood management, climate mitigation, energy development, industry, education, conservation and many more.*"

The climate action and energy policies CAEP16 – CAEP20 of the 2021-2027 development plan are specific policies in relation to peatlands.

In addition to the County Development Plans, Offaly County Council have also produced a Climate Change Action Plan 2024-2029 which outlines how the council will align with Government's national climate objectives, which seeks to transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy by 2050. The section on Green Energy outlines how the decarbonisation of the energy sector has affected the midlands region, and particularly Offaly due to the cessation of peat extraction. The section discusses the renewable energy development potential for the county and the progress to date – "*Offaly has 538MW of operational or currently under-construction renewables (wind)*".

Guidance

The quantity of carbon released from natural cycles through the earth's atmosphere, waters, soils and biota is much greater than the quantity added by anthropogenic GHG sources. However, the focus of the United Nations Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC) when setting emissions targets is on anthropogenic emissions because it is these emissions that have the potential to alter the climate by disrupting the natural balances in carbon's biogeochemical cycle and altering the atmosphere's heat-trapping ability. The carbon from biogenic sources such as pristine peatland[1] was originally removed from the atmosphere by photosynthesis, and under natural conditions, it would eventually cycle back to the atmosphere as CO_2

[1] *'pristine peatlands' refers to peatlands where peat soil has at least 30% dry organic matter and a peat depth generally exceeding 40 cm (S. E. & Baird, A. J. Peatlands and global change: response and resilience. Annu. Rev. Environ. Resour. 41, 35–57 (2016))*

due to degradation processes. Thus, these sources of carbon are not considered anthropogenic sources and do not contribute to emission totals considered in the Kyoto Protocol or EU 20-20-20 targets (IPCC 2006). The altering of the natural balances in carbon's biogeochemical cycle by removing the peat, dewatering, milling and burning of the peat as an energy source is considered an anthropogenic emission.

10.2.2.2 Carbon and Peatlands

A research project undertaken for the Applicant by the Forest Ecosystem Research Group, UCD (Wilson & Farrell, 2007) entitled "CARBAL - *Carbon Gas Balances in Industrial Cutaway Peatlands In Ireland*" investigated the carbon balance in industrial cutover peatlands, where carbon balance was defined as follows:

"Carbon balance: The difference between the amount of C sequestered by the vegetation and that released during autotrophic and heterotrophic respiration, Methane (CH_4) emissions and losses of Diesel Oxidation Catalyst (DOC). Positive values indicate that the ecosystem is a net Carbon (C) sink and negative values indicate ecosystem is a net C source."

The report investigated the post-industrial use of cutover bog with the main options being commercial afforestation, natural regeneration and wetland creation. The report notes that pristine peatlands act as a long-term CO_2 sink due to the persistently high-water table which creates conditions whereby the amount of CO_2 fixed by the peatland vegetation during photosynthesis (P_G) is greater than that released during ecosystem respiration (R_{TOT}) and the net ecosystem exchange (NEE) defined as the difference between uptake and release ($P_G - R_{TOT}$) is positive (Wilson & Farrell, 2007).

The report also notes that pristine peatlands are also a significant source of atmospheric CH_4 accounting for around 23% of global emissions. Again, the position of the water table is important with a decrease in CH_4 emissions associated with a lower water table. For pristine peat, plant mediated transport is the most important pathway for CH_4 movement from the anoxic peat to the atmosphere accounting for between 50-97% of total CH_4 transported (Wilson & Farrell, 2007).

In relation to harvested peatlands, CO_2 dynamics undergo significant changes when a peatland is exploited for its fuel resource. Drainage ditches, to facilitate industrial extraction of peat, lower the water table and reduce the moisture content of the peat from approximately 95% to 80%. The removal of the acrotelm layer at the surface and associated vegetation to facilitate the extraction of peat leads to the removal of the C sequestering capability of the system. This transforms the peatland into a significant source of CO_2. The installation of drainage ditches and the removal of the vegetation layer at the surface results in reduced or zero CH_4 emissions (or even a CH_4 sink) due to the increased oxic zone as the water table is lowered and due to the absence of easily degraded C substrate previously provided by the peatland vegetation and the conduit for CH_4 that is provided by aerenchymatic plants (Wilson & Farrell, 2007).

The report also reviewed some studies that found that it was possible to return the C sink function in a relatively short period of time following the cessation of peat extraction provided the water table was maintained close to the surface to minimise losses of CO_2 from degradation of the residual peat and the recolonization of the bare peat substrate occurred quickly. The report also found that rewetting and the return of vegetation also resulted in renewed emissions of CH_4 albeit at much lower levels than reported for nearby pristine peatlands (Wilson & Farrell, 2007).

The wetland creation study (Wilson & Farrell, 2007), based on the creation of a 60ha lake, found that the annual CO_2-C balance (tCO_2-C ha^{-1} yr^{-1}) was negative for all microsites (i.e. a source of C). In relation to CH_4 fluxes, emissions were highest in summer periods due to higher soil temperatures and increased supply of substrates with lower winter levels due to a higher water table. However, recolonization by vegetation is recognised as an essential first step on the road to long term C accumulation in terms of C fixation (photosynthesis). The study concludes that maintaining the water table close to the surface is essential as aerobic decomposition occurs up to 10,000 times faster than

anaerobic decomposition. In addition, a high-water table has the dual effect of reducing CO_2 emissions and will also promote recolonization by appropriate wetland vegetation and, over time, may lead to the return of the CO_2 sink function. The study also notes that the long-term objective for wetland creation, with regard to the annual C balance, is to reach a point where the losses of CH_4 are offset by CO_2 uptake (Wilson & Farrell, 2007).

Research in Ireland (Wilson et al, 2015) has investigated a range of both industrial and domestic Irish bogs, in order to determine country-specific emission factors. The results of the study indicated that the emission factors ranged from 1.7 (±0.47) and 1.64 (±0.44) t CO_2-C ha^{-1} yr^{-1} for the industrial and domestic sites respectively which is considerably lower than the Tier 1 EF in the IPCC 2013 Wetlands Supplement. The study found that the variation in emission factors was largely controlled by differences in soil temperature between the sites. Ireland has a temperate, oceanic climate, resulting in mild winters and cool summers.

10.2.3 Scoping & Consultation

The scope for this rEIAR has been informed by consultation with statutory consultees, bodies with environmental responsibility and other interested parties such as the Department of Housing, Local Government and Heritage, the Environmental Protection Agency, Transport Infrastructure Ireland, Natural Capital Ireland, and the Sustainable Energy Authority of Ireland, as outlined in Section 2.4 of Chapter 2 Background of the rEIAR. Scoping for the Project was undertaken originally in August 2022 and again, due to the passage of time, in June 2024. No specific consultation with regard to climate was conducted.

10.2.4 Study Area

In relation to climate, the selection of a specific study area is not as straightforward as with other disciplines as climate impacts are not geographically constrained. Impacts to climate are assessed with respect to Ireland's compliance with national and EU targets and policies. Therefore, the study area is the Republic of Ireland.

