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BUILT ON KNOWLEDGE

Bord na Móna

Derryadd, Derryaroge and Lough Bannow Bogs – Application for Substitute Consent

Remedial Environmental Impact Assessment Report

Chapter 15 –Climate

March 2025

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15.0 CLIMATE

15.1 INTRODUCTION

This chapter provides an assessment of the impacts to climate resulting from Bord na Móna's historic peat extraction and ancillary activities at the Application Site. The climate impact assessment has been prepared for the Peat Extraction Phase (1988 – 2019), the Current Phase (July 2019 – present) and the Remedial Phase of the Project. As discussed in Chapter 1, historical impacts associated with the Peat Extraction Phase have been assessed from 1988 (i.e. the latest date for the transposition of the EIA Directive into Irish law), to present day. The baseline environment has been prepared with reference to published climate data from the Environmental Protection Agency (EPA). For the purposes of this assessment, 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 the Application Site can indicate that no significant effects occurred based on the most recent policies then it is unlikely that significant impacts occurred based on historical policies. The primary concern regarding climate is the loss of carbon sink associated with the removal of peat from the Application Site as a result of the project.

A comprehensive description of the Application Site is provided in Chapter 4 (Project Description).

15.1.1 Statement of Authority

This chapter was prepared by Ciara Nolan, a Principal Air Quality Consultant with AWN Consulting Ltd. Ciara 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 Institute of Environmental Science (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.

15.1.2 Limitations and Difficulties

Historical data for climate for the period 1988 to present day were investigated in order to establish the relevant baseline. However, published data for this exact time period were not available for every source and therefore, the oldest data available has been used in establishing the baseline. Trends in greenhouse gas (GHG) emissions over the period 1990 - 2023 have been reviewed in order to establish the baseline environment as discussed in Section 15.3.2. GHG emissions data prior to 1990 was not available for review.

15.2 METHODOLOGY

15.2.1 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 significant of the effects are provided in Chapter 2- rEIA Methodology.

The rating of potential environmental effects of the Application Site on climate is based on the criteria presented in Table 3.4 of the 2022 EPA guidance document. These criteria allow the quality, significance, duration and types of effects to be determined.

15.2.2 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.

15.2.2.1 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 (the Minister for the Environment) 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 15.1. 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 shall prepare and submit to government the maximum amount of 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 15.2. The Application Site would likely 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 harvesting activities from 1988 – 2019. Therefore, the historic peat harvesting activities did not require compliance with any sectoral emissions ceilings or carbon budgets.

Table 15.1: 5-Year Carbon Budgets 2021-2025, 2026-2030 and 2031-2025

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 15.2: Sectoral Emission Ceilings 2030

Sector	Baseline ($MtCO_2e$)	Carbon Budgets ($MtCO_2e$)		2030 Emissions ($MtCO_2e$)	Indicative Emissions % Reduction in Final Year of 2025- 2030 Period (Compared to 2018)
	2018	2021-2025	2026-2030		
Transport	12	54	37	6	50
Electricity	10	40	20	3	75
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
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**

15.2.2.2 Policy

The Longford County Development Plan 1990 did not contain specific climate policy.

The Longford County Development Plan 2003 – 2009 did not contain specific policies on climate, however, there were references included to promoting sustainability specifically in the form of renewable energy generation.

The Longford County Development Plan 2009 – 2015 contains specific reference to sustainable development and climate change within Section 2.2. The plan states:

"*the plan* [Longford County Development Plan 2009 – 2015] *shall consider ways in which the production of greenhouse gases can be minimised, such as the promotion of sustainable transport patterns and environmentally conscious energy production. Promotion of locally sourced building materials, environmentally aware production methods and the use of passive technologies area all sustainable principles that will be promoted as part of this policy document*"

Additionally references to potential flooding impacts as a result of climate change are included within the Plan and the need to allow for this within development designs.

The plan also references renewable energy and the need to reduce reliance on fossil fuels within Section 5.5.2.1 of the Plan:

"*In attempting to achieve a more sustainable way of living in the County, acknowledging the need to respond to climate concerns and recognising the growing difficulties associated with continued use of fossil fuels, it is accepted that the demand for wind energy will increase over the plan period*".

Longford County Development Plan 2015 – 2021 Section 5.3.3 Climate Change includes;

"The National Climate Change Adaptation Framework provides a strategic policy focus to ensure adaptation measures are taken across different sectors and levels of government to reduce Ireland's vulnerability to the negative impacts of climate change. The aim of this Framework is to ensure that an effective role is played by all stakeholders in putting in place an active and enduring adaptation policy regime. The governance structure provides for climate change adaptation to be addressed at national and local level.