10.2.5 Desktop Review

A desk study was conducted to collate and review background information on the Application Site during the assessment. The relevant information sources are outlined below:

- EPA IPC/IE Licence Register - Boora Bog Group IPC Licence Reg No P0500-01 (https://www.epa.ie/our-services/licensing/licencesearch/, Accessed 16/05/2025)
- Met Eireann Historical 30-Year Average Meteorological Data for Mullingar Station (1978 – 2008) (https://www.met.ie/climate-ireland/1981-2010/mullingar.html, Accessed 16/05/2025)

In relation to climate, the assessment will review changes in CO_2 emissions due to the dewatering of the bog to allow peat extraction and the subsequent decommissioning of the Application Site.

Due to the partially retrospective nature of the assessment, this chapter will focus on existing or pre-existing measures employed to mitigate the likely significant effects of historic peat extraction. Any residual effects are also assessed.

10.2.6 Assessment Methodology

For the purposes of this assessment, the definition outlined in Council Directive 2009/28/EC for greenhouse gases has been used. In *Annex V, C. Methodology Point 5* the relevant greenhouse gases are defined as carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O).

Greenhouse gases (GHGs) have different efficiencies in retaining solar energy and different lifetimes in the atmosphere. In order to compare different GHGs, emissions are calculated on the basis of their Global Warming Potential (GWPs) over a 100-year period, giving a measure of their relative heating effect in the atmosphere. The Intergovernmental Panel on Climate Change (IPCC) 6th assessment report (AR6) sets out GWP100 (a system meant to level set the global warming potential of greenhouse gases) for carbon dioxide (CO_2) as the basic unit (GWP = 1) and methane gas (CH_4) has a global warming potential equivalent to 27 units of CO_2 and nitrous oxide (N_2O) has a GWP100 of 273.

For the purposes of calculating GHG emissions only CO_2, CH_4 and N_2O (combined as CO_2e) will be taken into account as there are no significant sources of F-gases from the Project.

A methodology for estimating greenhouse gas emissions associated with the peat extraction was published in the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories, Volume 4: Agriculture, Forestry and Other Land Use, Chapter 7 Wetlands (IPCC, 2006a). An update to the methodology was published in the 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands (IPCC, 2013). The 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories states that there is no refinement required on this methodology (IPCC 2019).

The 2006 Guidelines were designed to estimate and report on national inventories of anthropogenic GHG emissions and removals in order to ensure compliance with the Kyoto Protocol. Anthropogenic refers to GHG emissions and removals that are a direct result of human activities or are a result of natural processes that have been affected by human activities (IPCC, 2006a). The quantity of carbon from natural cycles through the earth's atmosphere, waters, soils and biota is much greater than the quantity added by anthropogenic GHG sources. However, the focus of the UNFCCC and the IPCC is on anthropogenic emissions because it is these emissions that have the potential to alter the climate by disrupting the natural balances in carbon's biogeochemical cycle and altering the atmosphere's heat-trapping ability. The carbon from biogenic sources such as pristine peatland was originally removed from the atmosphere by photosynthesis, and under natural conditions, it would eventually cycle back to the atmosphere as CO_2 due to degradation processes. Thus, these sources of carbon are not considered anthropogenic sources and do not contribute to emission totals considered in the Kyoto Protocol (IPCC, 2006a). The Guidelines do however outline a methodology to calculate the anthropogenic greenhouse gas emissions associated with the extraction and abandonment of peat.

The following methodology has been employed in order to calculate the carbon emissions associated with peat extraction and ancillary activities from July 1988 – June 2020, in order to present a precautionary scenario, the full 1988 year and full 2020 year have been utilised for these calculations rather than for a 6-month period (i.e from July 1988 to December 1988) and 6-month period (i.e. January 2020 to June 2020) respectively. The calculations in relation to carbon emissions were undertaken by AWN based on the areas of peat extracted, provided by the Applicant, all of which is detailed in Section 4.4 and 4.5 in Chapter 4 Description of the Development of this rEIAR. The calculations are detailed in the following section.

As mentioned above, the carbon calculations were based on the Intergovernmental Panel on Climate Change (IPCC) Guidelines, specifically:

- 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4: Agriculture, Forestry and Other Land Use, Chapter 7: Wetlands
- 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands, Chapter 2: Drained Inland Organic Soils
- 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4: Agriculture, Forestry and Other Land Use, Chapter 7: Wetlands

Carbon Emissions in Peatlands During Peat Extraction

The emission factor recommended in the 2006 Guidelines for use in Ireland was 0.2 (nutrient-poor bogs) and 1.1 (nutrient-rich bogs) t CO_2-C ha^{-1} yr^{-1} whilst the 2013 guidance updated these emission factors to a single higher emission factor of 2.8 t CO_2-C ha^{-1} yr^{-1}.

The 2013 Tier 1 Guidelines for on-site excavation and storage of peat were based on the formula below and based on an estimated area for the extracted peat:

$$CO_{2total} = CO_2 - C_{on\text{-}site} * (44/12)$$

$$CO_2 - C_{on\text{-}site} = [A \times EF]$$

Where:
$CO_2 - C_{on\text{-}site}$ = annual on-site CO_2-C emissions from peat deposits, tonnes C yr^{-1}
A = ha area of peat soils managed for peat extraction, ha
EF = emission factor for peat soils managed for peat extraction or abandoned after peat extraction (default of 2.8 tonnes C ha^{-1} yr^{-1})

N_2O Emissions from Peatlands During Peat Extraction

The emissions of N_2O associated with peat extraction were based on Equation 7.7 of the 2006 IPCC Guidelines (2006a) and outlined below. The N_2O emissions were converted to a CO_2e figure by multiplying by 273.

$$N_2O_{peat\ extraction} = [(A \times EF) * (44/28)]/1000$$

Where:
$N_2O_{peat\ extraction}$ = direct N_2O emissions from peatlands managed for peat extraction, tonnes N_2O yr^{-1}
A = area of peat soils managed for peat extraction, ha
EF = emission factor for drained wetlands organic soils, kg N_2O ha^{-1} yr^{-1} (default of 1.8 kg ha^{-1} yr^{-1})

CH_4 Emissions from Drainage Ditches

The creation of drainage ditches resulted in CH_4 emissions. These were calculated based on Equation 7.12 of the 2019 refinement to the 2006 IPCC Guidelines (IPCC, 2019) and the area of drainage ditches across the site. An average width of 5.5m was assumed for the drainage ditches for the purposes of this calculation. The CH_4 emissions were converted to a CO_2e figure by multiplying by 27.

$$F_{CH4} = (A \times EF)$$

Where:
F_{CH4} = total annual flux of CH4 from ponds and ditches, kg CH_4 yr^{-1}
A = Area, ha
EF = Emission factor for waterbody (default of 416 kg CH_4 ha^{-1} yr^{-1})

Carbon Reductions for Peatland Restoration

The rewetting of the bogs will aid in restoring the carbon sink potential of the land. Therefore, the rewetting activities as part of the Remedial Phase will result in converting the Application Site from a carbon source to a carbon sink. The CO_2e emission reduction associated with the Remedial Phase was calculated using the Emissions Calculator v2 calculation spreadsheet and methodology developed by the International Union for Conservation of Nature (IUCN) UK National Committee UK Peatland Programme 'Peatland Code Version 2.1' (2024).