The Council is committed to the implementation of this strategy and accordingly the Councils policy in this regard is as follows;

CLI 1: The Council recognises European and national objectives for climate adaptation and will work with the EPA, the Midland Regional Authority and neighbouring planning authorities in implementing future Guidance for climate change proofing of land use plan provisions as is flagged in the National Climate Change Adaptation Framework (DECLG, 2012). The Council will integrate as appropriate, the National Climate Change Adaptation Framework and any related Guidelines which may arise during its implementation."

The Longford County Development Plan 2021-2027 contains a Climate Strategy, which in conjunction with the Longford County Council Climate Adaptation Strategy 2019 sets out a vision for the future and key actions towards climate change and sustainable development.

Chapter 3 Climate Change includes Policy 3.1:

"Support the implementation and achievement of European, national, regional and local objectives for climate adaptation and mitigation as detailed in the following documents, taking into account other provisions of the Plan (including those relating to land use planning, energy, sustainable mobility, flood risk management and drainage) and having regard to the Climate mitigation and adaptation measures which have been outlined through the policy objectives in this Development Plan:

- Climate Action Plan (2019 and any subsequent versions);
- National Climate Change Adaptation Framework (2018 and any subsequent versions);
- Any Regional Decarbonisation Plan prepared on foot of commitments included in the EMRA RSES;
- Relevant provisions of any Sectoral Adaptation Plans prepared to comply the requirements of the Climate Action and Low Carbon Development Act 2015, including those seeking to contribute towards the National Transition Objective, to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050; and
- Longford County Council Climate Change Adaptation Strategy 2019-2024"

The first Climate Action Plan (CAP) was published by the Irish Government in June 2019 (Government of Ireland, 2019). The Climate Action Plan 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. The 2019 CAP 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 Climate Action Plan in November 2021 (Government of Ireland, 2021a) and a third update in December 2022 (Government of Ireland, 2022) with an Annex of Action published in March 2023. A fourth revision of the CAP was published in December 2023 – CAP24.

CAP24 is the second 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 with the implementation of the carbon budgets and sectoral emissions ceilings and sets out a roadmap for taking decisive action reach net zero no later than 2050, as committed to in the Programme for Government. CAP24 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.

CAP24 states that rehabilitation of peatlands and development of amenity and tourism opportunities will continue and the plan outlines the following action in relation to meeting the required level of emissions reduction in relation to peatlands:

- *Action JM/24/4 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 across 82 no. Bord na Móna bogs, which were previously subject to peat extraction and related activities.

Key metrics to 2030 highlighted by CAP24 to deliver abatement in wetlands are as follows:

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.

15.2.2.3 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 UNFCCC and the 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 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.

[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))

15.2.3 Desk 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 - Mountdillon Bog Group IPC Licence P0504-01 (https://www.epa.ie/our-services/licensing/licencesearch/, Accessed 22/01/2024)

- Met Eireann Historical 30-Year Average Meteorological Data for Mullingar Station (1978 – 2008) (https://www.met.ie/climate-ireland/1981-2010/mullingar.html, Accessed 23/01/2024)

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.

15.2.4 Carbon & Peatlands

A research project undertaken for Bord na Móna 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 scenarios examined including 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).

CO_2 dynamics undergo significant changes when a peatland is subject to peat extraction. 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 and associated vegetation at the surface to facilitate the harvesting 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. However, 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). This is 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 it was possible to restore 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 of the peat 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 60 ha 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, which is mediated via photosynthesis. The study concludes that maintaining the water table close to the surface of the peat 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.

15.2.5 Field Survey

No field surveys have been conducted specifically related to climate.

15.2.6 Consultation

As part of the assessment, consultations were conducted with various organisations, including the EPA, TII Natural Capital Ireland, and the Sustainable Energy Authority of Ireland. Correspondence related to these consultations can be found in Table 2-1 of Chapter 2 (rEIA Methodology) in this rEIAR. No specific consultation with regard to climate was conducted.

15.2.7 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.

15.2.8 Impact Assessment Methodology

The following methodology has been employed in order to calculate the carbon / greenhouse gas (GHG) emissions associated with historic peat extraction from 1988 to present day. All calculations in relation to carbon emissions are available as Appendix 15.1.

15.2.8.1 Peat extracted and exported off site

Bord na Móna peat extraction records describe annual extraction volume of peat from the bogs over the production period. With an average moisture content of 53.8% and assuming a carbon content in peat of 49%[2] the annual average amount of carbon lost from the extraction of peat is then estimated using the following function:

$$(1-0.538) \times 0.49 \times \text{annual tonnage} = \text{Exported peat } tCO_2\text{-eq } yr^{-1}$$

15.2.8.2 Emissions to atmosphere

For estimation of the total emission of greenhouse gases, the following information from Evans et al. (2017) is utilised. DOC in Table 15.3 below refers to Dissolved Organic Carbon and POC refers to Particulate Organic Carbon.

Table 15.3: Emission factors for extractive peatlands from Evans et al. (2017) (Table 4.1, pp. 39 therein). All values given as tCO_2-eq $ha^{-1}yr^{-1}$.

	Direct CO_2 (Evans et al. 2017)	CO_2 from DOC (IPCC 2014)	CO_2 from POC (Evans et al. 2016)	Direct CH_4 (Evans et al. 2017)	CH_4 from drainage channels (IPCC 2014)	N_2O Direct (Evans 2017) + Indirect (IPCC 2006)
Industrial Extraction	6.44	1.14	5.00	0.20	0.68	0.38
Domestic Extraction	4.73	1.14	0.89	0.20	0.68	0.27

(a) Direct CO_2 from production areas

The peat extraction areas across the Application Site are determined during each peat extraction season period (i.e. March to October) on the basis of peat tonnages required and site conditions.

The estimated average annual amount of direct CO_2 atmospheric emissions is therefore:

$$\text{Total peat extraction area (ha)} \times 6.44 = \text{Total emitted Carbon } tCO_2\text{-eq } yr^{-1}$$

(b) Methane (CH_4) from drains/ditches

2 Wilson et al. (2013) p.12

The total combined length of drainage ditches in the peat production areas of the Application Site was estimated. For the purposes of the calculation, it is assumed that each drain is a consistent 1m in width. The total emission arising from the drains is calculated as:

(Overall Length of Drain x Width of drains) (ha) x 0.68 = Carbon emission tCO_2-eq $ha^{-1}yr^{-1}$

(c) Methane from peat extraction areas

The average annual amount of direct methane CH_4 from the peat extraction areas is determined based on the production areas:

Total Production Area (ha) × 0.2 = Carbon emission tCO_2-eq yr^{-1}

(d) Surface Runoff

The emission rates for Dissolved Organic Carbon (DOC) and Particulate Organic Carbon (POC) were combined into an overall emission rate of 6.14 tCO_2-eq ha^{-1} yr^{-1}. The total estimated carbon lost through runoff was determined as follows:

Total Production Area (ha) × 6.14 = Carbon emission tCO_2-eq yr^{-1}

(e) Transport

Between 2016 - 2018 the average annual quantity of diesel used was 231,359 litres. Using conversion factors for "Gasoil/Diesel" provided by SEAI[3] (43,308 MJ/t, 1,183 L/t, 7.33×10^{-5} tCO_2/MJ) the annual average amount of CO_2 generated by Bord na Móna machinery at the Application Site during this period was 631.1 tCO_2 yr^{-1}. This figure was utilised along with the average tonnes of peat extracted during the same period to establish a ratio of 0.00265 tCO_2/tonne of peat extracted. This ratio was then applied to the historical tonnages of peat extracted. The resulting carbon emission is calculated as follows:

Annual Peat Extracted (Tonnes)x0.00265 tCO_2/tonne = Carbon emission tCO_2-eq yr^{-1}

This is a conservative assessment as some of the machinery were powered by a local electrical network.

15.2.8.3 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 15.2). With the publication of the Climate Action Act in 2021, sectoral carbon budgets have been published for comparison with the Net CO_2

GHG emissions from a project. The significance of GHG effects set out in PE-ENV-01104 (TII, 2022) is based on IEMA guidance (IEMA, 2022) which is consistent with the terminology contained within Figure 3.4 of the EPA's (2022) '*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*'.

3 https://www.seai.ie/data-and-insights/seai-statistics/conversion-factors/

The 2022 IEMA Guidance (IEMA, 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 IEMA 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 technical document (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 IEMA Guidance (IEMA, 2022), TII 2022 technical document states 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*[4] *by 2050*".

Significance is determined using the criteria outlined in Table 15.4 (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.

[4] 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.

Table 15.4: 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 • Well 'ahead of the curve' for Ireland's trajectory towards net zero, provides a positive climate impact.