The emissions figures used within the IUCN UK National Committee Emissions Calculator v2 calculation spreadsheet are based on *Aligning the Peatland Code with the UK peatland inventory* (Evans et. al, 2022 and 2023 update). As part of these calculations, the methodology applies a 10% reduction to the gross emissions reduction to ensure the model is conservative in its predictions and as an acknowledgement of any emissions that would arise as a result of restoration activities.

The calculator spreadsheet requires input of the area of peatland to be restored and the baseline condition (pre-restoration) of the peatland. The spreadsheet then calculates the potential CO_2e reductions over a 0 – 100 year period for the Application Site at 5-year intervals.

Indirect Carbon Emissions from Peat Extraction

In addition to the loss of the carbon sink at the Application Site through the extraction of peat, there were also indirect CO_2 emissions associated with the extracted peat.

For the purpose of calculating the tonnes of CO_2 within the extracted peat, the Sustainable Energy Authority of Ireland (SEAI) detail conversion factors for various fuel types on their website (SEAI 2025) and have an emission factor in $kgCO_2/kg$ for milled peat, sod peat and peat briquettes. The emission factor of 0.741 $kgCO_2/kg$ for milled peat has been utilised in combination with the tonnages of peat extracted as set out in Table 4-7 of Chapter 4 Description of the Development.

10.2.6.2 Significance Criteria for Climate

The Transport Infrastructure Ireland (TII) guidance document entitled *PE-ENV-01104 Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document* (TII 2022) outlines a recommended approach for determining the significance of a development. The approach is based on comparing the 'Do Something' scenario and the net project GHG emissions (i.e. Do Something – Do Minimum) to the relevant carbon budgets (see Table 10-1). With the publication of the Climate Action Act in 2021, sectoral carbon budgets have been published for comparison with the Net CO_2 project GHG emissions from a project. The significance of GHG effects set out in PE-ENV-01104 (TII, 2022) is based on Institute of Sustainable Environmental Professionals (ISEP) (formerly knowns as the Institute of Environmental Management and Assessment (IEMA)) guidance (ISEP, 2022) which is consistent with the terminology contained within Table 3.4 of the EPA's (2022) '*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*'.

The 2022 ISEP Guidance (ISEP, 2022) sets out the following principles for significance:

- When evaluating significance, all new GHG emissions contribute to a negative environmental impact; however, some projects will replace existing development or baseline activity that has a higher GHG profile. The significance of a project's emissions should therefore be based on its net impact over its lifetime, which may be positive, negative or negligible;
- Where GHG emissions cannot be avoided, the goal of the EIA process should be to reduce the Project's residual emissions at all stages; and,
- Where GHG emissions remain significant, but cannot be further reduced, approaches to compensate the Project's remaining emissions should be considered.

The criteria for determining the significance of effects follow a two-stage process that involves defining the magnitude of the impacts and the sensitivity of the receptors (i.e. Ireland's National GHG targets). In relation to climate, there is no project specific assessment criteria, but the Project will be assessed against the recommended ISEP significance determination and TII criteria. This takes account of any embedded or committed mitigation measures that form part of the design which should be considered.

TII (TII, 2022) states that professional judgement must be taken into account when contextualising and assessing the significance of a project's GHG impact. In line with ISEP Guidance (ISEP, 2022), TII state that the crux of assessing significance is "*not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero*[2] *by 2050*".

Significance is determined using the criteria outlined in Table 10-3 (derived from Table 6.7 of PE-ENV-01104 (TII, 2022a)) along with consideration of the following two factors:

- The extent to which the trajectory of GHG emissions from the Project aligns with Ireland's GHG trajectory to net zero by 2050; and
- The level of mitigation taking place.

Table 10-3 Climate Assessment Significance Criteria

Effects	Significance Level	Description
Significant adverse	Major adverse	› The Project's GHG impacts are not mitigated. › The Project has not complied with Do-Minimum standards set through regulation, nor provided reductions required by local or national policies; and › No meaningful absolute contribution to Ireland's trajectory towards net zero.
	Moderate adverse	› The Project's GHG impacts are partially mitigated. › The Project has partially complied with Do-Minimum standards set through regulation, and have not fully complied with local or national policies; and › Falls short of full contribution to Ireland's trajectory towards net zero.
Not Significant	Minor adverse	› The Project's GHG impacts are mitigated through 'good practice' measures. › The Project has complied with existing and emerging policy requirements; and › Fully in line to achieve Ireland's trajectory towards net zero.
	Negligible	› The Project's GHG impacts are mitigated beyond design standards. › The Project has gone well beyond existing and emerging policy requirements; and › Well 'ahead of the curve' for Ireland's trajectory towards net zero.
Beneficial	Beneficial	› The Project's net GHG impacts are below zero and it causes a reduction in atmosphere GHG concentration. › The Project has gone well beyond existing and emerging policy requirements; and

[2] Net Zero: "*When anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period.*" Net zero is achieved where emissions are first educed in line with a 'science-based' trajectory with any residual emissions neutralised through offsets.

Effects	Significance Level	Description
		› Well 'ahead of the curve' for Ireland's trajectory towards net zero, provides a positive climate impact.

Table 10- 3 Climate Assessment Significance Criteria

10.2.7 Difficulties Encountered

Historical data for climate for the period 1988 – present day was investigated in order to establish the relevant baseline. However, published data for this exact time period was not available for every source and therefore, data from as far back as possible has been used in establishing the baseline.

10.3 Establishment of Baseline (July 1988)

The baseline environment has been established as July 1988 for the purpose of this assessment. Historical data for climate from this time period was investigated in order to establish the relevant baseline. However, published data for this exact time period was not available for every source and therefore, data from as far back as possible has been used in establishing the baseline. 1990 is typically taken as the historical baseline year by countries when reporting GHG emissions under the United Nations Framework Convention on Climate Change (UNFCCC). Detailed emissions inventories for the full period 1988 to present are not available for the purposes of establishing the full climate baseline for this assessment. Data from 1990 are considered representative of the baseline conditions in July 1988. In order to frame the July 1988 baseline against the current climate context, and historic climate data, trends in GHG emissions for the period 1990 – 2023 have been discussed in the following section.