15.3 ESTABLISHMENT OF BASELINE (JULY 1988)

The baseline environment has been established as 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, the oldest available data has been used in establishing the baseline. 1990 is typically taken as the historical baseline year by countries when reporting GHG emissions under the UNFCCC (United Nations Framework Convention on Climate Change). 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 can be 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.

15.3.1 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 – 2023*' (EPA, 2024) reviews national emissions in 2023 and trends in emissions from 1990.

The EPA reported that GHG emissions in 2023 are -1.2% less than emissions in 1990, which is the first time in 33 years that emissions are below the 1990 historic baseline. Between 1990 and 2023 the greatest overall increase in emissions is from the Transport sector which has shown a 129.2% 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 30.8% over the 1990 – 2023 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 1.3% increase in emissions over the 1990 – 2023 period. Agriculture sector emissions had 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 2023 were 29.4% lower than in 1990. Figure 15.1 taken from the EPA report (2024) shows the trend in emissions from the largest sectors over the 1990 – 2023 period. It is clear from the EPA report that emissions in 1990, which is representative of the baseline year of 1988, were lower than GHG emissions in 2022. Therefore, any increase in historical GHG emissions is considered more significant due to the lower baseline levels of GHGs.

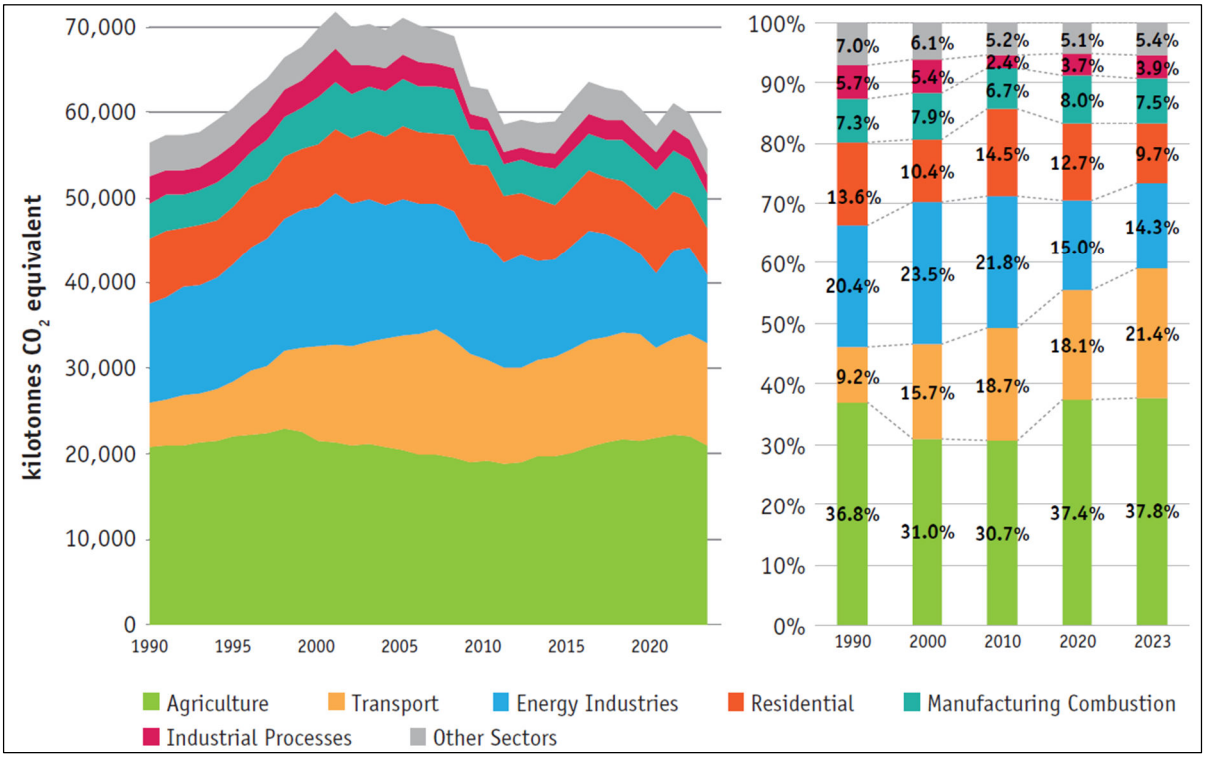

Figure 15.1: Trend in Emissions for Largest Sectors 1990-2023 (Source: Figure 25 EPA (2024) Ireland's provisional greenhouse gas emissions 1990 – 2023)