10.3.1 Greenhouse Gas Emissions and Climate Baseline

Although variation in climate is thought to be a natural process, the rate at which the climate is changing has been accelerated rapidly by human activities. Climate change is one of the most challenging global issues facing us today and is primarily the result of increased levels of GHGs in the atmosphere. These GHGs come primarily from the combustion of fossil fuels in energy use. Moving away from our reliance on coal, oil and other fossil fuel-driven power plants is essential to reduce emissions of GHGs and combat climate change.

For the purposes of this assessment, the definition for GHGs outlined in Council *Directive 2009/28/EC* on the promotion of the use of energy from renewable sources and amending and subsequently repealing *Directives 2001/77/EC* and *2003/30/EC* (European Parliament and Council of Europe 2009) has been used. In *'Annex V, C. Methodology Point 5'* the relevant GHGs are defined as Carbon Dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) which are also the most significant GHGs. Climate is defined as the average weather over a period of time, whilst climate change is a significant change to the average weather. Climate change is a natural phenomenon but in recent years human activities, which have resulted in the release of GHGs, have impacted on the climate (IPCC 2015). The release of anthropogenic GHGs is altering the Earth's atmosphere resulting in a 'Greenhouse Effect'. This effect is causing an increase in the atmosphere's heat trapping abilities resulting in increased average global temperatures over the past number of decades. The release of CO_2 as a result of burning fossil fuels, has been one of the leading factors in the creation of this 'Greenhouse Effect'.

Trends in GHG emissions at a national level are available in annual reports by the EPA. The most recent EPA report entitled '*Ireland's Provisional Greenhouse Gas Emissions 1990 – 2024* [3] (EPA, 2025) reviews national emissions in 2024 and trends in emissions from 1990.

The EPA reported that GHG emissions in 2024 are -3.4% less than emissions in 1990, which is the second consecutive year that emissions are below the 1990 historic baseline. Between 1990 and 2024 the greatest overall increase in emissions is from the Transport sector which has shown a 126.6% increase in emissions, particularly in relation to road transport which in large part is attributable to increasing population and economic prosperity. The Energy Industries have shown a decrease in emissions of 36.9% over the 1990 – 2024 period. This decrease reflects the improvement in efficiency of modern gas fired power plants replacing older peat and oil-fired plants and the increased share of renewables, primarily wind power, along with increased interconnectivity. The Agricultural sector has shown a 0.8% decrease in emissions over the 1990 – 2024 period. Agriculture sector emissions decreased between 1998 until 2011 but since 2011 emissions have been on an upward trend. Emissions from the Residential sector showed a general upward trend in emissions after 1997 due to increased housing stock and growing population. Emissions remained relatively stable over the 2015 to 2021 period despite an increasing population. Emissions from the Residential sector in 2024 were 25.8% lower than in 1990.

Figure 10-1 taken from the EPA report (2025) shows the trend in emissions from the largest sectors over the 1990 – 2024 period. It is clear from the EPA report that emissions in 1990, which is representative of the baseline year of 1988, were lower than current GHG emissions in 2024. Therefore, any increase in historical GHG emissions is considered more significant due to the lower baseline levels of GHGs.

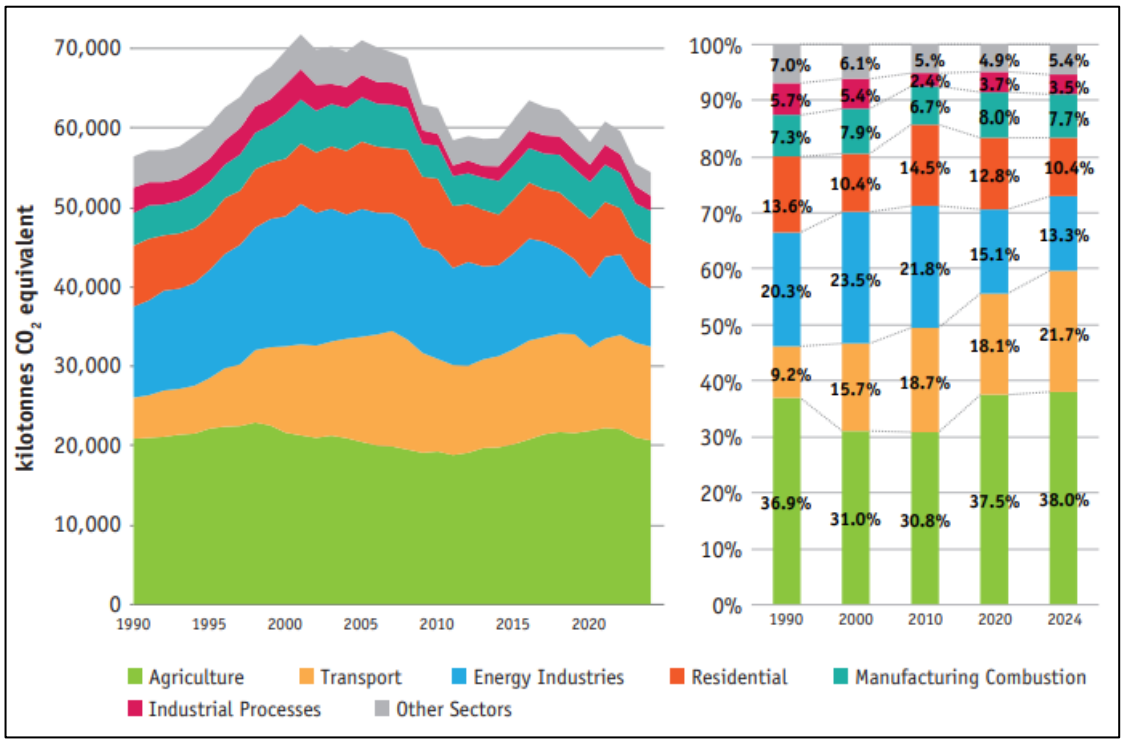

*Figure 10-1 Trend in Emissions for Largest Sectors 1990-2024 (*Source: Figure 25 EPA (2025) Ireland's Provisional Greenhouse Gas Emissions 1990 – 2024*)*

In relation to the current climate GHG emissions baseline, and in order to frame the July 1988 Baseline against a current climate context, Ireland's compliance with the EU Effort Sharing Regulation (ESR) (EU 2018/842) and the published carbon budgets (Table 10-1), data published in July 2025 (EPA, 2025)

[3] https://www.epa.ie/publications/monitoring–assessment/climate-change/air-emissions/EPA-Provisional-GHG-Report-Jul24-v6.pdf

predicts that Ireland exceeded (without the use of flexibilities) its 2024 annual limit set under EU's Effort Sharing Regulation by 3.74 $MtCO_2e$. Cumulatively from 2021-2024 and after using the ETS flexibility, Ireland is not in compliance with the ESR by a net distance to target of -1.03 Mt CO_2e, there is an exceedance of 1.83 Mt CO_2e above its Annual Emissions Allocation with the ETS flexibility. Agriculture and Transport accounted for 75.4% of total ESR emissions in 2024. The sectoral breakdown of 2024 GHG emissions is shown in Table 10-4. The sector with the highest emissions was Agriculture at 35.22% of the total, followed by transport at 20.1%.