In relation to the current climate GHG emissions baseline, and Ireland's compliance with the EU Effort Sharing Decision (ESD) (EU 2018/842) and the published carbon budgets (Table 15.1), data published in July 2024 (EPA, 2024) predicts that Ireland exceeded (without the use of flexibilities) its 2023 annual limit set under EU's Effort Sharing Decision by 2.27 Mt CO_2e. The sectoral breakdown of 2023 GHG emissions is shown in Table 15.5. The sector with the highest emissions was agriculture at 37.6% of the total, followed by transport at 21.4%. Total national emissions (excluding LULUCF) were estimated to be 55.01 Mt CO_2e as shown in Table 15.5 (EPA, 2024). Provisional National total emissions (including LULUCF) for 2023 are 60.62 Mt CO_2e. The data indicate that from 2021- 2023 Ireland has used 64% (188.4 Mt CO_2e) of the 295 Mt CO_2e Carbon Budget for the five-year period 2021-2025. This leaves 36% of the budget available for the succeeding two years, requiring a substantial 8% annual emissions reduction for 2024 and 2025 to stay within budget.

Table 15.5: Total National GHG Emissions in 2023

Category	2023 GHG Emissions (MtCO2e)	%of Total GHG Emissions
Electricity	7.56	12.5%
Transport	11.79	19.5%
Buildings (Residential)	5.35	8.8%
Buildings (Commercial and Public)	1.41	2.3%
Industry	6.29	10.4%
Agriculture	20.78	34.3%
Other Note 2	1.83	3.0%
LULUCF	5.61	9.3%
National total excluding LULUFC	**55.01**	**90.7%**
National total including LULUFC	**60.62**	**100.0%**

Note 1: Reproduced from Latest emissions data on the EPA website (EPA, 2024)

Note 2: Other includes Petroleum refining, F-Gases and Waste (emissions from solid waste disposal on land, solid waste treatment (composting and anaerobic digestion), wastewater treatment, waste incineration and open burning of waste).

15.3.2 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 south-east of the site. Meteorological data recorded at Mullingar over the 30-year period is shown in Table 15.6. 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 15.6: 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
SUNSHINE (hours)													

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
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)													
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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
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

15.4 ASSESSMENT OF SIGNIFICANT CLIMATE EFFECTS

15.4.1 'Do-Nothing' Option

For further information on the 'Do-Nothing' Option see Chapter 2 Methodology Section 2.11.

In the context of climate impacts and the loss of the carbon sink potential of the land, it is noted that peat extraction activities at the Application Site were underway prior to the latest date for the transposition of the EIA Directive into Irish law in 1988. Therefore, for the purposes of the 'Do-Nothing' Option it is assumed that all peat extraction and ancillary activities ceased in 1988.

While peat extraction took place on site prior to 1988, the area which had been suject to peat extraction at the point of the commencement of the 'Do-Nothing' Option would be lesser than the area subject to extraction over the entire assessment period 1988 – 2019. If peat extraction and ancillary activities ceased from 1988 onwards, the potential direct negative effects from continued peat extraction on climate would have ceased. The historic extraction of peat from the Application Site resulted in the reduction of a carbon sink, and the emission of CO_2, CH_4 and N_2O. The negative effect on climate would have likely still continued once peat extraction ceased due to the loss of the carbon sink potential of the land. Rewetting of the land would have returned the carbon sink potential, however, to a lesser degree than the original untouched lands. Activities at the Application Site were not under IPC Licence control as of 1988, and therefore there was no requirement to implement Cutaway Bog Decommissioning and Rehabilitation Plans as per Condition 10 of IPC Licence Reg. P0504-01. Consequently, any climate benefits arising from the environmental stabilisation intended to be achieved through the implementation of these plans may not have arisen.

As part of Bord na Móna's statutory obligations under IPC Licence requirements, Cutaway Bog Decommissioning and Rehabilitation Plans will be implemented at the Application Site separately and independently of the substitute consent application. These Cutaway Bog Decommissioning and Rehabilitation Plans are provided in Appendix 4-3. The impact to climate associated with the implementation of the rehabilitation plans is included in the impact assessment below.

15.4.2 Peat Extraction Phase (1988–2019)

As per research conducted, 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 is present on the 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 have reduced 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 15.2.8 the CO_2 emissions associated with the peat extraction over the period July 1988 – 2019 were calculated. In total 8,494,606 tCO_2 were released over the July 1988 – 2019 period (see Appendix 15.1). Over the 31-year period between July 1988 and 2019, there was on average 274,149 tonnes of CO_2 per annum released from the Application Site. Annually this equates to 0.84% of Ireland's non-ETS 2030

target of 33,381 $KtCO_2e$ (as set out in *Commission Implementing Decision (EU) 2020/2126 of 16 December 2020 on setting out the annual emission allocations of the Member States for the period from 2021 to 2030 pursuant to Regulation (EU) 2018/842 of the European Parliament and of the Council*).

There was also the potential for GHG emissions associated with vehicles accessing the Application Site. 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 15.1 and Table 15.2). GHG emissions from vehicles, in general, would have reduced as engine technologies and fuels improved over the 1988 – 2019 period. However, the primary source of GHG emissions throughout the Peat Extraction Phase was the removal of peat and the subsequent loss of carbon sink.

The removal of the carbon store of the site and the subsequent release of CO_2 from peat extraction activities resulted in a long-term, direct, negative and significant impact to climate.

15.4.3 Current Phase (July 2019 – Present Day)

As all peat extraction has ceased since July 2019, carbon losses associated with peat extraction and the subsequent impact to climate are not relevant to this phase. During the Current Phase (July 2019 to present day), the activity on site is limited to decommissioning and rehabilitation works (see Section 4.9 of Chapter 4). There may be some minor vehicle emissions, such as CO_2, associated with the movement of vehicles during the Current Phase which may impact climate. However, as per Chapter 14 Traffic & Transportation, there will be minimal traffic during the Current Phase. Therefore, no significant impact to climate in relation to Ireland's climate budgets and sectoral emissions ceilings (Table 15.1 and Table 15.2) is predicted as a result of vehicle emissions. Impacts are short-term, imperceptible and neutral in relation to climate.

15.4.4 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. (2012) as discussed in Section 15.2.4 has indicated that rehabilitation of peatlands can mitigate the carbon emitted as part of the historic peat extraction. However, the remediated carbon sink potential of the land as a result of re-wetting is not equivalent to the original sink potential prior to the removal of peat from 1988. The purpose of the Remedial Phase of the Application Site is in line with a number of key actions and priorities within the CAP24 in relation to the rehabilitation of peatlands, specifically those within the midlands area. With the enhancement 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. The impact to climate is considered long-term, neutral and not significant.

15.4.5 Risk of Major Accidents and Natural Disaster

There is no historical record of any significant major accidents or disasters in relation to climate at the Application Site. The Current Phase and Remedial Phase are not predicted to result in any climate related accidents or disasters due to the minor level of works involved, when compared to the historic peat extraction and the nature of the works required.

15.4.6 Cumulative and Indirect Impacts

The IEMA 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 the historic peat extraction 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.

15.5 CONTROL AND MONITORING MEASURES

There were no specific control measures implemented with respect to climate during the Peat Extraction Phase at the Application Site.

15.6 RESIDUAL EFFECTS

15.6.1 Peat Extraction Phase (1988–2019)

Historic peat extraction resulted in emissions of CO_2 and other GHGs as well as the removal of a carbon sink. The impact to climate as a result of this is considered direct, long-term, negative and significant.

15.6.2 Current Phase (July 2019 – Present Day)

There are no carbon losses associated with peat removal on-site during the Current Phase as peat extraction has ceased. The impact to climate is short-term, imperceptible and neutral.

15.6.3 Remedial Phase

The primary focus of the rehabilitation plans is re-wetting the bogs which will aid in restoring the carbon store function and promote the carbon sink potential of the land. 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. The impact to climate is considered long-term, neutral and not significant.

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www.tobin.ie

TOBIN Consulting Engineers

@tobinengineers

Galway
Fairgreen House,
Fairgreen Road,
Galway,
H91 AXK8,
Ireland.
Tel: +353 (0)91 565 211

Dublin
Block 10-4,
Blanchardstown Corporate Park,
Dublin 15,
D15 X98N,
Ireland.
Tel: +353 (0)1 803 0406

Castlebar
Market Square,
Castlebar,
Mayo,
F23 Y427,
Ireland.
Tel: +353 (0)94 902 1401

Limerick
Unit 4, Crescent Court,
St Nessan's Road, Dooradoyle,
Limerick
V94V298
Ireland
Tel: +353 (0)61 976 262

Sligo
First Floor,
Carroll House,
15/16 Stephen Street
Co Sligo
Tel: +353 (0)71 9318 844