The EPA report (EPA, 2025) states that the latest projections indicate that currently implemented measures (With Existing Measures) will achieve a reduction of 10% on 2005 levels by 2030, significantly short of the 42% reduction target. If measures in the higher ambition (With Additional Measures) scenario are implemented, EPA projections show that Ireland can achieve a reduction of 22% by 2030, still short of the 42% reduction target.

The current estimates of National greenhouse gas emissions (including LULUCF) in 2024 are 12% below 2018, well off the National Climate ambition of a 51% reduction by 2030. The data indicates that from 2021- 2024 Ireland has used 82.5% of the 295 Mt CO_2e Carbon Budget for the five-year period 2021-2025. This leaves 17% of the budget available for 2025, requiring a substantial 10.3% annual emissions reduction for 2025 to stay within budget.

Table 10- 4 Total National GHG Emissions in 2024

Sector	2024 Emissions (Mt CO_2e)	% Total 2024 (including LULUCF)
Agriculture	20.408	35.40%
Transport	11.652	20.21%
Energy Industries	7.157	12.42%
Residential	5.615	9.74%
Manufacturing Combustion	4.13	7.16%
Industrial Processes	1.88	3.26%
F-Gases	0.581	1.01%
Commercial Services	0.771	1.34%
Public Services	0.721	1.25%
Waste [Note 2]	0.837	1.45%
Land Use, Land-use Change and Forestry (LULUCF)	3.895	6.76%
National total excluding LULUFC	**53.752**	-
National total including LULUFC	**57.646**	-

Note 1: Reproduced from Latest emissions data on the EPA (EPA, 2025)
Note 2: Waste includes emissions from solid waste disposal on land, solid waste treatment (composting and anaerobic digestion), wastewater treatment, waste incineration and open burning of waste.

10.3.2 Meteorological Data

Ireland has a temperate, oceanic climate, resulting in mild winters and cool summers. The Met Éireann weather station at Mullingar, Co. Westmeath is the nearest weather and climate monitoring station to the site that has meteorological data recorded for the 30-year period from 1979-2008. The monitoring station is located approximately 34 km northeast of the Application Site. Meteorological data recorded at Mullingar over the 30-year period is shown in Table 10-5. The wettest month was October and the driest month on average was April. July was the warmest month with a mean temperature of 15.2° Celsius. This meteorological data can be considered representative of the weather conditions for the July 1988 baseline.

Table 10- 5 Data from Met Éireann Weather Station at Mullingar 1979– 2008: Monthly and Annual Mean and Extreme Values

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
TEMPERATURE (degrees Celsius)													
mean daily max	7.4	7.9	9.8	12.1	14.9	17.3	19.2	18.9	16.7	13.2	9.9	7.9	12.9
mean daily min	1.5	1.5	2.8	4.1	6.3	9.2	11.1	10.8	8.9	6.2	3.5	2.2	5.7
mean temperature	4.5	4.7	6.3	8.1	10.6	13.2	15.2	14.8	12.8	9.7	6.7	5.0	9.3
absolute max.	13.8	15.4	19.1	21.6	25.0	28.3	29.7	29.1	25.0	20.1	17.3	14.6	29.7
min. maximum	-3.2	-0.6	1.4	4.1	0.0	10.1	10.9	11.4	10.6	6.3	2.7	-1.7	-3.2
max. minimum	11.6	11.5	11.5	12.5	12.7	15.3	17.4	18.0	16.8	15.4	12.5	12.4	18.0
absolute min.	-14.9	-6.6	-8.0	-4.4	-2.6	0.2	3.8	2.1	0.0	-4.4	-6.9	-12.4	-14.9
mean num. of days with air frost	9.9	8.9	5.5	3.1	0.4	0.0	0.0	0.0	0.0	1.5	5.4	8.2	43.0
mean num. of days with ground frost	17.9	16.2	14.0	10.8	5.1	0.8	0.0	0.1	1.7	6.3	12.1	15.4	100.4
mean 5cm soil	3.3	3.3	5.0	8.1	11.8	14.8	16.3	15.5	12.8	8.9	5.7	4.1	9.1
mean 10cm soil	3.7	3.7	5.1	7.6	11.0	14.1	15.8	15.2	12.8	9.3	6.2	4.5	9.1
mean 20cm soil	4.3	4.4	5.8	8.1	11.4	14.3	16.1	15.8	13.7	10.3	7.2	5.2	9.7
RELATIVE HUMIDITY (%)													
mean at 0900UTC	90.8	89.8	87.6	81.9	78.3	79.7	82.1	84.8	87.6	89.9	91.7	91.8	86.3
mean at 1500UTC	83.4	77.8	72.8	68.1	67.1	69.1	69.9	70.6	72.1	77.0	82.2	85.9	74.7

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
SUNSHINE (hours)													
mean daily duration	1.8	2.5	3.2	4.9	5.8	5.0	4.6	4.6	3.9	3.2	2.2	1.6	3.6
greatest daily duration	8.2	9.9	10.9	13.6	15.4	15.9	15.3	14.4	12.2	10.1	8.6	7.3	15.9
mean num. of days with no sun	10.3	7.2	5.3	2.9	1.9	2.2	1.8	1.9	3.3	5.7	8.4	11.0	62.0
RAINFALL (mm)													
mean monthly total	91.7	72.0	78.3	62.1	68.7	70.5	61.8	80.8	73.8	102.1	82.4	97.1	941.3
greatest daily total	30.3	24.7	29.5	27.6	26.1	52.9	26.6	58.2	42.1	48.8	43.7	38.8	58.2
mean num. of days with >= 0.2mm	19	17	20	15	16	16	16	17	17	19	18	19	209
mean num. of days with >= 1.0mm	15	13	15	11	12	11	11	13	12	14	13	14	154
mean num. of days with >= 5.0mm	6	5	5	4	5	4	3	5	4	6	6	7	60
WIND (knots)													
mean monthly speed	9.0	9.1	9.1	7.7	7.3	6.7	6.4	6.3	6.7	7.5	7.8	8.3	7.6
max. gust	67	71	59	56	58	48	48	50	51	59	62	73	58.5
max. mean 10-minute speed	38	36	36	30	34	26	27	28	32	36	32	39	32.8
mean num. of days with gales	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.8
WEATHER (mean no. of days with)													

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
snow or sleet	5.0	4.4	3.5	1.6	0.2	0.0	0.0	0.0	0.0	0.0	0.4	2.7	17.8
snow lying at 0900UTC	2.7	0.9	0.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.0	5.7
hail	0.6	0.9	2.0	2.0	1.1	0.2	0.1	0.1	0.1	0.5	0.2	0.3	8.1
thunder	0.1	0.2	0.2	0.3	0.9	0.9	1.2	0.8	0.1	0.1	0.1	0.1	4.9
fog	3.4	3.0	2.4	2.0	1.8	1.3	1.9	2.9	4.0	4.1	4.1	4.3	35.1

10.4 Likely Significant Effects and Associated Control and Mitigation Measures

10.4.1 Do-Nothing Option

As outlined in the EPA Guidelines (May 2022), the description of 'Do-Nothing Effects' relates to the environment as it would be in the future should the Project not be carried out. Peat extraction was underway at the Application Site prior to the required date for the transposition of the EIA Directive in 1988. If peat extraction and ancillary activities had ceased from 1988 onwards, then consequently there would have been no further peat extraction from the site and therefore no impact on climate.

For those lands which as of 1988 had been subject to the installation of drainage in preparation for peat extraction but not peat extraction itself, it is assumed in the 'do-nothing' scenario that drainage would have remained in situ. Maintenance works to keep established drainage channels clear would have ceased as of 1988 in the 'do-nothing' scenario. It is likely that these areas would have been subject to natural recolonisation of the bog surface.

However, consideration must be given to the following:

- The legislative mandate given to Bord na Móna in the form of the Turf Development Act 1946, as amended) to acquire and develop peatlands; and
- The uncertainty with respect to the planning status of the activity did not arise until 2019 and was not evident in 1988.

Therefore, this 'Do-Nothing' option was not the chosen option. Peat extraction and ancillary activities have occurred at the Application Site from July 1988 onwards. A decision to cease peat extraction at the Application Site was taken in 2020 and the Application Site needs to be considered in the context of regularising (without prejudice) the planning status of the lands to facilitate future development (subject to planning consent as required). The Application Site has and will continue to revegetate, and there will be a change from areas of cutover peatland to revegetated peatland. These are described in the individual chapters of the rEIAR.

As part of Bord na Móna's statutory obligations under IPC licence requirements, the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan will continue to be implemented for the Application Site separate to, and independent of, the Substitute Consent application. The implementation of this plan is included in the impact assessment below.

10.4.2 Peat Extraction Phase (July 1988 - June 2020)

Lowering the water table increases the oxidation of the peat and in turn causes a rise in CO_2 emissions, this is further increased by the removal of vegetation and exposure of the peat that was present on the Application Site (Holmgren et al 2006) (Waddington & Price 2000). However, lowering of the water table had already occurred at the Application Site prior to 1988. 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 degraded bogs will continue to act as sources of these GHG until either they are rewetted/revegetated, the peat is removed, or all the remaining peat has oxidised. As a result of the draining of the bog and the removal of the vegetation, the peatland transformed from a net CO_2 sink to a net CO_2 source (Wilson 2013).

Using the assessment methodology outlined in Section 10.2.6, the CO_2 emissions associated with peat extraction and ancillary activities over the period 1988 – 2020 were calculated. In order to present a precautionary scenario, the full 1988 year and full 2020 year have been utilised for these calculations

rather than for a 6-month period (i.e from July 1988 to December 1988) and 6-month period (i.e. from January 2020 to June 2020) respectively. For the purposes of this assessment, it was assumed that the entire Application Site area of 1,111 ha was drained and subject to peat extraction. This is a conservative approach as the entirety of the Application Site was not subject to active peat extraction at the one time.

In total, 524,512 tCO_2 was released over the Peat Extraction Phase. Over this 32-year period there was on average 16,391 tonnes of CO_2 per annum released from the Application Site. Annually this equates to 0.006% of Ireland's 2021 – 2025 carbon budget of 295 $MtCO_2e$ or 0.01% of Ireland's more stringent 2030 – 2035 carbon budget of 151 $MtCO_2e$ (see Table 10-1).

There was also the potential for GHG emissions associated with vehicles accessing the Application Site, for site workers. However, the number of vehicles accessing the Application Site and their associated GHG emissions were not predicted to be significant in relation to Ireland's climate budgets and sectoral emissions ceilings (Table 10-1 and Table 10-2). GHG emissions from vehicles, in general, would have reduced as engine technologies and fuels improved over the 1988 – 2020 period. However, the primary source of GHG emissions throughout the Peat Extraction Phase was the extraction of peat and the subsequent loss of carbon sink.

In addition to the loss of the carbon sink at the Application Site through the extraction of peat, there were also indirect CO_2 emissions associated with the extracted peat.

While not directly related to the peat extraction activities, these indirect CO_2 emissions are being included for completeness of the assessment. For the purposes of this assessment the emission factor of 0.741 $kgCO_2/kg$ for milled peat has been utilised.

Table 4-7 of Chapter 4 Description of the Development details the tonnes of peat extracted annually at the Application Site. In total over the period July 1988 to June 2020 a total of 3,351,248 tonnes of peat was extracted. Based on the total tonnage extracted and the SEAI figure of 0.741 $kgCO_2/kg$, it is calculated that 2,483,275 tCO_2 total indirect CO_2 emissions were generated. Annually over the 32-year assessment period this equates to 77,602 tCO_2. Annually this equates to 0.026% of Ireland's 2021 – 2025 carbon budget of 295 $MtCO_2e$ or 0.051% of Ireland's more stringent 2030 – 2035 carbon budget of 151 $MtCO_2e$ (see Table 10-1).

The removal of the carbon store of the site and the subsequent release of CO_2 from peat extraction and ancillary activities during the Peat Extraction Phase resulted in a major significant adverse impact to climate as per the criteria in Table 10-3. This equates to a long-term, direct, negative and significant impact to climate using the EPA EIA terminology.

10.4.3 Current Phase

As peat extraction ceased at the Application Site in June 2020, carbon losses associated with peat extraction and the subsequent impact to climate are not relevant to this phase.

However, areas of degraded bogs will continue to act as sources of these GHG until they are either rewetted/revegetated, the peat is removed, or all the remaining peat has oxidised. In addition to the consideration of the loss of a sink due to the dewatering/removal of vegetation, consideration must be given to the dewatered peat now being a source of CO_2e. Renou-Wilson et al (2018) studied a range of blanket and cutover raised bogs in Ireland in its assessment. Site-specific rates for CO_2 and CH_4 emissions were calculated based on studies at 4 no. Irish bogs. The study, over five years, found that the drained bare peat sites were a net annual CO_2 source and resulted in an average emission factor of 1.2 t CO_2-C ha^{-1} yr^{-1}. In terms of CH_4 and N_2O, the net ecosystem exchange (NEE) (net CO_2 flux between land-atmosphere) was approximately neutral. Using the average emission factor of 1.2 t CO_2-C ha^{-1} yr^{-1} in conjunction with the area of the Application Site (1,111 ha) it can be concluded that there will be carbon emissions associated with the Current Phase of 1,277 tCO_2e per year. A conservative

approach has been taken in this assessment in assuming that the entire Application Site area is a current CO_2 source.

The Current Phase of the Project has the potential to emit approximately 1,277 tCO_2e each year until the land is rewetted or revegetated or developed into an alternative land use. In the context of Ireland's carbon budgets, this annual emission equates to 0.0004% of Ireland's 2021 – 2025 carbon budget of 295 $MtCO_2e$ or 0.0008% of Ireland's more stringent 2030 – 2035 carbon budget of 151 $MtCO_2e$ (see Table 10-1).

Other elements of the Current Phase are the removal of stockpiled peat, which was completed in 2024, and ongoing environmental and ecological monitoring. There is the potential for some minor GHG emissions associated with vehicles accessing the Application Site for removal of stockpiled peat or for monitoring works. However, the number of vehicles accessing the Application Site will be minimal and GHG emissions associated with these are not predicted to be significant in relation to Ireland's climate budgets and sectoral emissions ceilings (Table 10-1 and Table 10-2). The impact to climate from the Current Phase is considered major significant adverse as per the criteria in Table 10-3. This equates to a short-term, negative and significant impact as per the EPA EIA terminology.

10.4.4 Remedial Phase

The primary focus of the Remedial Phase is re-wetting the bogs which will aid in restoring the carbon store function and promote the carbon sink potential of the land. Research by Wilson et al. (2013) has indicated that rehabilitation of peatlands can mitigate the carbon emitted as a result of peat extraction. However, the research notes that the carbon sink potential is not equivalent to the original sink potential of undisturbed peatlands. Large volumes of peat in the Application Site had been removed prior to the baseline year of 1988. Therefore, the carbon sink potential of the land in the baseline scenario was significantly less than the undisturbed peatland. As a result, the re-wetting activities of the Remedial Phase as part of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan aid in formation of new peat over time which will have a materially beneficial impact in raising the carbon sink potential of the land when compared to the baseline scenario.

Table 4-9 of Chapter 4 Description of the Development sets out the areas for rehabilitation measures at the Application Site. Using the calculation spreadsheet from the IUCN UK National Committee UK Peatland Programme 'Peatland Code Version 2.1' (2024) in conjunction with a rehabilitation area of 1,114 ha allows the CO_2 reduction to be calculated. The CO_2 reductions will increase over time as the carbon store of the land returns. In the first 0 – 5 year period there is the potential for a reduction of 12,783 tCO_2e. This has the potential to increase to a reduction of 255,663 tCO_2e in years 95 – 100.

The purpose of the Remedial Phase of the Project is in line with a number of key actions and priorities within the Climate Action Plan 2024 and Climate Action Plan 2025 in relation to the rehabilitation of peatlands, specifically those within the Midlands area. With the restoration of the carbon sink potential of the land, albeit, to a lesser extent than the potential prior to the historic removal of the peat, the Application Site will aid in Ireland's trajectory towards net zero by 2050. Using the assessment criteria in Table 10-3, the Remedial Phase of the Project is considered minor adverse and not significant as the Project has complied with existing and emerging policy requirements and is in line to achieve Ireland's trajectory towards net zero. Using the EPA EIA terminology, the impact to climate is long-term, negative and not significant.

10.5 Control and Mitigation Measures

10.5.1 Peat Extraction Phase (July 1988 – June 2020)

No control measures in relation to climate were implemented during the Peat Extraction Phase.

10.5.2 Current Phase (June 2020 – Present Day)

No control measures in relation to climate and carbon emissions is relevant for the Current Phase.

10.5.3 Remedial Phase

There are no mitigation measures required in relation to climate for the Remedial Phase.

10.6 Residual Effects

10.6.1 Peat Extraction Phase (July 1988 - June 2020)

The removal of the carbon store of the Application Site and the subsequent release of CO_2 as a result of peat extraction and ancillary activities during the Peat Extraction Phase as well as the indirect emissions associated with the extracted and exported peat, resulted in a major significant adverse impact to climate as per the criteria in Table 10-3. This equates to a long-term, direct, negative and significant impact to climate using the EPA EIA terminology. The re-wetting of the bog will aid in restoring the carbon sink potential of the land. Research by Wilson et al. (2013) has indicated that rehabilitation of peatlands can mitigate the carbon emitted as a result of historic peat extraction.

10.6.2 Current Phase (June 2020 – Present Day)

As peat extraction ceased in June 2020, carbon losses associated with peat extraction and the subsequent impact to climate are not relevant to this phase. However, the degraded bogs will continue to act as sources of these GHG until they are either rewetted/revegetated, the peat is removed or all the remaining peat has oxidised.

The impact to climate from the Current Phase is considered major significant adverse as per the criteria in Table 10-3. This equates to a short-term, negative and significant impact as per the EPA EIA terminology. Emissions from vehicles accessing the site will be minimal in nature.

10.6.3 Remedial Phase

The Remedial Phase will include re-wetting the bogs which will aid in restoring the carbon store function and promote the carbon sink potential of the land. The carbon reductions associated with the Remedial Phase will result in a minor adverse and not significant impact as the Project has complied with existing and emerging policy requirements and is in line to achieve Ireland's trajectory towards net zero. Using the EPA EIA terminology, the impact to climate is long-term, neutral and not significant.

10.7 Significance of Effects

10.7.1 Peat Extraction Phase (July 1988 - June 2020)

The impacts on climate during the Peat Extraction Phase is considered long-term, direct, negative and Significant in EIA terms.

10.7.2 Current Phase (June 2020 – Present Day)

As peat extraction ceased at the Application Site in 2020, carbon losses associated with peat removal and the subsequent impact to climate are not relevant to this phase. Emissions from vehicles accessing the Application Site will be minimal in nature. However, the degraded bogs will continue to act as

sources of these GHGs until they are either rewetted/revegetated, the peat is removed or all the remaining peat has oxidised.

The impact to climate from the Current Phase is considered major significant adverse as per the criteria in Table 10-3. This equates to a short-term, negative and significant impact as per the EPA EIA terminology. Emissions from vehicles accessing the site will be minimal in nature and are considered not significant.

10.7.3 Remedial Phase

The Remedial Phase will include re-wetting the bogs which will aid in restoring the carbon store function and promote the carbon sink potential of the land. The carbon reductions associated with the Remedial Phase will result in a minor adverse and not significant impact as the Project has complied with existing and emerging policy requirements and is in line to achieve Ireland's trajectory towards net zero. Using the EPA EIA terminology, the impact to climate is long-term, neutral and not significant.

10.8 Cumulative and In-Combination Effects

The ISEP and TII guidance on which the assessment is based states that "*the identified receptor for the GHG Assessment is the global climate and impacts on the receptor from a project are not geographically constrained, the normal approach for cumulative assessment in EIA is not considered applicable. By presenting the GHG impact of a project in the context of its alignment to Ireland's trajectory of net zero and any sectoral carbon budgets, this assessment will demonstrate the potential for the project to affect Ireland's ability to meet its national carbon reduction target. This assessment approach is considered to be inherently cumulative*".

The GHG emissions associated with peat extraction and ancillary activities and the loss of the carbon sink potential of the land has been carried out in this assessment with the predicted emissions compared with Ireland's climate targets and emissions ceilings.

Cumulative impacts to climate associated with development in the 1950 – 1988 period include historic removal of peat and the associated loss of the carbon sink potential of the land. The impact to climate as a result of peat extraction and ancillary activities at the Application Site from 1950 – 1988 are similar to those discussed for the Peat Extraction Phase (i.e July 1988 – June 2020). While no detailed calculations in relation to tonnages of carbon have been conducted for the 1950 – 1988 period, it is likely that the impact to climate was long-term, negative and significant. The cumulative impact of peat extraction and ancillary activities from the commencement of drainage at the Application Site in 1950 up until peat extraction ceased in 2020 likely had a long-term, negative and significant impact on climate.

However, it should also be noted that in line with the Applicant's vision to assist in achieving a climate neutral Ireland by 2050, it is intended to utilise the Application Site for both peatland rehabilitation and wind energy infrastructure and to facilitate environmental stabilisation of the Application Site and the optimisation of climate action benefits. Lemanaghan DAC, a joint venture between SSE Renewables and Bord na Móna (BnM) (i.e the Applicant) are proposing a wind energy development consisting of 15 turbines with an overall blade to tip height of 220m[4]at the Application Site. A separate EIAR and accompanying NIS are being undertaken for the proposed Lemanaghan Wind Farm development. At the time of writing, the planning application for this development has not yet been submitted to An Coimisiún Pleanála.

The cumulative impact of providing a carbon sink within the re-wetted peatland and the carbon savings as a result of renewable energy generated by the proposed Lemanaghan Wind Farm (should it be

[4] https://www.lemanaghanwindfarm.ie/

granted planning permission) would result in a minor adverse, not significant impact to climate using the ISEP and TII criteria in Table 10-3, as the proposed Lemanaghan Windfarm will comply with existing and emerging policy requirements and is in line with Ireland's trajectory towards net zero. This equates to a significant, long-term positive impact to climate using the EPA EIA terminology and would assist in nation goal of achieving a climate neutral Ireland by 2050 as set out in the Climate Action and Low Carbon Development (Amendment) Act 2021.

10.9 Conclusion

This chapter of the rEIAR describes and assesses the residual direct and indirect climate impacts of peat extraction and ancillary activities, at the Application Site. The climate impact assessments have been prepared for the Peat Extraction Phase, the Current Phase and the Remedial Phase.

For the purposes of this assessment, while the activities assessed have occurred over the past decades, beginning in July 1988 and continuing to present day, impacts have been assessed against the most recently published climate guidance and policies which are likely more stringent than historical policies from previous years. Therefore, if it can be determined that, based on the most recent standards, no significant effects occurred as a result of the Project, then it is unlikely that significant impacts occurred based on historical standards. The climate impact assessment comprised a quantitative assessment of the carbon emissions as a result of the peat extraction and ancillary activities.

Historic climate data was reviewed in reference to Ireland's weather for the surrounding area of the Application Site over the period July 1988 to present day and was used to establish the baseline conditions for 1988. Climate is defined as the average weather over a period of time, whilst climate change is a significant change to the average weather. Climate change is a natural phenomenon but in recent years human activities, which have resulted in the release of GHGs, have impacted on the climate. Climate change has led to an increase in the frequency of extreme weather conditions such as storms, floods and droughts. Historic National greenhouse gas (GHG) emissions published by the Environmental Protection Agency (EPA) were also reviewed and used to inform the climate baseline assessment. National greenhouse gas (GHG) emissions are required to meet EU specific targets, however Ireland's annual GHG emissions have been in exceedance of these targets thus far.

Peat Extraction Activities (July 1988 – June 2020)

The CO_2 emissions associated with the peat extraction and ancillary activities over the period 1988 – 2020 were calculated. On average over this 32-year period there was 16,392 tonnes of CO_2 per annum released from the Application Site. Annually this equates to 0.006% of Ireland's 2021 – 2025 carbon budget of 295 $MtCO_2e$ or 0.01% of Ireland's more stringent 2030 – 2035 carbon budget of 151 $MtCO_2e$. The removal of the carbon store of the Application Site and the subsequent release of CO_2 as a result of peat extraction and ancillary activities during the Peat Extraction Phase resulted in a major significant adverse impact to climate as per the ISEP and TII criteria. Additionally, the indirect CO2 emissions associated with the extracted peat resulted in annual emissions of 77,602 tCO_2. Annually this equates to 0.026% of Ireland's 2021 – 2025 carbon budget of 295 $MtCO_2e$ or 0.051% of Ireland's more stringent 2030 – 2035 carbon budget of 151 $MtCO_2e$. This is a major significant adverse impact to climate. This equates to a long-term, negative and significant impact to climate using the EPA EIA terminology.

Current Phase (June 2020 – Present Day)

As peat extraction ceased at the Application Site in June 2020, carbon losses associated with peat removal and the subsequent impact to climate are not relevant to this phase.

However, areas of degraded bog will continue to act as sources of these GHG until they are either rewetted/revegetated, the peat is removed or all the remaining peat has oxidised. In addition to the

consideration of the loss of a sink due to the dewatering/removal of vegetation, consideration must be given to the dewatered peat now being a source of CO_2e. The Current Phase of the Project has the potential to emit approximately 1,277 tCO_2e each year until the land is rewetted or revegetated or developed into an alternative land use. In the context of Ireland's carbon budgets, this annual emission equates to 0.0004% of Ireland's 2021 – 2025 carbon budget of 295 $MtCO_2e$ or 0.0008% of Ireland's more stringent 2030 – 2035 carbon budget of 151 $MtCO_2e$.

There is the potential for some minor GHG emissions associated with vehicles accessing the Application Site for removal of stockpiled peat or for monitoring works. However, the number of vehicles accessing the Application Site will be minimal and GHG emissions associated with these are not predicted to be significant in relation to Ireland's climate budgets and sectoral emissions ceilings. The impact to climate from the Current Phase is considered major significant adverse as per the ISEP and TII significance criteria. This equates to a short-term, negative and significant impact as per the EPA EIA terminology.

Remedial Phase

The primary focus of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan is re-wetting the bogs which will aid in restoring the carbon store function. The CO_2 reductions will increase over time as the carbon store of the land returns. In the first 0 – 5 year period there is the potential for a reduction of 12,783 tCO_2e. This has the potential to increase to a reduction of 255,663 tCO_2e in years 95 – 100.

The purpose of the Remedial Phase of the Project is in line with a number of key actions and priorities within CAP24 and CAP25 in relation to the rehabilitation of peatlands, specifically those within the mid-lands area. With the restoration of the carbon sink potential of the land, albeit, to a lesser extent than the potential prior to the historic removal of the peat, the Project will aid in Ireland's trajectory towards net zero by 2050.

Using the ISEP and TII assessment criteria, the Remedial Phase of the Project is considered minor adverse and not significant as the Project has complied with existing and emerging policy requirements and is in line with Ireland's trajectory towards net zero. Using the EPA EIA terminology, the impact to climate is long-term, negative and not significant.